

**DRAFT**

# **ACOUSONDE™ QUICK-START GUIDE**

Model B003A and B003B

Firmware version 2.1, PalmOS client software version 2.1  
March 2012



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**GREENERIDGE SCIENCES, INC.**

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## **ACOUSONDE™ QUICK-START GUIDE**

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**DRAFT**

## 1 DOS AND DON'TS

- DO** set your Palm's time correctly before commanding the Acousonde.
- DO** bring your Palm's charging gear and/or spare batteries with you to the field.
- DO** bring a spare backup Palm and charger/batteries to the field.
- DO**, before each deployment, swab the positive battery contact (at the deep end of the battery housing) and the contact surfaces on the battery with isopropyl alcohol.
- DO** inspect the o-rings and o-ring seats (both on the battery cap and the battery enclosure) for cuts, abrasions, contamination, and adequate lubrication before each deployment.
- DO** use fresh, recently manufactured batteries.
- DO** tighten the battery cap **securely** to avoid depth- or vibration-induced power failure.
- DO** save the log file after deployments for future reference.
- DO** check the latest "Tips & Tricks" at [http://acousonde.com/tips\\_n\\_tricks.html](http://acousonde.com/tips_n_tricks.html).
- DON'T** allow any lithium battery to become shorted, by salt water or anything else.
- DON'T** force a MicroUSB plug into the Acousonde's MicroUSB jack. Do not use a rigid tool to insert the MicroUSB plug, as such a tool may allow excessive force. Damage to the MicroUSB jack is beyond repair and will render the Acousonde permanently unusable.
- DON'T** allow magnets near the Acousonde except to reset it using its magnetic switch. Magnets may alter the compass calibration or even permanently damage it, or may reset the Acousonde unintentionally.
- DON'T** drop the Acousonde or its battery cap, especially when they are separated. An impact may permanently deform the watertight sealing surfaces of the battery housing and/or cap.
- DON'T** force the battery cap if it will not "bottom" when being screwed in by hand. Remove the cap, check threads and o-rings, and try again. Tighten hard only *after* tightening by hand.
- DON'T** use a metal object, such as a knife or metal tweezers, to remove o-rings.
- DON'T** use abrasive material to clean the anodized o-ring facing wall in the battery housing or the anodized o-ring seats in the battery cap.
- DON'T** use petroleum-based lubricants (e.g. Vaseline) on the o-rings.
- DON'T** allow alcohol to remain in contact with the polyurethane body of the Acousonde; if any alcohol contacts the urethane during cleaning, wipe it away quickly.
- DON'T** secure the Acousonde 3A at the depth sensor (silver disk) or hydrophones. The battery housing, label area, and SD card stack are good regions for securing the 3A.
- DON'T** subject the Acousonde to pressures more than 125% of its pressure-sensor's rating, displayed on the label as the "depth" value. For extremely sensitive custom sensors (~50–100 m depth rating), finger pressure alone may be enough to destroy the sensor.
- DON'T** attempt to load new firmware without being advised to do so by the manufacturer.
- DON'T** store your Palm for long periods with batteries installed (if it uses field-replaceable batteries). They will deplete unnecessarily and may leak, damaging the Palm.
- DON'T** store lithium batteries in heat or humidity.

## 2 RECOMMENDED FIELD KIT

### *Tools*

- Cable, MicroUSB-to-USB, Hirose ZX40-B-5S-1000-STDA or similar
- Cutters, diagonal, miniature (i.e. dikes, snips, side cutters) to cut cable ties in close quarters
- Magnet, kitchen or similar (*to avoid compass damage, keep away from Acousondes unless to reset them!*)
- Palm (primary) with charger or spare batteries
- Palm (backup) with charger or spare batteries
- Pliers, needlenose, for tightening cable ties in close quarters
- Screwdriver, jumbo flat blade (for securing Acousonde 3B dome battery caps)
- Wrench, adjustable, small (for securing eyebolts in flange-type battery caps)
- Wrench, hex, deep, with T or screwdriver handle (for securing 3A floats)

### *Materials*

- Alcohol, isopropyl, 99% or electronics grade
- Bags, plastic, for Palms, zip-loc or similar
- Batteries, Saft LS17500 lithium A-cell
- Cable “zip” ties, select size for securing VHF transmitter in float
- Glue, “super”, Loctite Precision 01-21309 or similar
- Grease, silicone, Dow Corning 111 or similar (NOT petroleum-based!)
- Marker, waterproof, Sharpie or similar
- Q-tips
- Tape, electrical, Scotch Super 33+ or Super 88+, or similar
- Tape, reflective (for float)
- Tape, rubber self-fusing, Scotch 23 or similar (gripping battery cap, attachment foundation, other uses)
- Tissues, wipe/low-lint

### *Deployments screwing 3A float or eyebolt to battery cap*

- Anti-seize compound, Permatex/Bostik Never-Seez (Mariner’s Choice or Nickel), or Loctite Marine Grade, or other similar
- Eyebolts, 10-24 threads, with nut, 1.25” min. threaded shaft, for line attachments
- Screws, hexhead, 10-24 threads, and washers, for securing 3A float or other gear

### *Spare parts*

- Battery caps (in case of loss or damage)
- Cable “zip” ties, 0.1” width, short ~4”, UV resistant (for Acousonde 3B suction cups)
- Floats (spares typically only for 3A)
- O-rings, round cross-section, Buna-N 70 durometer size 019 or equivalent
- Suction cups (specific to 3A or 3B, choose as needed)

### *Suggested general deployment and retrieval gear*

- Antenna, VHF, with cable, compatible with receiver/transmitter frequencies
- Chart or map of study area
- Compass, handheld
- Deployment grip
- Deployment line and/or mooring gear (for fixed or boat-based deployments)
- Deployment pole
- GPS, handheld
- Headphones, silencing (e.g. aircraft cockpit), compatible with VHF receiver
- Receiver, VHF, compatible with transmitter frequencies, with batteries (built-in?) and charger
- Transmitter(s), VHF, compatible with tag (3A or 3B) and with frequencies documented

### 3 QUICK-START GUIDE

#### 3.1 MOUNT THE ACOUSONDE™ FILESYSTEM ON A PERSONAL COMPUTER

1. Remove the battery cap from the Acousonde. If it is difficult to grip the battery cap by hand, either wrap the cap with rubber tape (cylindrical caps) or use a jumbo flat screwdriver in the cap's slot (dome caps). Remove the battery if present.
2. Insert the MicroUSB end of the supplied MicroUSB/B-to-USB/A cable into the MicroUSB socket located deep in the battery housing. **The MicroUSB plug must be inserted with the USB logo and the 'B' marking facing outwards against the wall of the battery housing.** Wiggle the connector cable until the connector seats, then push the connector in gently, using a fingernail against the back end of the MicroUSB plug. It may be necessary to apply enough force that your fingernail bends, but not much more. ***Caution: Do not force the MicroUSB plug into the Acousonde's socket. Do not use a rigid tool to apply pressure on the plug; you could use more force than necessary without knowing it. IF YOU DAMAGE THE SOCKET THE ACOUSONDE WILL BE UNUSABLE AND PERMANENTLY BEYOND REPAIR.***
3. Plug the other end of the MicroUSB cable into an ordinary personal-computer USB socket, just as you would a flash drive or other USB peripheral. This will provide power to the Acousonde and it will boot up.
4. Ensure that the Acousonde boots up properly by watching the behavior of its red Alert LED (Figure 1), which should begin its flash sequences about 30 s after power is applied. When startup is complete, at least two USB volumes should be mounted for access on your personal computer. One of these volumes holds the log file and all auxiliary data. The remaining volume or volumes hold only acoustic data. *Note: Some PCs do not always see all volumes. On Apple computers, this can be solved simply by starting and then quitting the Apple "Disk Utility" application (found in the "Utilities" subfolder under "Applications"), or by disconnecting and reconnecting the Acousonde. No workaround for this problem has been found yet for Windows computers, other than to use a different computer.*
5. If any important files are located on the Acousonde filesystems that have not been saved, copy them from the Acousonde to your personal computer the same way you would from any USB flash drive. *Note: The Acousonde filesystems are read-only, you cannot modify them with your personal computer.*

### 3.2 PREPARE THE PALM AND MAKE SURE THE ACOUSONDE™ FILESYSTEM IS ERASED

1. Ensure your PalmOS-compatible Palm (henceforth “Palm”) has fresh or recharged batteries, and has been set to the correct date and time using the Palm’s built-in **Prefs** application. Whatever date and time you set will automatically export to the Acousonde when you use the Palm to interact with it.
2. If the Palm has not been loaded with the **Acousonde** client application since the last time it lost power (because its batteries were either removed or fully depleted), you will need to load the application on the Palm. You can do this via infrared directly from the Acousonde; no cables or other software are necessary. Create a text memo using the Palm’s built-in **Memo Pad** application. The memo should contain a single word – “Send” – with the S capitalized and the other letters lower-case, and without any quotes or leading spaces. Then select the **Beam Memo** item from the Palm’s drop-down menu (accessed in newer Palms by pressing the stylus to the upper-left corner of the screen, or, in all Palms, the menu softkey in the lower left corner of the screen). Ensure that the Palm and Acousonde infrared ports are facing each other and that the optical path between them is not obstructed. Once the memo has been beamed to the Acousonde, it will respond by beaming the **Acousonde** application to the Palm. Maintain the optical path between the Palm and the Acousonde until the transfer completes.
3. Start the **Acousonde** application on the Palm. From the drop-down menu, select the **STORAGE** page.
4. If the Acousonde filesystems mounted on your personal computer appear to contain files, erase them using the **Erase** softkey on the **Acousonde** application’s **STORAGE** page. This will send an erase command via infrared to the Acousonde. Again, for the infrared command to be received, the optical path between the Palm and Acousonde infrared ports must be clear. Erasure may take several minutes to complete, during which time the Acousonde will signal busy by cycling the brightness of its red Alert LED (see Figure 1).
5. When the red Alert LED turns off, indicating erase completion, remove the MicroUSB cable from the Acousonde by tugging gently.

### 3.3 PREPARE THE ACOUSONDE™ FOR DEPLOYMENT

1. Inspect the Acousonde's battery cap. Ensure the o-rings and o-ring seats in the Acousonde's battery cap are clean, undamaged, and lubricated with silicone (NOT petroleum-based) grease.
2. Inspect the Acousonde's battery housing. Check for obvious deformation or other damage that could result in leaks. Ensure the o-ring facing wall in the Acousonde's battery compartment is smooth and clean.
3. Ensure that the battery springs (both in the battery cap and deep in the battery housing) are clean. If in doubt, wipe the springs using a cotton swab wetted with isopropyl alcohol.
4. Prepare a Saft LS17500 A-size lithium battery cell by cleaning its contact surfaces using a cotton swap wetted with isopropyl alcohol.
5. Insert the LS17500 lithium cell into the battery compartment, button end first, and screw in the battery cap. Do not force it! If it does not screw in smoothly, an o-ring may be out of place or contaminated; remove the cap and check the o-rings. Once the battery cap is screwed in all the way, *tighten it very hard*. For Acousonde-3B "dome" caps use a jumbo flat screwdriver to ensure the cap is very secure. If the cap is not screwed in tightly, it may shift under pressure or vibration and lose electrical contact, which would end sampling. *Note: No damage will occur if the battery is inserted backwards. In that event a bright orange LED will light continuously to signify the error.*
6. Ensure that the Acousonde boots up properly by watching the behavior of its red Alert LED (Figure 1), which should begin its flash sequences about 30 s after power is applied.

### 3.4 PROGRAM THE ACOUSONDE™ AND START SAMPLING

1. Start the **Acousonde** application on the Palm; when the application is started, it will present the default **CONTROL** page. Or, if the application is already running, select the **CONTROL** page using the Palm's drop-down menu.
2. Select the acoustic (i.e. "primary") channel from which you wish to acquire data, either **Lo Power** or **Hi Freq**. *Caution: For some earlier units released in mid-2010 or before, if you select the Hi Freq channel but your Acousonde does not have the high-frequency hydrophone option installed, there may be no warning! In this event you will record instrument noise, not real data. This problem can be eliminated by updating the unit's configuration file and/or firmware.*
3. Enter the numeric sampling rate, in hertz, in the **Rate** field.
4. Select 0 or 20 dB **Gain** (selecting other gain options will round off to either 0 or 20 dB).
5. Select an **Aux** (auxiliary) sampling program, if one is desired.

6. Enter one or two arbitrary letters/numbers for the **Site**. Whatever is entered here will appear as the first two characters of the filenames for all data files acquired with this recording program. The choice of these characters is entirely up to you.
7. Use the **Send** softkey to beam the sampling program to the Acousonde. The Acousonde will confirm by beaming back the closest sampling program it can support. As with all infrared interactions, ensure that the optical path between the Palm and the Acousonde is unobstructed during this exchange.
8. Inspect the sampling program with which the Acousonde responded, and check the date and time returned by the Acousonde shown on the **Control** page as “Now”. If the sampling program now shown as accepted by the Acousonde is not what you want, adjust the sampling parameters. If the date or time is wrong, adjust the Palm’s time-of-day clock using the Palm’s **Prefs** application. Once you have made the necessary adjustments, you will need to **Send** the sampling program from the **Control** page again to transmit the modifications to the Acousonde.
9. Once you are satisfied with the sampling parameters, use the **Execute** softkey to tell the Acousonde to begin sampling. The red Alert LED will flash a “Caution Alert” (Figure 1) to indicate that the Acousonde received and is acting on the **Execute** command. Sampling will start approximately 15 seconds after the Caution Alert is displayed.
10. After sampling should have started, confirm that the yellow System LED flashes at the top of the minute as expected (Figure 2). If acoustic sampling is underway, the System LED will produce a single yellow flash; if no acoustic sampling is occurring but auxiliary sampling is underway, the System LED will produce a double yellow flash.
11. To terminate sampling, use the **Stop** softkey on the Palm application’s **CONTROL** page to send a stop request via infrared to the Acousonde. *Note: When sampling, the Acousonde is unable to devote as much processor time to handling infrared transactions. Your Palm may report errors when attempting to beam your request to stop sampling. You may need to retry the stop attempt, in some cases several times, before the stop command is received.*

### 3.5 INSPECTING DATA RECORDED BY THE ACOUSONDE™

1. To inspect acquired data, mount the Acousonde's filesystems on a personal computer as described in the beginning of this quick-start guide.
2. At least two volumes should be available to you. One volume is the “auxiliary” volume, denoted with a volume name suffixed with “\_X”. The auxiliary volume holds the log file (in plain text format) and all of the auxiliary data that has been gathered (temperature, pressure, orientation, etc.). Other volume(s) are “acoustic” volumes that contain only acoustic data files.
3. All data files, whether auxiliary or acoustic, share a common file naming convention:

AABCCCC .MT

where

AA = 2-letter site field entered when recording was programmed

B = 1-letter sensor code

CCCCC = 5-digit index for files recorded from a given sensor

The sensor code letter may be one of the following:

I, J, K = Accelerometer X, Y, Z axes respectively

X, Y, Z = Compass X, Y, Z axes

S = Acoustics from low-power hydrophone

H = Acoustics from high-frequency hydrophone

P = Pressure (i.e., depth)

T = Temperature

For example, the filename MBP00012.MT would indicate the thirteenth pressure file recorded since the last time storage was erased (the first file would be index 0). The “MB” that begins the file name is arbitrary, being whatever the user entered when the recording was programmed. Perhaps in this example it might stand for “Monterey Bay”, or it might be a code identifying the animal to which the tag was attached.

4. The creation date reported by the operating system for all data files is correct for the time zone in which the files were recorded.
5. All data files, whether auxiliary or acoustic, are in “MT” format. A MATLAB “M”-file that reads MT files may be downloaded from the Acousonde web site. For programmers, a “C” language header file that describes MT format is available on request.

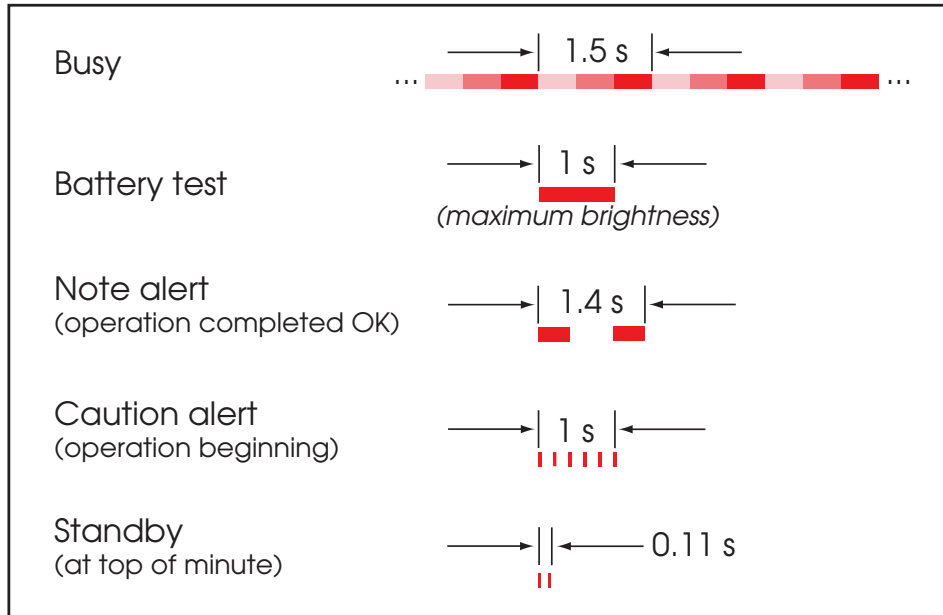


Figure 1. Normal red (Alert) LED behavior.

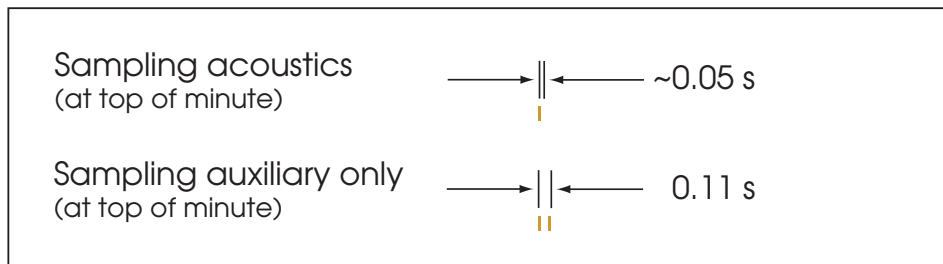


Figure 2. Normal yellow (System) LED behavior.