

# SongMeter (SM2) Maintenance Protocol

Bioacoustic Unit

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## Bioacoustic Unit

The Bioacoustic Unit (BU) is a partnership between the Alberta Biodiversity Monitoring Institute (ABMI) and the University of Alberta. The BU is a full-service organization that provides everything a client requires for wildlife acoustic studies. We provide advice, supply standardized protocols, provide equipment, conduct fieldwork, process audio recordings, and report on the results. Our team is actively conducting leading-edge research to improve methods and to understand acoustic wildlife communities better.

The recording equipment typically used for BU studies are manufactured either by Wildlife Acoustics (Song Meters SM2+ or SM3, [www.wildlifeacoustics.com](http://www.wildlifeacoustics.com)) or River Forks ([www.riverforks.com](http://www.riverforks.com)).

Clients regularly collaborate with us to assist with their wildlife monitoring needs. Our involvement varies from client to client and spans the full range of services from simply providing information to conducting a full research project on their behalf.

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- Database access, protocols, data management, ARU maintenance and setup

## Protocol Overview

The Autonomous Recording Units (ARUs) used for remote monitoring should be fully checked over at least once every year. There are a number of sources of potential problems. These are:

- Physical damage to the unit
- Recording problems
- Microphone damage or breakage
- Memory card issues

Before deployment, the timer batteries should be checked, the firmware updated and the correct setting file loaded. The following sections will walk you through how to check one specific type of ARU, the Song Meter SM2, made by Wildlife Acoustics.

The best time to give an ARU a full once-over is after the field season is over and before storing it for the winter. That way, broken units can be identified and sent for repair so that they are returned before being needed in the spring (or the next deployment). We recommend reviewing the manual provided by Wildlife Acoustics along with following the instructions provided by this protocol.

The BU\_SM2\_ARU\_Checklist in Appendix I can be printed off and used to keep track of inspection for each individual ARU. It is divided into two sections: Post-Field Season Checklist and Pre-Deployment Checklist. This protocol will explain how to check whether units are intact or damaged and whether they need to be sent to the factory for repair.

## Physical Check Exterior

### 1.1 Tools for ARU maintenance

Maintenance of SM2 units will require the following tools and items (Figure 1):

- SD card
- Batteries (these may still be in the unit from the field)
- Snap ring pliers (for removing and replacing windscreens on microphones)
- Pulse load battery tester (good to check batteries when removing them from units and for testing timer batteries)
- Spare wind screens
- Spare lid screws
- Spare hex nuts for attaching microphone ports
- Extech 407744 Sound Level calibrator and adapter to reduce tone to 70 dB
- Screwdriver to open lids and tighten bracket screws.



Figure 1: Tools for SM2 maintenance.

## 1.2 Going through the checklist

**Brackets:** Check that the metal brackets are not bent and that they are securely attached. If brackets are bent, remove them and straighten them. If straightening the brackets is not possible, replace the bent bracket with a new one. If the screws holding brackets are loose, use a screwdriver and a small wrench to tighten them (hand tighten only) once you have opened the lid of the unit.

**Left and Right Microphone Ports:** make sure all microphone/power ports are intact, if they are loose you can finger tighten the hex nut to re-secure the port. If this does not work, a closer look from the inside will be needed.

**Pressure Vent:** Check to see if the pressure vent and cable port are damaged, If the pressure vent is damaged you may be able to repair it yourself. If the cable port is damaged you will have to send it in for repair. The pressure vent can be replaced with a new one, the nut on the back of the vent has a flat side and a bevel side. Make sure you put the flat side against the housing and tighten it enough to slightly compress the O-ring but not much more.

**Cable Port:** Check that the cable port is intact. The most frequently found damage is from rodents chewing holes in the port. This makes it possible for water to get into the unit. Units with damaged cable ports should be sent to the company for repair.

**Lid screws:** Check that the Lid screws are not worn out or stripped. Lid screws should be replaced if they can barely be turned with a screwdriver. Use a pair of pliers to pull the metal O-ring off of the original screw, insert the new screw into the lid, then push that metal ring onto your replacement screw. New screws are available for purchase from Wildlife Acoustics.

**Seal on lid:** While taking off the lid, check the gasket seal around the edge to ensure there is still a water-tight seal.

## Physical Check Interior

There are multiple internal components that require checking (Figure 2 to Figure 5), including the following:

**Battery Compartment:** Check that the battery compartment is attached and secure. If the screws are loose and hard to tighten, a plastic washer can be used to keep the screw from pulling through. Now is a good time to put in batteries if there are none in it yet. If the unit will not turn on, your first step should be to check if both battery terminals are in contact with their receivers. Rotating the batteries in place can also help.

**Motherboard:** Check that the motherboard is not damaged in anyway (no cracks, no pieces broken off). If there is any damage, the unit should be sent for repair.

**Screen:** When turning on the unit, check that the screen displays all information correctly. Send the unit for repair if any parts of the screen are not working.

**Time and Date:** Check that the time and date are correct. If not, correct the time. This needs to be checked again before deployment.

**SD card slots:** Put cards in all 4 slots while the unit is on and check that the unit reads the cards correctly and that the cards click into place securely. If any of the slots do not work, the unit should be sent for repair.

**Buttons:** Make sure that all buttons respond to being pressed. If any consistently do not respond, the unit needs to be repaired.

**Switches:** Make sure that the white switches are configured correctly. The correct configuration for all standard recording schedules is:

- Row 1: On
- Row 2: On
- Row 3: Off
- Row 4: On
- Row 5: Off
- Row 6: Off
- Row 7: On
- Row 8: Off
- Row 9: Off

**GPS chip:** If you have a GPS enabled AM2 unit, take it outside and make sure that it is able to track satellites and find a location. Also check that the GPS daughter chip under the motherboards is securely attached. If not, re-insert the pins into the motherboard. Placing a piece of foam between the chip and the housing helps to keep the chip in place. If this does not repair the unit, discuss the issues with Wildlife Acoustics. They might need to assess it.

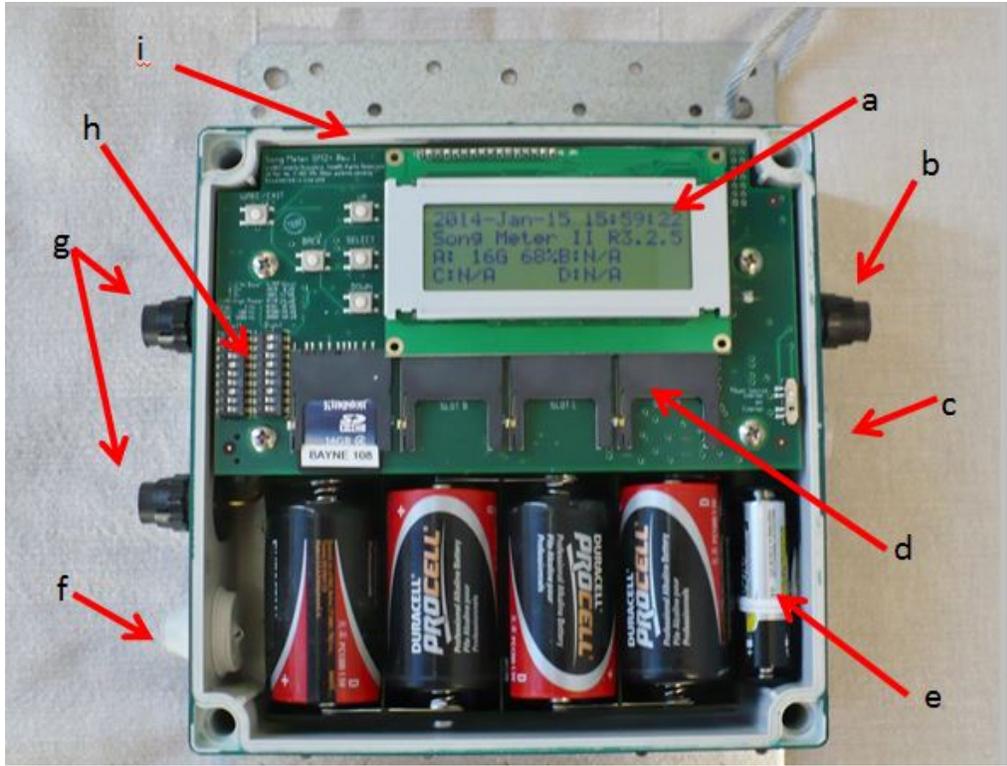


Figure 2: Check the following: a) Date and time, b) Right microphone port, c) Pressure vent, d) SD card slots, e) Timer batteries, f) Cable port, g) Left side ports, h) Switches and buttons, and i) Gasket.

The following photos show some examples of physical problems.

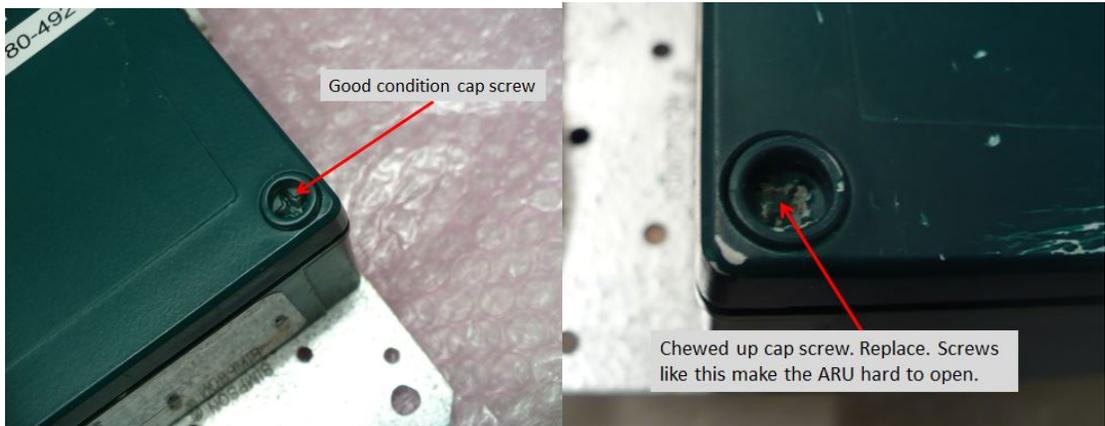


Figure 3: Examples of caps screws in good condition (left) and damaged condition (right).



Missing hex nut on microphone port. This needs to be replaced to keep dirt and water out.



Loose hex nut on microphone port. Hold port with one hand and tighten nut with other hand.

Figure 4: Examples of missing (left) and loose (right) hex nuts.



Damaged seal on cable port. This ARU is no longer waterproof and the electronics will get damaged if this is not repaired. Return to Wildlife Acoustics for repair.

Figure 5: Example of a damage seal on the cable port.

## Recording Check

One of the most important things to check is that an ARU is recording correctly in both channels. This means recording at an adequate volume (gain) and at an even gain between both the right and the left channel. Recording issues can be caused by either damage to the unit or to the microphones. Both issues can be checked by doing test recordings.

### 1.3 Recording Test: Field Version

Recording tests should always be done in the quietest environment possible. Loud sounds like motors or having a louder sound on one side of the room than the other will make testing the recording quality of an ARU difficult. The following instructions are the simplest way to test if an ARU is recording and whether there are problems with one or both microphones (see Figure 6 and Figure 7).

1. Put a memory card in slot A
2. Put batteries in the unit and turn the power on. (In older models the memory card can get in the way of the batteries, and the batteries must be put in first).
3. The LCD screen should show that the unit is waking up and display the date, time, firmware version and the status of the SD cards
4. Use WAV format for the test recording so that you don't have to convert the files to look at them (see Appendix II for instructions on how to set the file format).
5. Do a test recording: manually initiate recording by pressing the UP and DOWN buttons at the same time. Once the unit is recording, press the SELECT button to toggle to the screen showing the gain levels. The gain bars (stars) and numbers should be similar for both channels, as they are just recording the ambient noise in the room and one microphone is not closer to any sound source than another. If the left or right side is consistently higher, this could indicate an imbalance in the channel or the microphones.
6. Test the responsiveness of the microphones by talking to the recorder. The stars and number should change with the volume of the voice. Talking into the left or right microphone should cause them to peak on that side.
7. Stop the test recording by pressing the BACK button.
8. Switch left microphone to the right and the right to the left and do a second recording. If the microphones are unbalanced, the channel that is higher or lower will be opposite that of the first test. If there is a problem with the unit itself, switching the microphones will not have an effect.



Figure 6: Test recording showing balanced left and right channels. Both the number of stars on the left and the dB numbers on the right are equal.

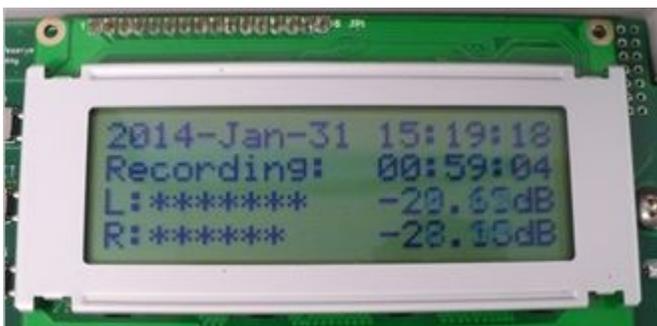


Figure 7: Test recording showing unbalanced channels. Only be concerned if one channel is consistently more 4 dB different from the other. Always switch microphones to opposite channels and redo the test recording. If the side

that is higher switches when you switch the microphones, it is a microphone issue. If the side that is higher stays the same after switching microphones, it is a unit issue. Contact Wildlife Acoustics if you have any concerns.

## 1.4 Recording Test: Office Version

The Field Version of the Recording test (Section 1.3) is generally sufficient and will reveal most issues. If you have access to software such as Audacity or Adobe Audition, you can take the test recordings and view them on your computer to detect issues (see Figure 8 through Figure 11 for examples). Audacity is available free online (<http://audacityteam.org/>).

1. Take out the SD card and save the recordings to a folder labelled with the serial number of the unit.
2. Look at the recording on sound software such as Audacity that allows you to see both the waveform and spectrogram displays. The waveform should show the same amplitude (dB) on both sides except for when exposed to directional sounds such as talking into the left and right microphones separately. The spectrogram display should show the same amount of background static for each side and this should be similar between recorders. Any substantial differences from the averages indicate an issue with the microphone connection or the wiring or switches.
3. If you have any doubt about whether a unit is recording evenly, you can send the test recording to Wildlife Acoustics and let them look at it.



Figure 8: Example of a good recording seen in waveform view in recording software. Both sides (channels) are the same indicating that there are not differences. This means that all wiring, microphones and switches are working and correctly configured.

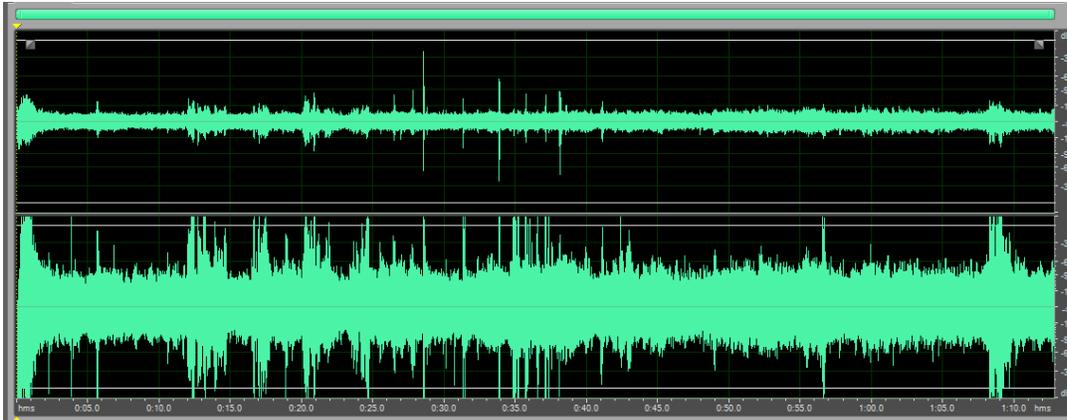


Figure 9: Example of a problem recording. Waveform view of a recording with a left channel issue (the top waveform). This also may be detected by looking at the gain levels. This issue may be caused by microphone issues, wiring issues or incorrect switch configuration.

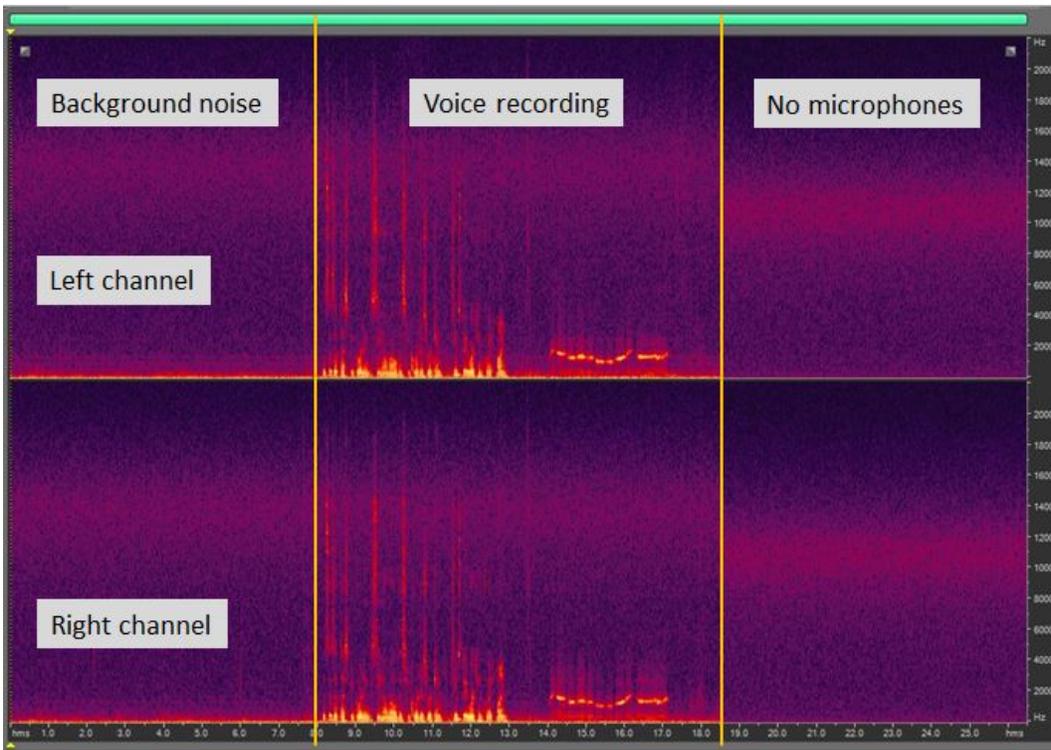


Figure 10: Example of a good recording showing an even amount of background noise and a clear recording of a human voice.

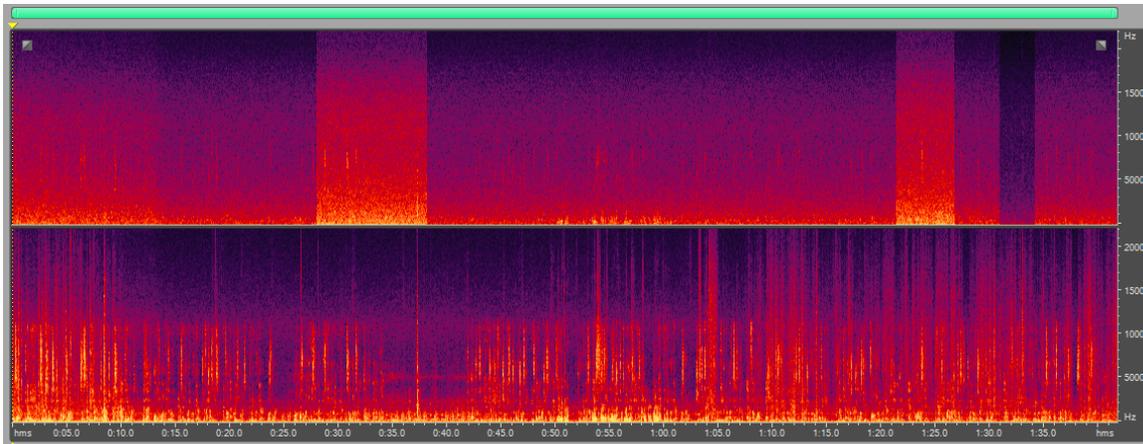


Figure 11: Example of a problem spectrogram showing a recording with a left channel issue (the top spectrogram in the panel). Note that the left channel is recording (top) but looks very different from the right channel (bottom panel).

## 1.5 Recording Test using Calibrator

To get accurate measurements of the ARU recording ability, use a standardized set of microphones (ones that have already been tested using a calibrator to read -12.3 Db and be within <1.0 dB of each other) to check the left and right channels. Use the same set of microphones to test all units so that any variation in results is due to unit differences and not to microphone differences.

1. Put one microphone on each side (wind screen removed).
2. Initiate a test recording
3. Gently slide the tube of the calibrator adaptor over the microphone.
4. Play the calibration tone (70 dB) on each side separately and record the number of stars and the reading in dB. The test tone should give a very stable dB reading.
5. Record all dB values in a spread sheet or in a database and look for outliers or channels where there was no response to the test tone. Consider sending units for repair if there is difference between channels

Please refer to the *BU\_Calibration\_Methods\_2015* document for more details on microphone calibration and how to interpret the results.

## Testing Microphones

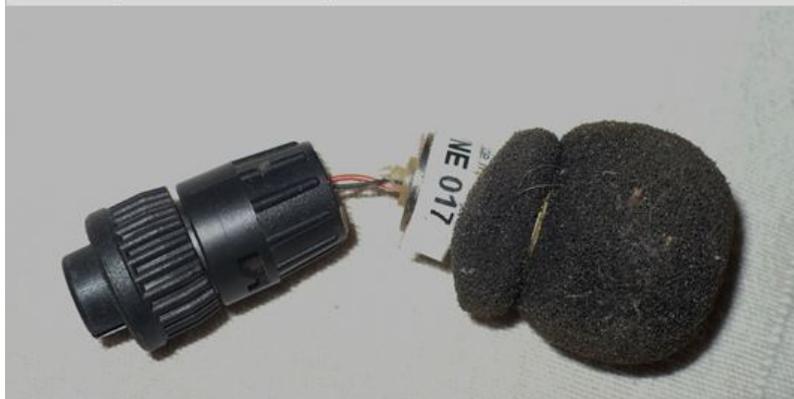
Over time the Song Meter microphones will wear out or become damaged (Figure 12). It is very important to use microphones that record evenly on both channels of the same unit and between channels so that we can use the stereo recordings to help us identify how many birds are on a recording. First, inspect the microphones for physical damage. If the windscreen (black foamy part at the end) is damaged, the microphone is likely still good but the windscreen should be replaced. Windscreens normally fade from black to brown from exposure to the sunlight. This is not a problem as long as there are no holes in the screen and the foam is not brittle. If the wiring in the microphone is damaged from wildlife chewing on them, you will have to replace the microphones.



a. Damaged windscreen. Replace windscreen and test microphone.



b. Damaged windscreen. Replace windscreen and test microphone.



c. Broken microphone. Salvage windscreen and discard. Buy new microphone.

Figure 12: Examples of damaged microphones and windscreens.

## 1.6 Testing Microphones: Field Method

Basic testing of the microphones can be done using the same method as for the Song Meters. This time, use one Song Meter that is known to be functioning correctly and use it to test all the microphones. First, do a test recording with one microphone on the left and another microphone on the right. Then switch them around and do a second test recording. Compare the channels to each other to see if the microphones are the same or different. If they do not make a clear recording, they should be replaced. The more rigorous testing explained below should be used whenever possible.

## 1.7 Testing Microphones with Calibrator

All microphones should be tested before they go into the field so that non-functional and below par microphones can be removed. To do this take one SM2 unit that is working correctly, attach a short cable to one port and measure all the microphones using the same channel on the same unit. The cable functions to ensure we do not wear out the mic port by repeatedly plugging in and removing microphones any more than necessary.

1. Take windscreen off microphone (Figure 13)
2. Attach microphone to SM2 unit (Figure 14)
3. Initiate test recording
4. Put the calibrator over the end of the microphone.
5. Play a 70dB test tone into the microphone (Figure 15)
6. Read and record the gain values in both number of stars and dB values
7. Assess the values once all microphones have been tested and remove/discard the microphones that recorded below expected values.

Correspondence with Wildlife Acoustics indicates that with a 70dB test tone we should be getting values around -12 dB +/- 4 dB. Values below -18 are definitely out of the expected range. The Bioacoustic Unit uses only those microphones that are +/- 2 dB (most microphones fall into this range). Microphones that are +/-3 dB are kept as spares. Microphones recording in the +/-4 dB range are not used.



Figure 13: Using snap ring pliers to remove a microphone windscreen.



Figure 14: Using a cable to attach microphones to an ARU for testing. The cable is only used when multiple microphones need to be tested because this takes stress off the microphone port on the ARU.



Figure 15: Extech calibrators. The upper one has a custom built adapter to reduce the test tone to 70 dB SPL.

## Pre-deployment Setup

### 1.8 Upgrading Firmware SM2

Upgrading the firmware is best done just before deployment so that units go out with the latest firmware loaded. Keeping firmware up-to-date is important since Wildlife Acoustics continues to provide updates to remedy existing bugs or to add new functions.

Go to the Wildlife Acoustics website (<http://www.wildlifeacoustics.com/>) and follow these instructions (from their website):

1. Download the most recent firmware file (e.g. SYS3 3 1.SM2).
2. Copy this file to the top level directory of an SD card.
3. Insert the flash memory card into Slot A of the SM2.
4. Press and release the "Reset" button (for SM2) or turn on power switch (for SM2+, NOT THE WAKE/EXIT BUTTON) while pressing the "Up" button. Continue holding the "Up" button until you see the message "Song Meter II Boot".
5. A list of available .SM2 files will be displayed. Use the "Up" and "Down" buttons to scroll to the desired firmware file and press "Select". You should see the following messages:  
Upgrading... Upgrading Complete! Press Reset to Boot
6. Press the "Reset" (for SM2) or turn power off and on (for SM2+) to reboot the SM2 with the new firmware.
7. Repeat steps 3 through 6 for any other SM2s you wish to upgrade.

## 1.9 Changing Timer Batteries SM2

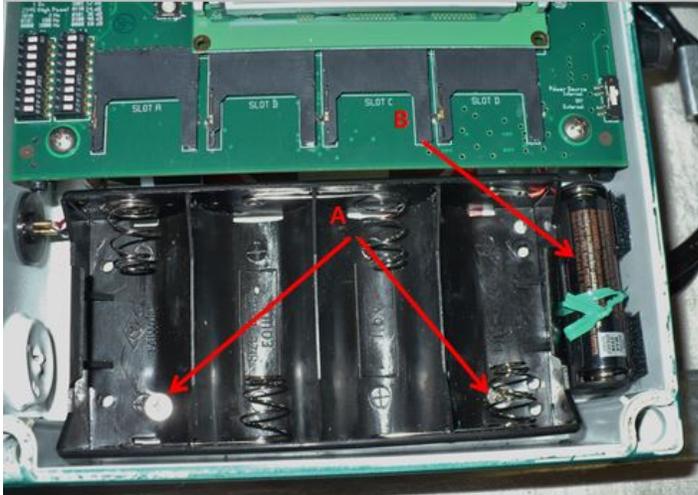
Timer batteries (Figure 16) should be checked within 1 month of deployment to ensure that they have enough power for the upcoming field season. The timer batteries (AA) keep the internal clock running so that the Song Meter keeps time even when it is fully turned off. Run down or disconnected timer batteries result in a number of problems. A unit with dead timer batteries may not keep time or put the correct time stamp on recordings.

One set of AA batteries will last approximately 2 years in SM2 models. You can use a pulse load battery tester to check the remaining battery voltage. At the Bioacoustic Unit, we replace timer batteries at the beginning of the year if they measure 40% or lower. These partially depleted batteries can still be used for cameras or GPS units if desired and practical.

To change the timer batteries, simply pull the small timer battery compartment away from the side of the ARU where it is attached with Velcro. Undo the twist tie (Figure 16), remove the old batteries and replace them with fresh AA batteries. Use professional grade batteries such as Energizer Industrial or Duracell Procell which last longer. Replace the twist tie before reattaching the battery compartment to the Velcro. If the twist tie is not in place, then the batteries may come loose during transport and the unit will not keep time.

Note that when you are changing the timer batteries, if you have 4 D cell batteries in the unit at the same time, the time and date will not reset to their default setting.

If you are unable to get the small timer batter compartment out, slide an thin card (like an credit card or piece of ID) between the Velcro and the timer batteries will come out easily.



Batteries: A) screws that hold D-cell compartment in place.  
B) timer battery compartment with green twist tie.

Figure 16: Location of timer batteries.

## Speed Testing Memory Cards (Optional)

As memory cards are used over and over (data is written to the cards and deleted over time) they start to work more slowly. Eventually worn out cards will not be able to write data fast enough. This will result in “skips” where there are distorted and blank parts on the recordings. Such skips are lost data and, if very severe, will mean that data is useless and cannot be analyzed. Memory cards should be tested at purchase and, ideally, before every use. Memory cards that fail speed tests should no longer be used in ARU deployments. If you have any questions about speed test results, please contact Wildlife Acoustics and ask them for advice.

Song Meters conveniently have a “speed test” function (Figure 17 to Figure 20) that measure how quickly data can be written on a memory card at different sample rates.

- Put the SD card in Slot A.
- Navigate to the utilities menu.
- Scroll down to Speed Test A and press select.
- Wait for the test to run.
- Compare results to Figures 1 and 2
- Take a picture of the screen and save it with the SD card number (optional).

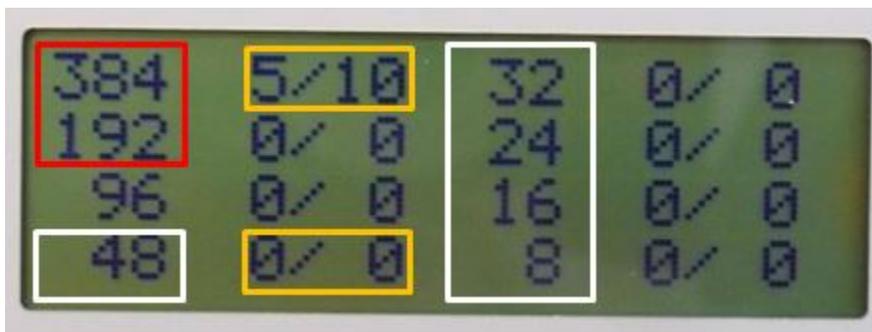


Figure 17: Details of speed test results for a Class 4 card. The column on the left (red and white boxes) refers to different sample rates. Bats are sampled at 384 and 192. Birds are commonly sampled at 44.1 (just below 48). The right columns show the error rate (yellow boxes). The first number is the seconds to the first skip and the second number is the number of seconds to the second skip. 0/0 means that there are no skips at all and the card is all clear. A result of 5/10 indicates that 5 seconds to the first skip and 1- to the second skip and that the issue is likely re-occurring. A result of 1/0 is still OK to use for birds because it indicates that there is only one skip at the beginning of the recording and it is clear after that. Ideally, memory cards used for birds should be all clear up to a sample rate of 48. Bats need to be all clear up to 192 and 384 since they are only sampled at these high rates. Triggered bat recordings should be done only with cards that show all clear for all sample rates.

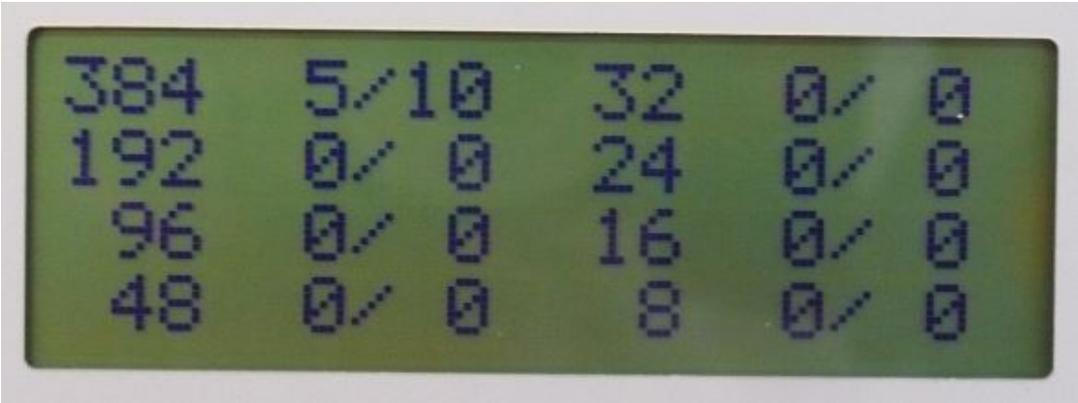


Figure 18: Example of a good test result for a Class 4 SD card. The 5/10 results is not an issue because bird are never recorded at that high a sample rate.

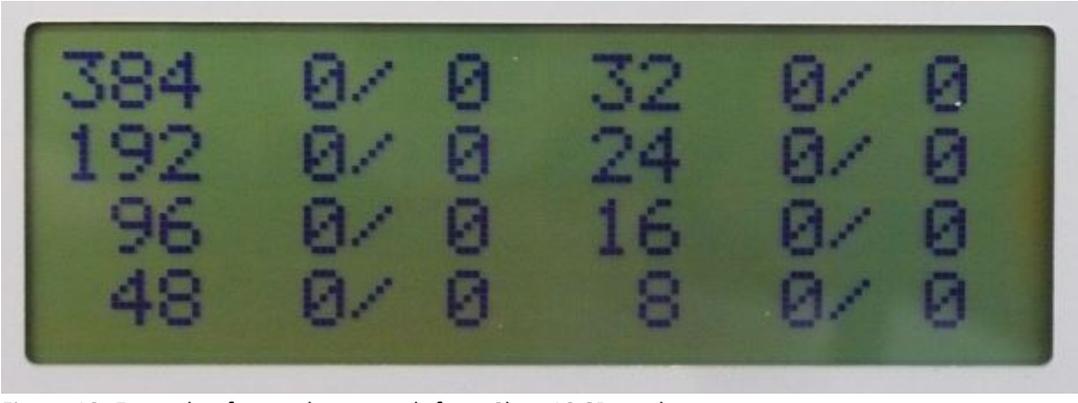


Figure 19: Example of a good test result for a Class 10 SD card.

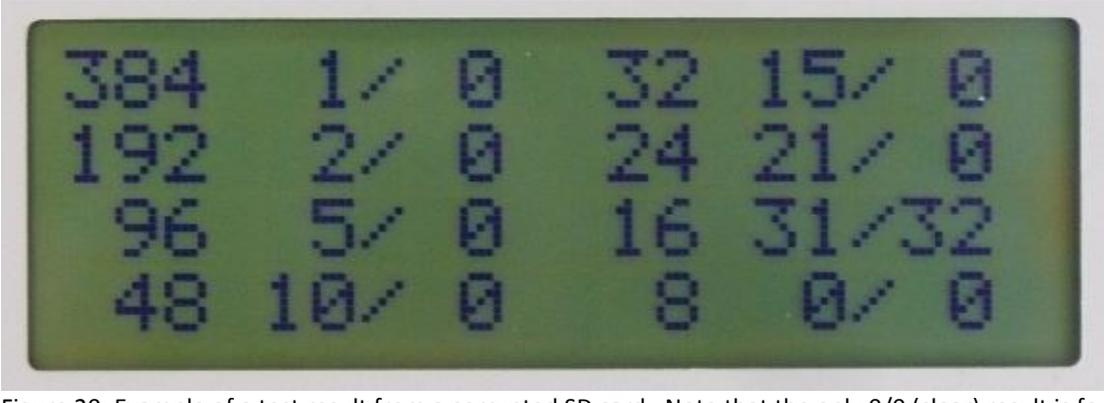


Figure 20: Example of a test result from a corrupted SD card. Note that the only 0/0 (clear) result is for the lowest Sample Rate. All other Sample rates are showing errors. If you get this result, the SD card should not be used for ARU recordings anymore.

## ARU Repairs SM2

There are a number of physical issues that can be repaired very easily. If there is a problem with the wiring, send a picture of the problem to Wildlife Acoustics and ask whether you can fix it or if you should send it back to them.

**Worn out lid screws:** remove the worn out screw and replace with a new screw. Sets of lid screws are available from Wildlife Acoustics.

**Loose hex nut on microphone port:** hold the microphone port in one hand and tighten the hex nut with the other. As long as this results in a firmly attached microphone port AND the microphone on that side records correctly (see doing a test recording), everything is OK. If the microphone port is still loose and/or there are recording issues on that channel, the wiring is damaged and the unit should be returned to Wildlife Acoustics for repairs.

**Damaged Windscreen:** get replacement windscreen from Wildlife Acoustics and replace the damaged ones. You will need a pair of snap-ring pliers to open and close the small clip that holds the windscreens on.

## Appendix I: Datasheet Examples

Table 1. ARU maintenance datasheet sample

Owner	ARU ID	Serial Number	Test #	Mic Left	Mic Right	Gain left (stars)	Gain right (Stars)	Gain left (#)	Gain right (#)	Current Time	Time corrected	Current Firmware	Updated Firmware	Physical Issues	Comments
EMCLA	2	8279	1	E158	E155	7	7.5	-21	-19	6+	yes	R3.2.4	R3.3.1		
			2	E155	E158	6	8	-21	-17						
EMCLA	7	8288	1	E158	E155	7	7	-21	-19	4-	yes	R3.2.4	R3.3.1		
			2	E155	E158	6	7	-27	-18						
EMCLA	5	8266	1	E158	E155	7	7	-21	-20	6+	yes	R3.2.5	R3.3.1		
			2	E155	E158	7	7	-22	-19						
EMCLA	8	8286	1	E158	E155	7	8	-23	-16	2-	no	R3.2.5	R3.3.1	SD slot d broken and unusable	
			2	E155	E158	7	8	-21	-17						
EMCLA	6	8292	1	E158	E155	7	7	-21	-22	6+	yes	R3.2.5	R3.3.1		
			2	E155	E158	7	7	-21	-19						
EMCLA	1	8269	1	E158	E155	6.5	7.5	-23	-17	5+	yes	R3.2.5	R3.3.1		
			2	E155	E158	7	7	-21	-19						
EMCLA	9	8289	1	E158	E155	7	8	-21	-17	2+	yes	R3.2.5	R3.3.1		
			2	E155	E158	6	7	-26	-19						
EMCLA	3	8270	1	E158	E155	7	7	-19	-21	6+	yes	R3.2.4	R3.3.1		
			2	E155	E158	7	6	-17	-19						
EMCLA	15	8317	1	E158	E155	6	6.5	-27	-22	1-	yes	R3.2.5	R3.3.1		
			2	E155	E158	6	6.5	-32	-25						

Table 2. Microphone maintenance datasheet sample

Owner	#	Inventory	Gain (Stars)	Gain (#)	Condition	Outcome	Comments
EMCLA	1	1	7	-21	good		
EMCLA	2	1	7	-23	good		
EMCLA	3	1	7	-22	good		
EMCLA	4	1	7	21	good		
EMCLA	5	1	6	-24	good		
EMCLA	6	2			missing in field	Buy replacement	
EMCLA	7	1	7.5	-19	good		
EMCLA	8	1	6.5	-20	good		
EMCLA	9	3	7	-21	wind screen chewed	replace windscre	
EMCLA	10	3	7	-23	wind screen chewed	replace windscre	
EMCLA	11	1	7	-22	good		

Table 3. Memory card maintenance datasheet sample (showing for Class 4 cards for bird recording).

Card #	384 kHz	192 kHz	96 kHz	48 kHz	32 kHz	24 kHz	16 kHz	8 kHz	Result
7	0	0	0	0	0	0	0	0	Pass
222	0	0	0	0	0	0	0	0	Pass
8	1/0	1/0	1/0	1/0	1/0	0	0	0	Pass
138	1/0	1/0	1/0	1/0	1/0	0	0	0	Pass
314	1/0	1/0	1/0	1/0	1/0	0	0	0	Pass
143	1/3	5/10	3/0	23/12	23/45	1/0	0	0	Fail

## Appendix II: Navigating the Song Meter Menu

This section will provide brief instructions on how to navigate to some of the menu locations. Also read the manual that come with the Song Meters for information on how to operate the Song Meters. These instructions are written for staff that are already familiar with the basic use of the Song Meters.

### 1.10 How to download the SET file from a Song Meter SM2

Knowing how to do this is useful if you are trying to save a Setting file from a unit, either to keep it on file or to transfer it to other units.

1. Put an SD card in Slot A
2. Navigate to the utilities menu.
3. Select "SAVE A:SONGMETER SET"
4. This saves a copy of the settings of an existing unit to Slot A
5. Save the SET file to your computer
6. Label the SET file with the unit number and serial number.

### 1.11 How to change recording from WAC to WAV format and back again

It is easier to do test recordings in WAV format because most acoustic software can read WAV files but is unable to open the compressed WAC files that wildlife acoustics uses. When doing a test recording, is sometime convenient to switch the Song Meter to WAV recording format and then back to WAC once you are done.

Switching to WAV format

- Press SELECT button
- Select "SETTING" on the menu
- Select "AUDIO" from the menu
- Toggle down to "FILE FORMAT" and press SELECT button
- Toggle down to the option called "WAV" and press SELECT button
- Use BACK button to navigate back to start up screen

Switching back to WAC format

- Press SELECT button
- Select "SETTING" on the menu
- Select "AUDIO" from the menu
- Toggle down to "FILE FORMAT" and press SELECT button
- Toggle up to the option called "WAC0" and press SELECT button

Use BACK button to navigate back to start up screen

# ARU Check list (for SM2 model Song Meters)

UNIT # \_\_\_\_\_

Serial # \_\_\_\_\_

Owned by: \_\_\_\_\_

## Post-Field Season Checklist:

\*Code "Damaged" as 1 (can be repaired in house) or 2 (needs to be sent to Wildlife Acoustics).

Only "Describe" if damaged.

Exterior Check	Good	Damaged	Describe
Brackets	_____	_____	(Replaced?) _____
Left Mic Port	_____	_____	_____
Right Mic Port	_____	_____	_____
Pressure Vent	_____	_____	_____
Cable Port	_____	_____	_____
Lid Screws	_____	_____	(Replaced?) _____
Seal on Lid	_____	_____	_____
External Power Point	_____	_____	_____
Any major scratches on exterior?			_____

Interior Check	Good	Damaged	Describe
Battery Compartment	_____	_____	_____
Motherboard	_____	_____	_____
Screen	_____	_____	_____
SD Card Slots (All 4)	_____	_____	_____
Switches/Buttons (All)	_____	_____	_____
GPS Chip (for GPS units)	_____	_____	_____
Time and Date:	Correct	Incorrect	–days/hours/mins off: _____

Recording check: Calibrator ID: \_\_\_\_\_

Calibration Microphone ID: Left Mic \_\_\_\_\_ Right Mic \_\_\_\_\_

Without microphones:

Left Gain: \_\_\_\_\_ dB Right Gain: \_\_\_\_\_ dB

With Microphones: \*

Left Gain: \_\_\_\_\_ dB Right Gain: \_\_\_\_\_ dB

\* If dB reading is unbalanced by more than 1 dB, switch microphones are retry. Check microphones wiring if one channel is consistently off.

If this is a GPS Unit, check the receiver and cable. Test whether the unit can connect to satellites. Indicate any issues:

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Post field season check done by: \_\_\_\_\_ Date: \_\_\_\_\_

**Pre-deployment Checklist:**

Time and Date: Correct                      Incorrect –days/hours/mins off: \_\_\_\_\_

Firmware Updated to: \_\_\_\_\_ Date Updated \_\_\_\_\_

Have the timer batteries been replaced?    Yes    No    If yes please indicate date: \_\_\_\_\_

\*Replace if battery reads less than 60%

Settings File Loaded: Yes    No              Name of Settings File: \_\_\_\_\_

Pre-deployment check done by: \_\_\_\_\_ Date: \_\_\_\_\_