

SUR-1

Submersible Ultrasonic Receiver Operation Manual



SONOTRONICS

**3169 S Chrysler Ave
Tucson, AZ 85713**
Email: sales@sonotronics.com
www.sonotronics.com

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SUR-01 Submersible Ultrasonic Receiver

The SUR-01 is a submersible receiver designed to detect and log to flash memory the presence of an animal wearing a Sonotronics ultrasonic transmitter.

Specifications:

Weight: 766g
Buoyancy: *Positively Buoyant*
Sensitivity: *>35dB (S+N)/N with 10uV input*
Length: *368mm from transducer to eye bolt*
Diameter: 60mm
Memory: *1/2 Megabyte—Over 50000 detections*
Lifetime¹: *5 months—1xD cell, 10 months-2xD cell**
Battery: *Tadiran TL5930*
Depth Rating: *200m recommended, 270m tested*

**For the two month battery life option, the SUR-1 must be ordered with the extra battery compartment option—ordering code “2D”*

¹Please see our section on blanking times for a full understanding of lifetime and blanking time implications on lifetime.

Basic Operation:

The SUR detects Sonotronics transmitters using standard Sonotronics detection algorithms. This allows the same transmitters to be used across any platform—manual tracking receivers, diver receivers, etc. The SUR also employs new proprietary techniques for noise reduction. The SUR is designed to be “plug and play”, meaning that you can just turn it on and deploy it. There are many advanced options available to customize SUR performance to your particular study, but the default settings work in many cases. The main change made is the selection of frequencies to scan which can be done using SURsoft PC software.

Understanding the data being logged:

The standard Sonotronics algorithm for the detection of ultrasonic transmitters is the use of unique frequency and interval time (time in milliseconds between pings) combinations. An example data hit looks like:

00>09:06:55 09/28/04,76.0,986

This would mean a transmitter at 76 kHz was detected with a pulse interval of 986ms, at 9:06 am 9/28/04.

Please read “Understanding Pinger ID Algorithm” document from the support page of

Anatomy of an SUR-1:



The SUR is intended to be opened on the top for replacing batteries, and opened on the bottom for turning the unit off and on.

Warning!!! Never hold the transducer or Serial Com Port jack when opening. Use the rim of the gray cap only.

The On/Off switch is to be used for changing batteries. If the SUR is going to be stored and has a battery in it, you can also use the on/off switch for that purpose. Note that the switch is in the off position when it is towards the middle of the SUR. It is in the on position when it switched towards the outside of the SUR.

The SUR operating LED will blink once each time the SUR finishes its channel map. This allows the user to know the SUR is operating.

The SUR serial number inside each unit is easy to read through the clear housing. This number is also at the top of data files exported by the SUR, allowing it to be easy to identify which SUR the file came from.

Understanding the SUR-Interface software:

The SUR interface software allows the user to upload the data from the SUR, erase memory, program frequencies to scan, and other options. The software is available for download from the Sonotronics website. There is a complete manual included with the software, and an icon is placed on the desktop during installation.

Understanding SUR-PPC:

In July 2005 Sonotronics introduced the SUR-PPC, a pocket PC with a lite version of SURsoft installed. The unit comes in a waterproof case and data connection cable. The lite version of SURsoft allows for memory download, memory erase, set time, and checking of the SUR ID. This way a PC can be used in the lab for setting the SUR's up with frequency map, etc, but in the field only a physically small and weather ready device needs to be used.

Deployment/Mounting:

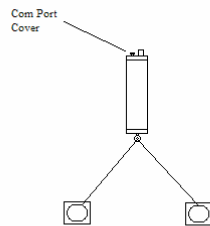
It is suggested that a quick test be done in air to verify everything is working (correct frequencies chosen, etc.) To perform such a test, turn on the SUR, simply put the test pinger in the channel map using the SURsoft PC software, erase the SUR memory, and hold the test pinger 2" away from the transducer. You can do all of this while leaving the SUR plugged into the PC with SURsoft running. You can then select check SUR for data and see if the any data being logged. Note that there can be a significant delay while scanning. Using the default channel map, hich has 15 frequencies in it, it takes over 100 seconds to complete the channel map. This means that it could take this long to detect a tag, and in some cases it could take several passes through the channel map to pick up the tag. Please see the section on blanking times in order to understand this concept further. You should eventually see that the SUR has record(s) in it, which you can now download.

The most common deployment configuration is shown in the first diagram. The eye bolt on the bottom of the SUR is intended for running a cable or rope for mooring the unit. Having two anchor points (in the picture, concrete blocks) allows more stability. When deploying, it is important to mount the SUR so that the unit will be clear of boat traffic overhead. Also it is important to remember to put on the communication port cap on the bottom of the unit before deploying. The SUR outside diameter is designed so that a 2" PVC coupler can be snapped onto the top of the SUR to protect the transducer. The SUR can be deployed with this cap on, and it will not affect detection.

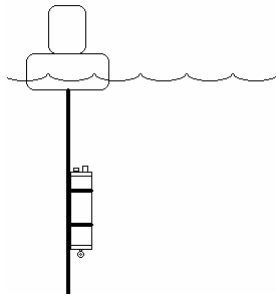
Deployment/Mounting continued:

It is of course important to make sure that you can find the SUR in order to retrieve it. There are several techniques available for this:

1. Most common deployment configuration—anchor size depends upon water flow, etc.

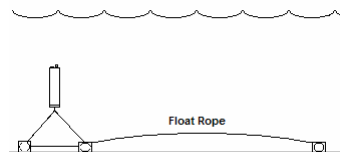


1. Attaching the SUR to a known object, such as a dock piling or an anchor chain.



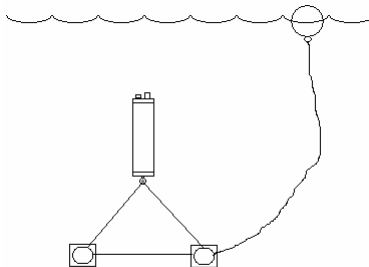
2. Leaving a rope running from the SUR to shore, keeping the end just underwater where it is easy to find from shore. (No picture)

3. Leaving a length of floating rope running from one of the SUR anchor points out to a second anchor a distance away, say 10m. The float rope will stay off the bottom, making it easy to grapple for.



Deployment/Mounting continued:

4. Leaving a float on a rope above the SUR at the surface—of course this isn't good in an area with a lot of boat traffic or curiosity.



Ping and Response function:

The ping and Response function allows the user to determine the presence/absence of data in the SUR. To implement the feature, simply set your manual tracking receiver to 33kHz, and lower the special interrogator pinger into the water within 100m of the SUR. The SUR will respond with one of the following codes:

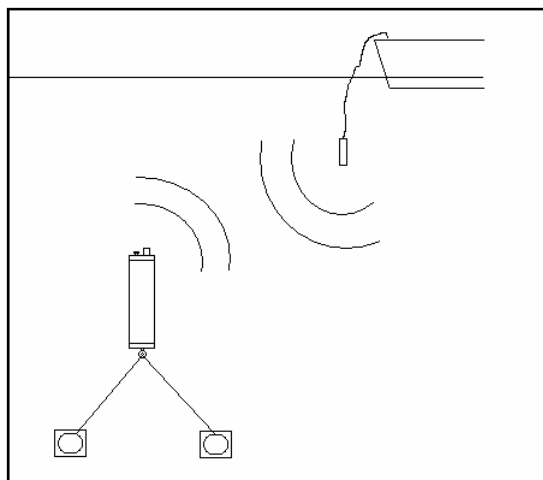
3 pings, with no successive pings= Zero data hits

3 pings, followed by 3 fast pings= greater than 0 and less than 100 data hits

3 pings, followed by 6 fast pings = greater than 100 data hits

The interrogator transmitter pings at 528ms and is NOT logged as data. This is to avoid false positive data hits from the interrogator.

Note: The SUR interrogator operates at 60kHz, which is never used as a standard pinger frequency.



You MUST put 60kHz in your channel map in order for ping and response to work!!!

Replacing Batteries:

To replace the batteries in an SUR, follow these steps:

1. Unscrew the top cap of the SUR. DO NOT unscrew holding the transducer or serial connector. Hold the circumference of the grey cap itself.
2. Slide the PCB out of the SUR housing
3. Turn off the power using the switch at the end of the board. The SUR is on when the switch is towards the outside world.
4. Replace batteries, being careful to keep the same orientation. The positive end should be towards the transducer. Note that you have about an hour with no battery in the SUR before you lose the time and date. Frequency map and all other settings are not lost regardless of how long the battery is out of the SUR.
5. When reassembling the unit, it should be observed that the LED on the end of the battery compartment board will blink three times when the unit is powered on with the switch.
6. IMPORTANT!!! You must inspect the O-ring as you are screwing the top end back into the unit. If the O-ring is not seated properly, the units will not be water-proof. You must tighten the top as tight as you can by hand. Occasionally it is recommended that you add a little bit of Vaseline to this O-ring as this will help it seat properly.

Replacement Batteries can be ordered from Sonotronics. Do not replace the battery with a standard D cell alkaline battery. The SUR requires a special Lithium 3.65v battery in order to operate. They can be ordered using the ordering code SUR-BAT from Sonotronics.

Understanding Blanking Times:

In order to increase battery life on SUR's, a blanking time is introduced. This means that there are periods of time that certain subsystems in the SUR are powered down in order to save battery power. In most applications, it is not necessary for the SUR to be continuously monitoring as an animal will take time to move through an area. The default blanking times and their meanings are listed below:

1. 6 seconds between each channel—This means that the SUR will spend around a second listening on a frequency for a tag, then it will power down for 6 seconds. It will then power up and check the next channel, etc.
2. 10 seconds between channel maps—This means that the SUR will power down for 10 seconds after the channel map is complete. It will then power up and start again with the first frequency in the channel map.
3. Due to the two algorithms above, the total time for an SUR to check each frequency map is as follows:
 $(15 \text{ channels (default)} \times 1 \text{ sec/channel}) + (6 \text{ secs} \times 15 \text{ channels}) + 10 \text{ seconds}$
 $= 115 \text{ seconds to complete sequence}$
This means that a particular frequency will be checked for tags every 115 seconds.

The default blanking times result in an SUR lifetime of 5 months on a single D cell battery. Without any blanking times, the SUR lifetime is 3 months. In applications where constant monitoring is necessary, these parameters can be changed easily using the character interface in the SURsoft software with the aid from Sonotronics support.

Ordering Codes:

Available Add On SUR Options and Their Codes

Features/Accessories	Ordering Code	Benefit
Compartment for two D cell Batteries	SUR-1-2D	5 month extra lifetime, for a total of 10 months.
Replacement Batteries for SUR's	SUR-BAT	Convenient ordering from Sonotronics of Tadiran TL-5930 D cell replacement batteries for SUR's.
Pocket PC "data vacuum" with SURsoft PPC software	SUR-PPC	Easy interaction with SUR's in the field via pocket PC. The pocket PC is a fully functional HP ipaq 3115 with a water proof field case. Comes installed with SURsoft PPC software.
SIT-1 SUR interrogator transmitter	SIT-1	This special pinger interrogates the SUR's, allowing the ping and response function to work. Only one SIT is needed to service an array of SUR's.

Suggested Reading:

SURsoft Manual—icon is installed on your desktop when you install SURsoft

Understanding Pinger ID Algorithm Document —available from support section on the website

NOTES:

SONOTRONICS
3169 S Chrysler Ave
Tucson, Az 85713
(520) 746-3322
www.sonotronics.com
sales@sonotronics.com