



# Song Meter User Manual

**Wildlife Acoustics, Inc.**

[www.wildlifeacoustics.com](http://www.wildlifeacoustics.com)

Firmware Version 1.9.0

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## **Prohibition against Eavesdropping**

United States law (Federal Communications Commission Part 15 Section 15.9) states “Except for the operations of law enforcement officers conducted under lawful authority, no person shall use, either directly or indirectly, a device operated pursuant to the provisions of this Part for the purpose of overhearing or recording the private conversations of others unless such use is authorized by all of the parties engaging in the conversation.”

You are responsible for complying with all applicable laws within your jurisdiction.

## **Electromagnetic Interference**

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

Changes or modifications not expressly approved by Wildlife Acoustics, Inc., could void the user's authority to operate the equipment.

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## Introduction

### Overview

# Introduction

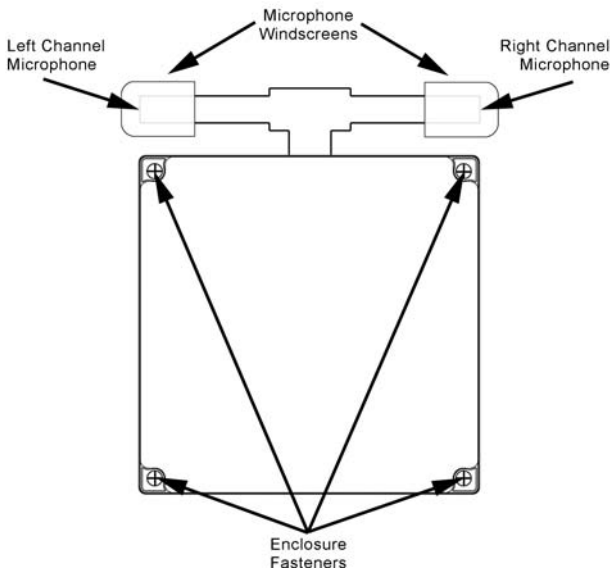
Song Meter™ is a cost-effective digital audio recorder specifically designed to monitor wildlife populations, such as birds and frogs, in harsh outdoor environments over extended periods of time.

You can program Song Meter to record automatically on a schedule. Song Meter has the battery life and memory capacity to record for almost 120 hours spread out through several weeks, or even months.

Song Meter recordings can also be analyzed automatically by Song Scope™ software, sold separately, to quickly locate species of interest. For more information, please visit our web-site at [www.wildlifeacoustics.com](http://www.wildlifeacoustics.com).

## Overview

The Song Meter SM1 and SM1-P come equipped with two built-in microphones as shown below, one for the left channel and one for the right channel.



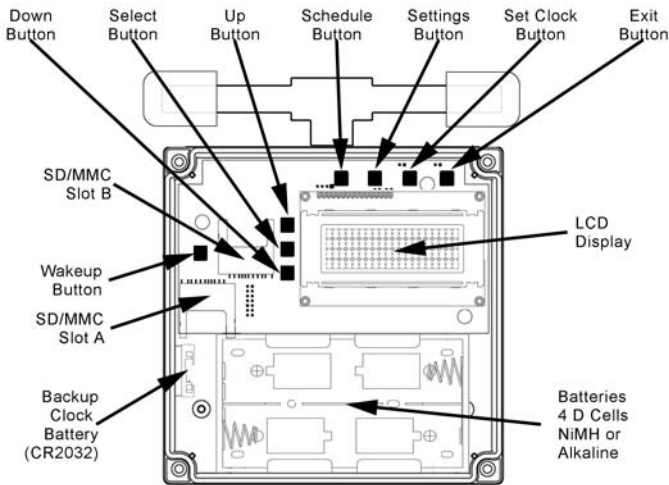
**Figure 1—Song Meter SM1 Enclosure**

The SM1-M and SM1-MP models do not have built-in microphones and instead come with two XLR microphone cables for external microphones not included.

You can program Song Meter to use both microphones for stereo recording, or just one microphone for mono recording. Each microphone has a removable foam windscreen used to protect the microphones and to reduce the sound of wind blowing across the microphone elements.

All of the Song Meter electronics, batteries, display and controls are mounted inside a weatherproof enclosure (rated IP66/67 and NEMA-4) to protect them from the elements, and are therefore inaccessible without removing the enclosure's cover. The cover can be removed by unscrewing the four plastic fasteners with a Phillips head screwdriver (counter-clockwise). If the Song Meter exterior is wet, we recommend that you first dry it off with a towel before removing the cover.

The following components of the Song Meter can be accessed when the cover is removed as shown in the figure below:



**Figure 2—Song Meter SM1 (Cover Removed)**

## Introduction

### Overview

## Main Batteries

The standard Song Meter SM1 product takes 4 “D” cells for power. These can be standard off-the-shelf Alkaline batteries or rechargeable NiMH batteries. Long-life “D” cell NiMH and Alkaline batteries have a capacity of 11,000 mAH (milliamp-hours). The SM1-P and SM1-MP models require an external 6V to 12V<sup>1</sup> DC power source (not included) instead.

Song Meter uses almost no current (<0.5mA) when “sleeping” between scheduled recording events so it can remain idle (not recording) for months at a time (noting that batteries will discharge on their own over time).

When recording, Song Meter draws between 115-145mA depending on sample rates and compression, and can therefore record 75-95 hours on a single charge. High quality alkaline batteries can typically deliver 14,000mAH for 95-120 hours of recording time. See “Managing Power and Memory Resources” on page 19 for more information.

## Backup Clock Battery

Song Meter makes use of a lithium CR2032 backup battery to maintain the clock function when the main batteries are discharged or disconnected. This lets the clock continue running when replacing batteries in the field so you don’t have to set the clock again.<sup>2</sup>

## SD/MMC Slot A and B

Song Meter supports standard off-the-shelf SD, SDHC, MMC, and MMC Plus flash memory cards<sup>3</sup> (using “SPI mode”) for storing

- 
1. Song Meter SM1-P before serial number 000503 and Song Meter SM1-MP before serial number 000578 do not have any source voltage protection. Voltages exceeding 6.5V or reverse polarity can cause permanent damage in these older Song Meters.
  2. It is possible for the backup battery feature to fail under certain conditions. You should therefore always verify the correct time after replacing batteries or reconnecting power.
  3. Some specific models of flash cards are incompatible with Song Meter. See <http://www.wildlifeacoustics.com/songmeter/flash.html> for details.

recordings as standard “.WAV” format files, or in a proprietary “.WAC” lossless compression format. Two slots (A and B) are provided for extra capacity. As of this writing, today’s SDHC cards are available in up to 32GB (32 billion bytes). With two slots, Song Meter has a capacity of at least 64GB, and more as higher capacity cards become available.

## **LCD Display**

A 4-row by 20-column LCD display is used for status and configuration.

## **Wake Up Button**

Song Meter normally sleeps until the next scheduled recording time arrives. In order to check or configure Song Meter, it must be woken up manually. Press and hold the Wake Up Button until the “SONG METER” banner appears on the display.

To put Song Meter back to sleep without recording, use the power down command from the selection menu. See “Power down” on page 18.

## **Exit Button**

Press the Exit Button to put Song Meter back to sleep until the next scheduled recording time arrives. Note that if the Exit Button is pressed during a scheduled recording period, the Song Meter will begin recording until the end of the current recording period before going to sleep to wait for the subsequent scheduled recording time.

Also note that if using the “advanced” scheduling mode, the schedule program will start from the beginning. See “Viewing or Changing the Advanced Recording Schedule” on page 25 for more details.

When Song Meter is awake and not recording, it will automatically exit after 5 minutes of inactivity.

## **Schedule Button**

Press the Schedule Button to create, view or change the Song Meter’s recording schedule.

## **Introduction**

### *Overview*

## **Settings Button**

Press the Settings Button to view or change the Song Meter's settings and to perform maintenance functions.

## **Set Clock Button**

Press the Set Clock Button to change the Song Meter's current date and time.

## **Up, Down and Select Buttons**

Use the Up, Down, and Select buttons to navigate Song Meter's menus. The Up and Down buttons are used to advance to the previous or next menu item or parameter value. The Select button is used to select the menu item or lock in the parameter value.

## **High-pass Filter Jumpers**

Two jumpers can be used to enable an optional high-pass analog filter with a cut-off frequency of approximately 160Hz. One jumper (for the right channel) can be found just above the "Exit Button" while the other jumper (for the left channel) can be found between the "Settings Button" and the "Set Clock Button". To disable the high-pass filter, a jumper should be installed so as to short the two header pins of the corresponding channel. To enable the high-pass filter, the jumper should be removed so as to leave an open circuit between the two header pins of the corresponding channel. The Song Meter comes with jumpers installed to disable the high-pass filter on both channels by default.

We recommend enabling the high-pass filters (by removing the two jumpers) to cut down on low frequency noise, unless you are trying to record species with low frequency vocalizations near or below 160Hz.

# Getting Started

## Removing and Replacing the Protective Cover

You must first remove the enclosure cover by unscrewing (counter clockwise) the four plastic fasteners located at each corner using a Phillips head screwdriver. If the Song Meter exterior is wet, we recommend that you first dry it off with a towel before removing the cover.

When replacing the cover, be sure that the lip of the cover and the mating gasket around the edge of the enclosure are clean and free of debris (e.g. vegetation) to ensure a water-tight seal.

**Do not over-tighten the fasteners!** If the fasteners are too tight, the knife-edge of the cover can warp slightly reducing the effectiveness of the gasket seal. Additionally, there is some risk of stripping the threads.

Instead, gently tighten the fasteners until the plastic on the cover just meets the plastic on the enclosure at the corners. Continue to tighten a generous 1/8th turn more. This is equivalent to approximately 9.0 inch-pounds or 1.0 newton-meters of torque.

In cold environments, it is best to seal the cover outdoors with the cold dry air to avoid condensation from forming inside the sealed enclosure. In very humid (e.g. tropical) environments, we recommend sealing the Song Meter with a silica gel desiccant to dry out the air inside the enclosure to avoid condensation.

## Mounting the Song Meter

You may wish to mount the Song Meter to a tree, post or other fixed object. With the cover removed, you can drop M4 or #6 screws into any of the four holes used for mounting the cover. The tips of the screws will emerge through holes in the back of the Song Meter and can be screwed into the fixed object. When the cover is replaced, the plastic cover fasteners will cover the heads of the mounting screws. We recommend either using two #6 one inch wood screws placed in the top and bottom holes on either the left or right side to screw directly into a tree. Alternatively, two #6 one inch machine screws can be used and paired with wing nuts to attach the Song Meter to a wire cable.

## Getting Started

### *Installing Flash Cards*

## Installing Flash Cards

You must install at least one flash card in order for Song Meter to make and store recordings. You may install a second flash card for additional storage capacity. If using only one flash card, we recommend you insert the card in Slot A as this is required for some features.

Song Meter supports SD, SDHC, MMC and MMC Plus cards in “SPI mode”.

Some specific models of flash cards will not work properly with Song Meter because they are unable to keep up with audio sampling rates. This results in unusable recordings that sound distorted and choppy. Unfortunately, the published speed ratings of flash cards do not correspond to the “SPI mode” interface and are therefore unhelpful in selecting compatible cards.

Additionally, some specific models of flash cards are not designed to function properly in a multi-card system such as Song Meter. These cards may only operate in Slot B. We have posted a list of flash cards that we have tested at:

<http://www.wildlifeacoustics.com/songmeter/flash.html>

Please help us add to this list if you test additional cards on your own.

## Installing Batteries

### Main Batteries for SM1 and SM1-M Models

Song Meter takes 4 standard “D” size batteries and works with disposable Alkaline batteries as well as rechargeable NiMH batteries.

If you are using NiMH rechargeable batteries, you should make sure they are fully charged as these batteries tend to discharge over time when not in use. **Warning: NiMH batteries can be damaged if discharged beyond their capacity.** See the section on “Managing Power and Memory Resources” on page 19” for more information.

Be sure to install the batteries in the correct orientation as indicated by the battery holder.

Battery life can vary widely depending on the battery capacity, brand, charger used, temperature, etc.

## **Main Power for SM1-P or SM1-MP Models**

Note that the SM1-P and SM1-MP models do not have main batteries and instead provide a cable to an external power source you must provide.

The cable is terminated with two terminal rings suitable for M4 or #8 screws. The terminal ring on the black wire is ground, and the terminal ring on the white wire is +6V to +12V<sup>1</sup> DC. The power supply should be rated at 500mA or more. Note that the source voltage protection circuit uses an additional 10mA, even when the Song Meter is sleeping between scheduled recording events.

## **Backup Battery**

Song Meter uses a CR2032 lithium button battery for backup power to the time-of-day clock so that the clock will continue keeping time even when the main batteries are discharged or disconnected. Song Meter comes with this battery installed and it should last for a very long time.

If Song Meter consistently fails to keep time when removing the main batteries, you should replace the backup battery. The lithium battery holder is located to the left of the main battery holder.

Note that it is possible for the backup battery feature to fail under certain conditions. You should therefore always verify the correct time after replacing batteries or reconnecting power.

## **Installing Microphones**

The Song Meter SM1 and SM1-P come with two built-in microphones.

The Song Meter SM1-M and SM1-MP do not have built-in microphones, and instead have two XLR cables for the left and right channels. For mono recordings, the left channel microphone must be provided. For stereo recordings, both the left and right channel microphones must be provided.

---

1. Song Meter SM1-P before serial number 000503 and Song Meter SM1-MP before serial number 000578 do not have any source voltage protection. Voltages exceeding 6.5V or reverse polarity can cause permanent damage in these older Song Meters.

## Getting Started

### *Waking Song Meter*

The microphones should be transformerless electret microphones. A 2.5V bias voltage is provided. Only pin 1 (Ground) and pin 2 (Signal+) are connected leaving pin 3 (Signal-) disconnected.

You may need to adjust the Song Meter gain settings to balance your microphone's sensitivity with your particular application. See "Microphone Gain" on page 14 for more information.

## Waking Song Meter

Song Meter is designed to remain in a deep sleep between recording events and must be manually awakened in order to view or change the recording schedule or settings.

Press and hold the "Wake Up Button" on the far left side of the Song Meter mother board for a few seconds until text appears on the LCD display. The following message should appear:

```
2008-Feb-12 13:32:56
SONG METER 1.9.0
(c) WildlifeAcoustics
A:  N/A    B: 8G ( 2%)
```

The top row displays the current date and time and is updated every second.

The bottom row displays the status of the two SD/MMC flash memory card slots labelled "A" and "B" (the "A" slot is located in the bottom left corner of the Song Meter mother board and the "B" slot is located just above and to the right).

If no SD/MMC flash card is plugged into a slot, "N/A" is displayed to indicate that the slot is not available. Otherwise, its capacity in gigabytes and percent full are displayed. In the above example, no card is plugged into slot A and an 8GB card is plugged into slot B that is 2% full.

Note that it can take several seconds to scan some flash cards. The slot information will remain blank while the card is being scanned.

# Configuration

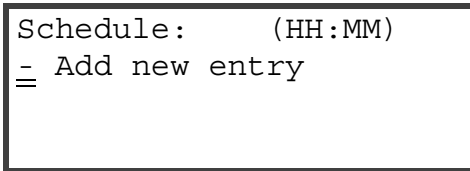
## Using the Song Meter Configuration Utility

All of the Song Meter settings and recording schedule can be configured directly on the Song Meter using the display and buttons as described throughout this manual. As a convenience, you may also create, view, or edit Song Meter configuration files using the *Song Meter Configuration Utility* application software. This software is available at no charge from the Wildlife Acoustics website at <http://www.wildlifeacoustics.com/>.

## Viewing or Changing the Daily Recording Schedule

This section describes the simple “daily” scheduling mode of the Song Meter. This is the default scheduling mode and can be selected from the settings menu. Song Meter also supports a more advanced scheduling mode discussed later. See “Schedule Selection” on page 15 and “Viewing or Changing the Advanced Recording Schedule” on page 25 for more details.

After waking up Song Meter as described above, press the “Schedule Button”, the first from the left in the row of four buttons above the display. If no schedule entries have been recorded, the display will look like this:



Note that the double underline in the figure above represents the blinking cursor on the display.

## Configuration

### *Viewing or Changing the Daily Recording Schedule*

If a recording schedule has already been programmed, the display will show one line for each recording entry as follows:

```
Schedule:      (HH:MM)
- @ 05:30 for 01:30
- @ 23:00 for 01:00
- Add new entry
```

In the example above, there are two scheduled recording times, one from 5:30AM for an hour and a half and another at 11:00PM for an hour. Note that there can be up to 128 different scheduled recording times. If there are more than two scheduled recording times, then only three will be displayed at a time with others scrolled off the screen.

You can use the “Up” and “Down” buttons to scroll through the schedule entries and the “Add new entry” line. The “Up” and “Down” buttons are the top and bottom of the three buttons located to the left of the display.

To make a selection, push the “Select” button, the middle of the three buttons located to the left of the display.

## Adding a New Scheduled Recording Time

Use the “Up” and “Down” buttons to scroll to the “Add new entry” line, and then press the “Select” button.

```
Schedule:      (HH:MM)
- @ 05:30 for 01:30
- @ 23:00 for 01:00
- @ 00:00 for 00:00
```

Notice that the “Add new entry” is replaced with “@ 00:00 for 00:00” with the cursor on the starting time hour.

Use the “Up” and “Down” buttons to select the closest hour to the desired start time, then press the “Select” button.

The cursor will now advance to the minutes portion of the starting time. Again, you can use the “Up” and “Down” buttons to change the minute (and hour) to the desired start time, then press “Select”.

The cursor will now advance to the hours portion of the recording duration. Use the “Up” and “Down” buttons to select the closest number of hours and press “Select”.

Finally, the cursor will advance to the minutes portion of the recording duration. Use the “Up” and “Down” buttons to select the minute (and hour) of the desired recording duration, then press “Select”.

Notice that you may not have any two recording periods that overlap. In fact, there must be at least a one minute gap between the end of one recording period and the beginning of the next. If you attempt to create a recording entry that violates this rule, the error message “OVERLAP! TRY AGAIN” will be displayed for 5 seconds.

Also note that the maximum file size for any individual recording is 2GB. If you specify a duration (times sample rate, times number of channels, times 2 bytes per sample) exceeding 2GB, the recording may be split into more than one file.

## **Changing an Existing Scheduled Recording Time**

Use the “Up” and “Down” buttons to scroll to the entry you wish to change, and then press the “Select” button. The cursor will advance to the starting time hour. Follow the steps above to change the entry.

## **Deleting an Existing Scheduled Recording Time**

Use the “Up” and “Down” buttons to scroll to the entry you wish to delete, and then press the “Select” button. Follow the steps above and set the recording duration to 00:00. This will cause the entry to be deleted.

## **Viewing or Changing Song Meter Settings**

After waking up Song Meter, press the “Settings Button”, the second from the left in the row of four buttons above the display. The display will look like this:

```
Settings:
-Sample rate    44100
-Channels        Stereo
-Gain (left)    +42.0
```

## Configuration

### *Viewing or Changing Song Meter Settings*

```
-Gain (right)  +42.0
-Compression   Off
-Schedule      Daily
-Prefix
-Timezone      UTC + 0
-Latitude      0.00 N
-Longitude     0.00 W
-Solar        Sunrise/set
-Save A:SONGMETR.SET
-Load A:SONGMETR.SET
-Set factory default
-Delete A:DATA/*.WAV
-Delete B:DATA/*.WAV
-Calibrate
-Power down
```

Note that only three choices are shown at a time on the display, but the figure above shows all of the choices available. You can use the “Up” and “Down” buttons to scroll to the setting or action you desire, and then press the “Select” button to edit a setting or take an action.

When you select a setting and press the “Select” button, the cursor moves to the setting value. You can then use the “Up” and “Down” buttons to change the value until the desired value is shown, and press the “Select” button one more time to lock in the setting.

## Sample Rate

Song Meter supports the following sample rates (in samples per second):

- 48,000
- 44,100
- 32,000
- 24,000
- 22,050
- 16,000
- 8,000
- 4,000

The default value set by the factory is 16,000 samples per second.

## Channels

Song Meter can record in Stereo (both left and right channels) or Mono (using either the left or right channel). The default value set by the factory is two-channel stereo recording.

## Microphone Gain

The amplification (gain) of each channel can be configured independently from between -1.5dB and +45.0dB in 1.5dB increments. The default value set by the factory is +42.0dB for both channels.

The 16-bit A/D (analog-to-digital) converter in the Song Meter reaches full scale (i.e. -32768 to +32767) at 1 volt (root-mean-squared). We recommend a gain that reaches full scale at a sound pressure level of 0.5 pascals (88dBA SPL) for most field recording applications (this is -6dB relative to 1 pascal). The built-in microphones in Song Meter SM1 and SM1-P have a sensitivity of -35 dBV/pa. Given that 0.5 pascals is -6 dB relative to 1 pascal, and 1 V<sub>rms</sub> is 0dBV, the recommended gain is  $35 + 6 = 41$ dB (rounding up to the 42dB default gain setting).

Note however that the microphones have a sensitivity tolerance of  $\pm 4$ dBV/pa, and there may be additional variation in the Song Meter electronics. Therefore, you may want to adjust the microphone gain accordingly. In

## Configuration

### *Viewing or Changing Song Meter Settings*

other words, if a microphone has a sensitivity of -39dBV/pa, you should adjust the gain up to +45dB (the maximum), and if a microphone has a sensitivity of -30dBV/pa, you should adjust the gain down to +36dB.

## Compression

Song Meter can compress audio files to increase storage capacity. By default, compression is turned off and the audio files are stored as uncompressed “.WAV” files. If compression is turned on, Song Meter will instead store audio files using the proprietary Wildlife Acoustics Audio Compression (WAAC) file format “.WAC” files.

The WAAC format is a lossless audio compression format designed to provide efficient compression for typical open microphone field recordings. On average, “.WAC” files will be 50-60% the size of uncompressed “.WAV” files. Actual compression rates will vary depending on the sounds picked up by the microphones.

The processing power required is minimal so as to have little impact on battery life (for high sample rates, an additional 10mA of current may be required).

“.WAC” files can be read by our Song Scope software. Additionally, we provide a free cross-platform “.WAC” to “.WAV” (wac2wav) conversion program available from our website at:

<http://www.wildlifeacoustics.com/downloads/>

## Schedule Selection

Song Meter supports two different methods for scheduling recordings. The default value is “Daily” for creating a simple daily schedule of recording times as described in “Viewing or Changing the Daily Recording Schedule” on page 10. For more advanced applications, the “Advanced” scheduling mode can be used instead as described in “Viewing or Changing the Advanced Recording Schedule” on page 25. You can then press the schedule button to create or edit the schedule.

## Filename Prefix

Song Meter lets you specify a filename prefix of up to 12 characters that will become part of the recording file names and can be used to uniquely label recordings made by each Song Meter (e.g. to designate a location and/

or project). Recordings are saved in a “Data” folder on the flash card and have names of the form *Prefix\_YYYYMMDD\_hhmmss.wav*, where *Prefix* is the prefix specified here, *YYYY* is the year, *MM* is the month, *DD* is the day, *hh* is the hour, *mm* is the minute, and *ss* is the second at which the recording was started. The suffix “.wav” is used for uncompressed files, and “.wac” for the proprietary lossless audio compression WAAC format.

The prefix may contain capital letters, numbers, and hyphens. Press the select button to advance to each position in the prefix, and then use the up and down arrows to select from among the possible characters. Press select one more time to mark the end of the prefix.

The default value is no prefix, in which case no *Prefix\_* will be present in the recording file names.

## **Timezone**

Timezone is one of the parameters used to calculate the actual time of sunrise and sunset for scheduling recordings relative to sunrise and sunset times. You can specify the local timezone (as used to set the clock) in hours relative to UTC (Universal Time Coordinated). See “Solar Tracking” on page 30 for details.

## **Latitude**

Latitude is one of the parameters used to calculate the actual time of sunrise and sunset for scheduling recordings relative to sunrise and sunset times. You can specify the latitude of the Song Meter’s location on the globe in degrees north (N) or south (S) of the equator. See “Solar Tracking” on page 30 for details.

## **Longitude**

Longitude is one of the parameters used to calculate the actual time of sunrise and sunset for scheduling recordings relative to sunrise and sunset times. You can specify the longitude of the Song Meter’s location on the globe in degrees west (W) or east (E) of Greenwich. See “Solar Tracking” on page 30 for details.

## **Solar**

Solar is used to select the solar tracking calculation used. The default value “Sunrise/set” calculates the sunrise and sunset times. Other choices include

## Configuration

### *Viewing or Changing Song Meter Settings*

“Civil” for civil twilight, “Nautical” for nautical twilight, and “Astronomical” for astronomical twilight.

## Saving and Restoring Settings and Recording Schedule

The recording schedule and settings can be saved to or loaded from the file “SONGMETR.SET” on the SD/MMC card plugged into slot A. This feature is handy if you need to configure several Song Meters using the same schedule and settings. You can configure one Song Meter and save the configuration, then load the same configuration on other Song Meters.

You can also use the *Song Meter Configuration Utility* application software to conveniently create or edit SONGMETR.SET files on your computer and visualize the recording schedule. **Note that by default, microphone gain settings and the prefix are not updated when you load settings.** The microphone gain settings may be calibrated to the tolerances of individual microphones and Song Meters, and the prefix is intended to uniquely identify each Song Meter in the field. However, with firmware version 1.6.0 and later, you can override these parameters when using the *Song Meter Configuration Utility* application software.

## Setting Factory Defaults

Selecting the “Set factory default” setting causes all of the parameter settings (including microphone gain settings) to be set to the factory defaults and erases both the daily and advanced schedules.

## Deleting Recordings

You can permanently delete all the “.WAV” and “.WAC” files (recordings) in the DATA directory on either SD/MMC card to make room for new recordings.

## Calibrate

Enter calibration mode. In calibration mode, the display shows the measured voltage level of each channel (relative to 0dB gain) on a scale of between -117.2dBV and -30.1dBV. By using a sound level calibrator (available from a number of test equipment manufacturers), you can measure the sensitivity of the microphones (combined with any variation in the Song Meter electronics). The sound level calibrator should generate a

test signal of 1 pascal (+94dBA), and the calibration display will show the effective channel sensitivity in dBV/pa.

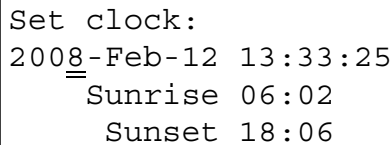
The effective channel sensitivity should be considered when configuring the gain settings. See “Microphone Gain” on page 14 for more information.

## **Power down**

When power down is selected, the Song Meter immediately enters a deep sleep. Use the wake up button to wake up the Song Meter.

## **Changing the Time and Date**

After waking up Song Meter, press the “Change Time Button”, the third from the left in the row of four buttons above the display. The display will look like this:



```
Set clock:  
2008-Feb-12 13:33:25  
Sunrise 06:02  
Sunset 18:06
```

The date and time displayed indicate the currently set time, and the cursor is positioned on the year. Using the “Up” and “Down” buttons, you can change the year. When the actual year is reached, press the “Select” button to lock in the year and proceed to the month. Repeat this for the day, hour, minute and second. When you press the “Select” button after setting the seconds, the time will be set and the display will reset to the start-up screen.

## **View Calculated Sunrise and Sunset Times**

The Sunrise and Sunset times are only displayed as shown above if the timezone, latitude and longitude parameters have been set (see “Timezone” on page 16) and indicate the calculated times of sunrise and sunset for the current date and location. These values are automatically updated as you change the year, month, and day.

## Configuration

### *Start Recording Schedule*

## Start Recording Schedule

Press the “Exit” button, the right-most in the row of four buttons above the display. If the next scheduled recording is more than 45 seconds away, the following message is displayed:

```
2008-Feb-12 13:34:12  
  
Going to sleep until  
2008-Feb-12 05:30:00
```

The top row indicates the current time and date. The bottom shows the next scheduled recording start time. After 5 seconds, the Song Meter will go into a deep sleep and the display will go blank.

You should now replace the protective cover being sure that the lip of the cover and the mating gasket around the edge of the enclosure are clean and free of debris (e.g. vegetation) to ensure a water-tight seal.

If the next scheduled recording event is in progress or within 30 seconds away, then Song Meter will begin preparing to record and begin recording at the correct start time (or as soon as possible if a scheduled recording is already in progress).

If there were no scheduled recordings configured, the following message is displayed instead and Song Meter will go into a deep sleep until manually awoken:

```
2008-Feb-12 13:34:12  
  
NO SCHEDULED EVENTS  
Going to sleep.....
```

## Managing Power and Memory Resources

Recording time is limited by power and memory resources. Song Meter can only record while it still has sufficient power available in the batteries and while it has sufficient room to save recordings in the SD/MMC cards. Download our free *Song Meter Configuration Utility* to see estimates of how long battery and memory resources are expected to last given your specific recording schedule and configuration.

## **Power Resources**

The Song Meter SM1 and SM1-M run on 4 “D” size Alkaline or rechargeable NiMH batteries. Song Meter draws only 115-145 milliamps of current when recording (depending on sample rates and compression), and almost no measurable current (< 0.15 milliamps) when sleeping between recording events.

## **Rechargeable NiMH Batteries**

Good rechargeable NiMH D batteries have a capacity of 11,000 mAh (milliamp hours) delivering an estimated potential battery life of 75-95 hours of recording time. Unfortunately, NiMH batteries have a high self-discharge rate and will typically lose 1% of their capacity per day, so the effective recording time may be greatly reduced depending on the recording schedule.

Actual battery life will also vary due to a number of other factors including the quality of the batteries and charger used, temperature, time between charges, etc. NiMH batteries may need to be cycled several times before they are able to hold a full charge. In addition, some Song Meters might draw a little more or a little less current due to the variability in tolerances of electronic components used.

**Warning: NiMH batteries should not be over-discharged.** If you are using NiMH batteries, and Song Meter runs out of power before it runs out of memory, the batteries will continue to discharge and may become unable to accept a new charge if left in this state for too long. We recommend that you either arrange your recording schedule to run out of memory first, or plan on retrieving the batteries before they are expected to run out of power.

## **Alkaline Batteries**

Good alkaline batteries will typically deliver around 14,000 mAh when used with Song Meter. In addition, alkaline batteries have a very long shelf life and can maintain over 90% of their full capacity for a year. Song Meter will typically deliver around 95-120 hours of recording time when using Alkaline batteries.

## Configuration

### *Managing Power and Memory Resources*

## Estimating Battery Life

The following table illustrates typical estimated run-times based on daily recording minutes for 11,000mAH NiMH and 14,000mAH Alkaline batteries assuming a 120mA drain during recording (add 30 seconds for each recording per day to account for overhead), 0.1mA drain while sleeping, and 1% daily self discharge rate for NiMH batteries. Note that run time and total recording hours will be about 14% less when using audio compression at high sample rates, and another 8% less when providing external power to an SM1-P or SM1-MP model:

Scheduled Recording Time per Day	Alkaline		NiMH	
	Total Run-time (days)	Total Recording Hours	Total Run-time (days)	Total Recording Hours
5 minutes	1038	86	90	7
10 minutes	596	99	83	14
15 minutes	418	105	77	19
20 minutes	322	107	72	24
25 minutes	262	109	68	28
30 minutes	221	110	64	32
35 minutes	191	111	60	35
40 minutes	168	112	57	38
45 minutes	150	112	54	41
50 minutes	135	113	52	43
55 minutes	123	113	49	45

Scheduled Recording Time per Day	Alkaline		NiMH	
	Total Run-time (days)	Total Recording Hours	Total Run-time (days)	Total Recording Hours
1 hour	113	113	47	47
2 hours	58	115	31	62
3 hours	39	116	23	70
4 hours	29	116	19	74
5 hours	23	116	15	77
6 hours	19	116	13	79
7 hours	17	116	12	81
8 hours	15	116	10	82
9 hours	13	116	9	83
10 hours	12	116	8	84
11 hours	11	116	8	85
12 hours	10	116	7	85
13 hours	9	117	7	86
14 hours	8	117	6	86
15 hours	8	117	6	86
16 hours	7	117	5	87
17 hours	7	117	5	87
18 hours	6	117	5	87

## Configuration

### *Managing Power and Memory Resources*

Scheduled Recording Time per Day	Alkaline		NiMH	
	Total Run-time (days)	Total Recording Hours	Total Run-time (days)	Total Recording Hours
19 hours	6	117	5	87
20 hours	6	117	4	87
21 hours	6	117	4	88
22 hours	5	117	4	88
23 hours	5	117	4	88
24 hours	5	117	4	88

## Memory Resources

Song Meter has two SD/MMC card slots. As of this writing, high capacity flash cards are available with up to 32GB (gigabytes = billion bytes). Thus, with two 32GB cards, Song Meter can be configured with a capacity of 64GB, and more in the future as higher capacity flash cards become available.

Recordings consume 2 bytes (16-bits) per sample, times the sample rate, times the number of channels per second. For example, a recording made at a sampling rate of 44,100 samples per second in stereo (2 channels) consumes  $2 \times 44,100 \times 2 = 176,400$  bytes per second. With 32GB total capacity,  $64,000,000,000$  divided by  $176,400 = 362,812$  seconds = 100 hours of recording time.

Note that the largest file size allowed for an individual recording is 2GB. You may need to adjust the duration of a given recording to fit within this limit.

In most applications, there is no reason to use sampling rates faster than twice the frequencies of interest. The majority of frog vocalizations are under 4KHz and need only be sampled at 8KHz while most bird vocalizations are under 8KHz and need only be sampled at 16KHz (with the

exception of some high-pitched warblers who sing at 10KHz and need to be sampled at greater than 20KHz).

The following tables illustrate the recording time in hours available for different combinations of total memory capacity, sample rates and channels. If you enable compression, you can almost double the capacity. (Compression rates vary with sample rates and site-specific ambient sound levels).

	<b>Mono (1 channel)</b>							
	<b>48,000</b>	<b>44,100</b>	<b>32,000</b>	<b>24,000</b>	<b>22,050</b>	<b>16,000</b>	<b>8,000</b>	<b>4,000</b>
2GB	5.8	6.3	8.7	11.6	12.6	17.4	34.7	69.4
4GB	11.6	12.6	17.4	23.1	25.2	34.7	69.4	138.9
8GB	23.1	25.2	34.7	46.3	50.4	69.4	138.9	277.8
16GB	46.3	50.4	69.4	92.6	100.8	138.9	277.8	555.6
32GB	92.6	100.8	138.9	185.2	201.6	277.8	555.6	1111.1
64GB	185.2	201.6	277.8	370.4	403.1	555.6	1111.1	2222.2

	<b>Stereo (2 channels)</b>							
	<b>48,000</b>	<b>44,100</b>	<b>32,000</b>	<b>24,000</b>	<b>22,050</b>	<b>16,000</b>	<b>8,000</b>	<b>4,000</b>
2GB	2.9	3.1	4.3	5.8	6.3	8.7	17.4	34.7
4GB	5.8	6.3	8.7	11.6	12.6	17.4	34.7	69.4
8GB	11.6	12.6	17.4	23.1	25.2	34.7	69.4	138.9
16GB	23.1	25.2	34.7	46.3	50.4	69.4	138.9	277.8
32GB	46.3	50.4	69.4	92.6	100.8	138.9	277.8	555.6
64GB	92.6	100.8	138.9	185.2	201.6	277.8	555.6	1111.1

## Configuration

### *Viewing or Changing the Advanced Recording Schedule*

# Viewing or Changing the Advanced Recording Schedule

This section describes the advanced scheduling mode of the Song Meter. By default, Song Meter is configured to use a simpler “daily” scheduling mode as described in “Viewing or Changing the Daily Recording Schedule” on page 10. The advanced scheduling mode can be selected by changing the schedule selection setting on the settings menu as described in “Schedule Selection” on page 15.

## Advanced Recording Commands

When the Song Meter is configured to use advanced scheduling, the schedule is defined as a sequence of simple commands. Each command is numbered sequentially with up to 99 commands in a recording program.

**Warning: When the last command of the advanced schedule is executed, the program will end. If you want to repeat the schedule, you must include a GOTO LINE command at the end of your program.** It is always a good idea to use the *Song Meter Configuration Utility* to verify that advanced schedules will work as expected.

There are several types of commands as follows:

### **AT TIME hh:mm:ss**

The “At Time” command is used to cause Song Meter to wait until the specified time of day. If possible, Song Meter will put itself to sleep until just before the scheduled time. Song Meter will wake up about 30 seconds early to take into account preparation time so that subsequent recordings begin at the specified time.

### **AT SRIS-hh:mm:ss**

The “At Sunrise” command is used to cause Song Meter to wait until the specified amount of time before the next occurring sunrise. The time of sunrise is calculated according to the current date and location as specified by the timezone, latitude, and longitude parameter settings (see “Timezone” on page 16, “Latitude” on page 16, and “Longitude” on page 16).

**AT SSET-hh:mm:ss**

The “At Sunset” command is used to cause Song Meter to wait until the specified amount of time before the next occurring sunset. The time of sunset is calculated according to the current date and location as specified by the timezone, latitude, and longitude parameter settings (see “Timezone” on page 16, “Latitude” on page 16, and “Longitude” on page 16).

**RECORD hh:mm:ss**

The “Record” command is used to cause Song Meter to record for the specified duration. Zero duration recording entries will be ignored.

Note that the maximum file size is 2GB. You should make sure that the specified duration (times sample rate, times number of channels, times 2 bytes per sample) is less than this 2GB limit. Otherwise, the recording will be truncated to 2GB, but the next recording will start at the correct scheduled time.

**PAUSE hh:mm:ss**

The “Pause” command is used to cause Song Meter to wait for the specified duration. If possible, Song Meter will put itself to sleep until about thirty seconds before the end of the pause. Additionally, Song Meter will take into consideration any delays in finishing and saving the previous recording such that the delay begins when the previous recording ended, not when the previous recording was saved. We recommend a pause of at least 30 seconds to give Song Meter enough time to finish a previous recording and prepare for a subsequent recording.

Note that sequential “Pause” and “At Time” commands may be consolidated by Song Meter. For example, consider the following sequence:

```
AT TIME 05:00:00
PAUSE 01:00:00
```

When Song Meter comes across the sequence above, it will sleep until just before 06:00AM without waking up at 05:00AM.

## Configuration

### *Viewing or Changing the Advanced Recording Schedule*

## **GOTO LINE aa bbX**

The “Goto Line” command is used to create programmable loops (which may be nested). If “bb” is zero, the loop is always taken and the next command to be executed will be line “aa”. Otherwise, the loop to line “aa” will be executed “bb” times. After “bb” loops, Song Meter will continue with the commands immediately following the “Goto Line” command.

Be careful to avoid unwanted infinite loops. If Song Meter detects an infinite loop while running, it will abandon the program and go to sleep until awoken manually.

When inserting or deleting commands from the program, Song Meter will automatically adjust the “Goto Line” command line numbers referenced.

## **SET rrrrrXccccc**

The “Set” command is used to change the recording settings to use the sample rate specified by rrrrr and the number of channels specified by ccccc. These settings will be used until the next “Set” command, or until the program is restarted. When an advanced schedule program is first started, the initial settings specified by the settings parameter menu are used.

## **DO**

The DO command starts a DO...UNTIL block as defined by a sequence of RECORD, PAUSE, GOTO LINE, or SET commands followed by either an “UNTTIME, UNTSRIS+, or UNTSSET+ command. These UNTIL commands specify an ending time for the block.

After the DO command, the advanced schedule program will continue normally. However, if the ending time is reached, any recording in progress will be truncated and the advanced schedule will skip ahead to the command following the UNTIL command.

If the UNTIL command is reached before the ending time, the schedule will wait for the ending time before continuing.

DO...UNTIL blocks may not be nested.

GOTO commands within the DO...UNTIL block should not jump out of the DO...UNTIL block.

AT TIME, AT SRIS- and AT SSET- commands should not be used inside a DO...UNTIL block.

## **UNTTIME hh:mm:ss**

The “Until Time” command ends a DO...UNTIL block and specifies a specific ending time of day.

## **UNTSRIS+hh:mm:ss**

The “Until Sunrise” command ends a DO...UNTIL block and indicates an ending time as the specified amount of time after the next occurring sunrise.

## **UNTSSET+hh:mm:ss**

The “Until Sunset” command ends a DO...UNTIL block and indicates an ending time as the specified amount of time after the next occurring sunset.

## **Advanced Recording Example**

Consider the following example:

```
01 AT TIME 05:30:00
02 RECORD 00:30:00
03 PAUSE 01:00:00
04 RECORD 00:01:00
05 PAUSE 00:09:00
06 GOTO LINE 04 10X
07 PAUSE 01:00:00
08 GOTO LINE 04 1X
09 GOTO LINE 01 0X
```

In the above example, a fairly complex schedule is defined in only 9 commands.

First, look at lines 01 and 02 in the example. Song Meter will wait until 5:30AM and record for 30 minutes (5:30-6:00AM).

## Configuration

### *Viewing or Changing the Advanced Recording Schedule*

Next, in line 03, Song Meter will wait for an hour (7:00AM), and then (line 04) record for one minute (7:00-7:01AM), and then (line 05) wait for 9 minutes (7:10AM).

Now look at line 06. The “Goto Line” command will go back to line 04 and repeat line 04 and 05 10 times. This will cause ten one-minute recordings to be made every 10 minutes at 7:10, 7:20, 7:30, 7:40, 7:50, 8:00, 8:10, 8:20, 8:30, and 8:40AM. The pause in line 05 added to the one minute recording causes Song Meter to wait until 8:50AM before reaching the “Goto Line” command on line 06 for the 11th time (after the 10th loop). Song Meter will now continue processing at line 07.

Next look at line 07. Song Meter will wait for an hour (9:50AM).

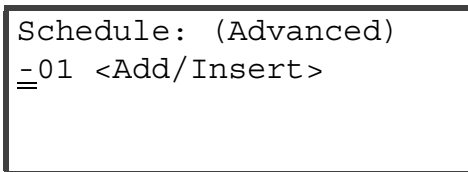
On line 08, another “Goto Line” command will cause lines 04 through 07 to be run one more time. This will result in eleven more one-minute recordings to be made at 9:50, 10:00, 10:10, 10:20, 10:30, 10:40, 10:50, 11:00, 11:10, 11:20 and 11:30AM. The last pause on line 05 ends at 11:40AM, and the pause on line 07 ends at 12:40PM.

Finally, line 09 causes the program to run all over again from the beginning waiting until 5:30AM on line 01.

As you can see, this simple 9-line program is able to schedule 23 different recordings per day at various intervals and durations.

## Configuring Advanced Recordings

After waking up Song Meter, press the “Schedule Button”, the first from the left in the row of four buttons above the display. If no advanced schedule has been programmed yet, the display will look like this:



```
Schedule: (Advanced)
== -01 <Add/Insert>
```

Note that the double underline in the figure above represents the blinking cursor on the display.

If an advanced recording schedule has already been programmed, the display will show one line for each recording entry as follows (using the above example):

```
Schedule: (Advanced)
-01 AT TIME 05:00:00
-02 RECORD 00:30:00
-03 PAUSE 01:00:00
-04 RECORD 00:01:00
-05 PAUSE 00:09:00
-06 GOTO LINE 04 10X
-07 PAUSE 01:00:00
-08 GOTO LINE 04 1X
-09 GOTO LINE 01 0X
-10 <Add/Insert>
```

To change or delete a line, use the up and down buttons to scroll to the desired line and press the select button. You can then use the up and down buttons to choose from different commands or to choose “<Delete>” to delete the line. Press the select button to confirm your choice and advance the cursor to any parameters to be modified. Continue using the select, up and down buttons to complete the command.

To add or insert a line, scroll down to the “<Add/Insert>” entry and press the select button. You may then use the up and down buttons to change the line number. By default, a new line is created at the bottom of the program. However, you can choose a different line number and the new line will be inserted above your choice. Press the select button to confirm the line number and continue as described above to choose the command and parameter values for the new line until it is complete.

## **Solar Tracking**

Song Meter can be used to schedule recordings relative to actual sunrise and sunset times as they change according to the time of year and location on the globe. To use the solar tracking feature, the Song Meter’s coordinates must be specified (see “Latitude” on page 16 and “Longitude” on page 16). In addition, the timezone used to set the clock must be specified relative to UTC (see “Timezone” on page 16).

## Configuration

### *Viewing or Changing the Advanced Recording Schedule*

The advanced scheduling commands “AT SRIS” and “AT SSET” can be used to cause Song Meter to wait until some specified time before the next occurring sunrise or sunset respectively (see “AT SRIS-hh:mm:ss” on page 25 and “AT SSET-hh:mm:ss” on page 26). The following example advanced scheduling program would record daily for one hour beginning 15 minutes before sunrise, and another hour beginning 15 minutes after sunset:

```
01 AT SRIS-00:15:00
02 RECORD 01:00:00
03 AT SSET-00:00:00
04 PAUSE 00:15:00
05 RECORD 01:00:00
06 GOTO LINE 01 0X
```

The calculated sunrise and sunset times for the current day can be displayed by pressing the “Change Time Button”. See “View Calculated Sunrise and Sunset Times” on page 18 for details.

## Ending a Recording Schedule at a Specified Time

The DO...UNTIL commands described above can be used to end a recording schedule relative to sunrise, sunset, or a specific time of day.

For example, the following sequence will record 5 minutes every hour from 15 minutes before sunrise until 15 minutes after sunset daily:

```
01 AT SRIS-00:15:00
02 DO
03 RECORD 00:05:00
04 PAUSE 00:55:00
05 GOTO LINE 03 00X
06 UNTSSET+00:15:00
07 GOTO LINE 01 00X
```

## Caveats and Implementation Details

Song Meter maintains program state information in a file called “SONGMETR.RUN” on the SD/MMC card plugged in to slot A. This is how Song Meter keeps track of what program line is to be processed next and how many times each “Goto Line” command has looped so far. The

SONGMETR.RUN file is automatically created and initialized when the exit button is pressed and the advanced scheduling mode is enabled.

As a consequence of the advanced scheduling implementation, you should be aware of the following limitations:

- An SD/MMC flash card must be installed in Slot A of the Song Meter in order to make use of the advanced scheduling mode.
- If you change the SD/MMC card in Slot A, you must reset the SONGMETR.RUN file by making sure that Song Meter is awake, and then pressing the exit button.
- You should ensure that there is at least 30 seconds between the end of one recording and the beginning of the next recording to allow Song Meter enough time to finish saving the previous recording and prepare to start the subsequent recording. If Song Meter does not have enough time, it will start the second recording late (as soon as it is able), and shorten the recording so that it will end on schedule.
- If you want Song Meter to start the program somewhere other than line 01 when you press the exit button, you can insert a “Goto Line” command on line 01 to branch to the desired starting point.

# Making Recordings

## Autonomous Operation

After configuring Song Meter as described in the previous chapter, pressing the “Exit” button located on the far right above the display will cause Song Meter to put itself to sleep until the next scheduled recording event.

Song Meter will automatically wake up one minute before the scheduled event to prepare. The start-up display will be as before:

```
2008-Feb-12 05:29:00
SONG METER 1.9.0
(c)WildlifeAcoustics
A:  N/A    B: 8G( 2%)
```

After scanning the two SD/MMC flash slots, the message “Preparing to record” will appear:

```
2008-Feb-12 05:29:11
SONG METER 1.9.0
Preparing to record
A:  N/A    B: 8G( 2%)
```

Song Meter is now preparing itself to begin recording and will wait for the scheduled starting time to begin. Note that if a scheduled recording time is already in progress, Song Meter will begin recording as soon as it is ready to do so and end the recording on schedule.

When Song Meter begins recording, the display will indicate progress as shown below:

```
2008-Feb-12 05:30:48
Recording: 01:29:12
B:07180530.WAV 0%
44100xStereo 5%
```

The top line of the display shows the current date and time as before.

The second line indicates the time remaining in the current recording.

The third line shows the flash card slot and short file name of the recording file (*MMDDhhmm.WAV*) and the percent complete. Note that unique long file names are actually used on the flash card of the form *Prefix\_YYYYMMDD\_hhmmss.wav*.

The last line shows the sample rate and number of channels (x2 for stereo, x1 for mono), and the percentage indicates how full the SD/MMC slot is on which the recording is being made.

## Files

Song Meter creates a file for each scheduled recording under a directory called *Data*. The file name indicates the actual start time of the recording and has the format *Prefix\_YYYYMMDD\_hhmmss.wav*, where *Prefix\_* is a user-defined label (see “Filename Prefix” on page 15), *YYYY* is the year, *MM* is the month (00-12), *DD* is the day (00-31), *hh* is the hour (00-23) *mm* is the minute (00-59), and *ss* is the second (00-59). The file is a standard 16-bit PCM uncompressed “.WAV” file. For display purposes, Song Meter shows a shortened version of the filename on the LCD of the form *MMDDhhmm.WAV*.

If compression is enabled, files are stored in the Wildlife Acoustics Audio Compression format indicated by “.WAC” instead of “.WAV”.

The filename is shown with an A: or B: prefix indicating which SD/MMC card slot is being used. Song Meter will favor the A slot if present and sufficient space is available to complete the recording, otherwise Song Meter will use slot B. If there is no more room for recording in either slot, the following message will be displayed for 5 seconds, then Song Meter will go to sleep until manually awoken:

## **Making Recordings**

### *Aborting a Recording in Progress*

```
2008-Feb-12 05:29:11  
SONG METER 1.9.0  
MEDIA FULL OR FAILED  
Shutting down.....
```

## **Aborting a Recording in Progress**

While the Song Meter is recording, you can press the “Schedule Button”, “Settings Button”, or “Change Time Button” to abort the recording in progress and enter the schedule, settings, or change time modes described in the previous chapter. The message “Aborted: please wait” will be displayed while Song Meter finishes and saves the partial recording.

## **Manual Recording Feature**

In addition to recording on a schedule, the Song Meter can also start a recording when awake by pushing the “Up” and “Down” buttons simultaneously. Recording will be made to the flash card in Slot A if there is room, otherwise it will be made to the flash card in Slot B. The recording will stop when the selected flash card is full, or one of the mode buttons is pressed.

# Song Meter Specifications

## Physical Specifications

- Dimensions: 8.4" x 7.1" x 2.4"
- Weight: 2.8 pounds with batteries (SM1, SM1-M)  
1.6 pounds w/o batteries (SM1-P, SM1-MP)
- Enclosure: IP 66/67, NEMA-4 (weatherproof)
- Operating Temp.: -4°F to +158°F    -20°C to +70°C

## Audio Specifications

- Built-in stereo omnidirectional microphones (SM1 and SM1-P only):
  - Sensitivity: -35±4dB (0dB=1V/pa@1KHz)
  - Frequency response: 20Hz - 20,000Hz
  - Signal-to-Noise Ratio: > 62dB
- High-pass filter: Optional 160Hz high-pass filter enabled per-channel.
- Amplification: Programmable -1.5dB to +45.0dB in 1.5dB increments, per channel
- Sample rates: 4000, 8000, 16000, 22050, 24000, 32000, 44100, and 48000 samples/second
- Digital format: 16-bit PCM (.wav) or Wildlife Acoustics lossless compression format (.wac)

## Storage

- SD/MMC flash card slots: 2
- Compatibility: SD, SDHC, MMC, MMC Plus. For caveats and details, see:

<http://www.wildlifeacoustics.com/songmeter/flash.html>

## Song Meter Specifications

- 32GB SDHC cards are available from vendors today for a total of 64GB capacity with more expected as new SDHC and MMC Plus cards become available.
- Storage is almost doubled with compression.

## Power

- Batteries: (SM1 and SM1-M only) 4 “D” batteries (Alkaline or NiMH)
- External power supply: (for SM1-P and SM1-MP only) 6-12V DC, 500mA (models shipped before March 31, 2008 are only rated to 6V)
- Power Consumption:
  - 115-120mA uncompressed recording up to 16KHz stereo or 32KHz mono
  - 120-125mA faster uncompressed recordings or compressed recordings up to 16KHz stereo or 32KHz mono
  - 140-145mA faster compressed recordings.
  - < 0.15mA sleeping between recordings.
  - Add 10mA in all modes for SM1-P and SM1-MP.
- Recording time: 75-95 hours assuming 11,000mAh NiMH batteries in ideal conditions, or 95-120 hours in most cases with fresh Alkaline batteries.

## Future Expansion

- Field upgradeable via SD/MMC cards
- 400MIPS DSP, 8MB SDRAM, 4MB FLASH available for future signal processing applications such as detection, classification, and compression.



## Warranty

*Wildlife Acoustics Inc. Limited Warranty*

# Warranty

## Wildlife Acoustics Inc. Limited Warranty

**HARDWARE:** Wildlife Acoustics, Inc. ("WAI") warrants to the original end user ("Customer") that new WAI branded products will be free from defects in workmanship and materials, under normal use, for one (1) year from the original purchase date. WAI warrants refurbished WAI products, marked and sold as such, for ninety (90) days from the original purchase date.

**SOFTWARE:** WAI warrants to Customer that any WAI branded software will perform in substantial conformance to their program specifications for a period of ninety (90) days from the date of original purchase. WAI warrants the media containing software against failure during the warranty period. WAI makes no warranty or representation that the operation of the software products will be uninterrupted or error free, or that all defects in the software products will be corrected.

### EXCLUSIONS

This warranty excludes (1) physical damage to the surface of the product, including cracks or scratches on the outside casing; (2) damage caused by misuse, neglect, improper installation or testing, unauthorized attempts to open, repair, or modify the product, or any other cause beyond the range of the intended use; (3) damage caused by accident, fire, power changes, other hazards, or acts of God; or (4) use of the product with any non-WAI device or service if such device or service causes the problem.

Any third party products, including software, included with WAI products are not covered by this WAI warranty and WAI makes no representations or warranties on behalf of such third parties. Any warranty on such products is from the supplier or licensor of the product.

### EXCLUSIVE REMEDIES

Should a covered defect occur during the warranty period and you notify WAI, your sole and exclusive remedy shall be, at WAI's sole option and expense, to repair or replace the product or software. If WAI cannot reasonably repair nor replace then WAI may, in its sole discretion, refund the purchase price paid for the product. Replacement products or parts may be new or reconditioned or comparable versions of the defective item. WAI warrants any replaced or

repaired product, part, or software for a period of ninety (90) days from shipment, or through the end of the original warranty, whichever is longer.

**OBTAINING WARRANTY SERVICE:** Customer should refer to WAI's website at [www.wildlifeacoustics.com/support](http://www.wildlifeacoustics.com/support) for information on obtaining warranty service authorization. Methods for obtaining warranty service may vary depending on whether purchases were made from an authorized provider of WAI products, or from WAI directly. All requests for warranty service authorization must be made within the applicable warranty period. Dated proof of original purchase will be required. Products or parts shipped by Customer to WAI must be sent postage-paid and packaged appropriately for safe shipment. WAI is not responsible for Customer products received without a warranty service authorization and may be rejected. Repaired or replacement products will be shipped to Customer at WAI's expense. All products or parts that are replaced become the property of WAI. WAI shall not be responsible for Customer's software, firmware, information, or memory data contained in, stored on, or integrated with any products returned to WAI for repair, whether under warranty or not. The repair and replacement process for products or parts in locations outside of the United States will vary depending on Customer's location.

**WARRANTIES EXCLUSIVE: THE FOREGOING WARRANTIES AND REMEDIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, TERMS OR CONDITIONS, EXPRESS, IMPLIED OR STATUTORY, INCLUDING WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, ACCURACY, CORRESPONDENCE WITH DESCRIPTION, SATIS-FACTORY QUALITY AND NON-INFRINGEMENT, ALL OF WHICH ARE EXPRESSLY DISCLAIMED BY WAI AND ITS SUPPLIERS.**

**LIMITATION OF LIABILITY: NEITHER WAI NOR ITS SUPPLIERS SHALL BE LIABLE FOR INCIDENTAL, CONSEQUENTIAL, INDIRECT, SPECIAL, OR PUNITIVE DAMAGES OF ANY KIND, LOSS OF INFORMATION OR DATA, LOSS OF REVENUE, LOSS OF BUSINESS OR OTHER FINANCIAL LOSS ARISING OUT OF OR IN CONNECTION WITH THE SALE OR USE OF THIS PRODUCT, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), STRICT PRODUCT LIABILITY OR ANY OTHER THEORY, EVEN IF WAI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES AND EVEN IF ANY LIMITED REMEDY SPECIFIED IN THIS LICENCE AGREEMENT IS DEEMED TO HAVE FAILED OF ITS ESSENTIAL PURPOSE. WAI'S ENTIRE LIABILITY SHALL BE LIMITED TO REPLACEMENT, REPAIR,**

## **Warranty**

### *Wildlife Acoustics Inc. Limited Warranty*

OR REFUND OF THE PURCHASE PRICE PAID, AT WAI'S OPTION. IN NO EVENT SHALL WAI'S LIABILITY FOR ALL DAMAGES RELATED TO THE PURCHASE OF PRODUCT EXCEED THE AMOUNT PAID FOR THE APPLICABLE PRODUCT. THE FOREGOING LIMITATIONS WILL APPLY EVEN IF THE ABOVE STATED REMEDY FAILS OF ITS ESSENTIAL PURPOSE.

**DISCLAIMER:** Some countries, states, or provinces do not allow the exclusion or limitation of implied warranties or the limitation of incidental or consequential damages so the above limitations and exclusions may be limited in their application to you. When implied warranties may not be excluded in their entirety, they will be limited to the duration of the applicable written warranty. This warranty gives you specific legal rights; you may have other rights that may vary depending on local law. Your statutory rights are not affected.

**GOVERNING LAW:** This Limited Warranty shall be governed by the laws of the Commonwealth of Massachusetts, U.S.A., and by the laws of the United States, excluding their conflicts of laws principles. The United Nations Convention on Contracts for the International Sale of Goods is hereby excluded in its entirety from application to this Limited Warranty.

Wildlife Acoustics, Inc., P.O. Box 680, Concord, MA 01742-0680, United States of America, (888) 733-0200, [www.wildlifeacoustics.com](http://www.wildlifeacoustics.com)

# Declaration of Conformity (EN 45014)

Manufacturer: Wildlife Acoustics, Inc.  
P. O. Box 680  
Concord, MA 01742-0680  
United States of America

Declares that the following product:

Product Name: Song Meter  
Product Model Numbers: SM1, SM1-M, SM1-P, SM1-MP

Product Type: Digital Audio Field Recorder

Conforms to the appropriate country standards and governing regulations listed below. We, as the manufacturer, are fully responsible for the design and production of the above-mentioned equipment.

89/336/EEC: Official Journal of the European Communities Council  
(3 May 1989) on Electromagnetic Compatibility

92/31/EEC: Official Journal of the European Communities  
(28 April 1982) Amending Directive 89/336/EEC on: Council Directive  
on Electromagnetic Compatibility

CFR 47,  
FCC Part 15: Requirements for commercial data processing  
(8/14/2006) equipment. Class A: Industrial and commercial

EN 55022: Limits and methods of measurement of radio interference  
(1998, A1:2000, characteristics of information technology equipment  
A2:2003) Class A: ITE

CISPR22: (2005) Information technology equipment - Radio disturbance  
characteristics - Limits and methods of measurement.  
Class A:ITE

AS/NZS: Limits and methods of measurements of radio  
(CISPR: 2004) disturbance characteristics of information  
technology equipment. Class A: Industrial and

## Declaration of Conformity (EN 45014)

commercial

ICES-003: issue 4 Electronic Emissions from Data Processing Equipment  
(2/2004) and Electronic Office Machines

EN 55024: Information technology equipment - Immunity  
(1998, A1:2001, characteristics - Limits and methods of measurement  
A2:2003)

EN 61000-4-2: Electromagnetic compatibility (EMC) Part 4: Testing  
(1995, A1:1998, and measurement techniques - Section 2: Electrostatic  
A2:2001) discharge immunity test

EN 61000-4-3: Electromagnetic compatibility (EMC) Part 4: Testing  
(1995, A1:1998, and measurement techniques - Section 3: Radiated, radio  
A2:2001) frequency, electromagnetic field immunity test

This class A digital apparatus also meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

This product operates on 6V DC.

This product was tested in a typical configuration.



Ian Agranat, President  
Wildlife Acoustics, Inc.  
September 4, 2007

## Declaration of Conformity (EN 45014)