

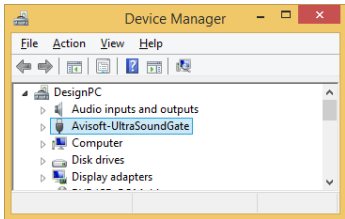
Introduction

Thank you for purchasing Avisoft UltraSoundGate 116Hm. This bus-powered USB device supports single-channel high-speed data acquisition at sampling rates of up to 1 MHz. The accompanying recording software Avisoft-RECORDER USGH provides either continuous or triggered direct-to-disk recording with real-time spectrogram displays.

Installation procedure

First download and install the RECORDER USGH software from the Avisoft Bioacoustics website (www.avisoft.com/downloads.htm or directly www.avisoft.com/RECORDER_USGH.exe). This installation program will install both the RECORDER USGH application (`rec_usgh.exe`) and the required device drivers (`usgh_xx16h.inf`, `usgh.sys`) for the UltraSoundGate xx16H devices. When the installation procedure has completed, the UltraSoundGate unit can be connected to the computer. The device should then be detected as "Avisoft-UltraSoundGate 116H" and the pre-installed driver should be finally activated.

Under some circumstances it might happen that the silent installation of the device driver fails. If that happens, navigate to the *Windows Control Panel > Hardware and Sound > Device Manager* and right-click at the entry *Other devices > Avisoft UltraSoundGate 116H* and select the *Update Driver Software...* option. Then click at *Browse my computer for device driver software*, click at *Browse* and navigate to the folder `C:\Program Files (x86)\Avisoft Bioacoustics\RECORDER USGH\Drivers` and finally click at *Next*. The completed device driver installation will then look like this:



Getting started

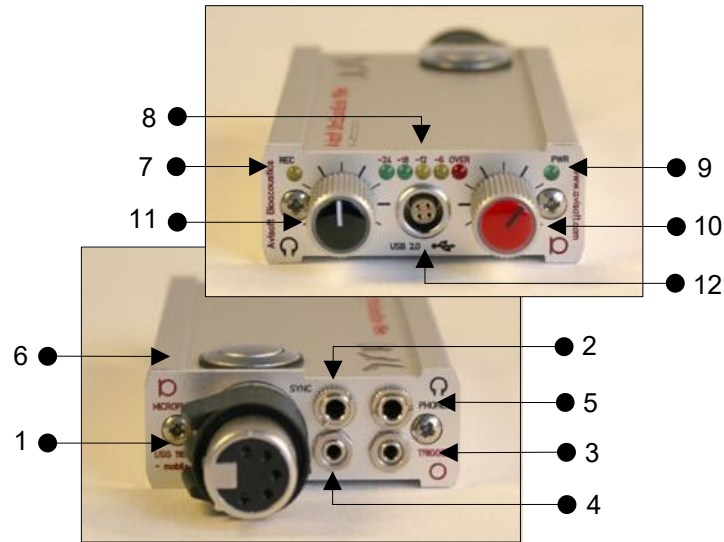
The supplied RECORDER USGH software can be launched from **Start / All Programs / Avisoft Bioacoustics / RECORDER USGH**

On the first program start, the configuration dialog box will be launched automatically (otherwise it is available from **Options / Configuration**). Select the desired **Sampling rate** from the **Input Device Settings** section and click at **Ok**. Then click at the **Pause** button (**Monitoring/Pause**) and the **Start** button (**Monitoring/Start**). You will then see the real-time spectrogram displaying the incoming signals.

To become familiar with the RECORDER USGH software use the online help system that can be accessed through the drop-down menu **Help > Help...**, the **Help...** buttons on the individual dialog boxes or the website at <http://www.avisoft.com/Help/RECORDER/content.htm> and the section **RECORDER USGH Software Settings** in this guide.



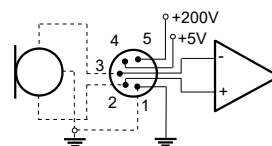
Components of the UltraSoundGate 116Hm



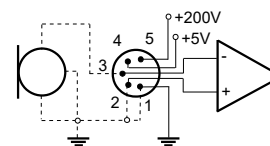
1 XLR input connector

The 5-pole XLR input connector represents the analog inputs of the recording device and provide power supply voltages for external amplifiers and microphones. The connector scheme is as follows:

- 1 Ground
- 2 Positive input
- 3 Negative input
- 4 +5V supply voltage (max current 20 mA)
- 5 +200V polarization voltage



differential source



single-ended source

2 SYNC input/output

This socket allows to synchronize the sample clock signals of several UltraSoundGate units. To accomplish this, all devices must be connected to a single computer and one device must be configured as the master (see section *RECORDER USGH Settings* for details).

3 TRIGGER input/output

This 2-pole (mono) 2.5 mm mini-jack connector is electrically connected to the TRG button (7) and allows connecting an external trigger. This input is TTL-compatible (there is additionally an internal pull-up resistor of 10 kOhm to Vcc). Pulling this input to ground (for instance by closing a simple switch) will activate the logic **USG TRG button**. See the last page on how to configure the TRIGGER socket as an output

4 DIN

This 2-pole 2.5mm mini-jack connector allows to connect an external digital signal. The input is TTL-compatible (internal pull-up resistor of 10 kOhm to Vcc). The status of this signal is stored in the LSB (bit 0) of the 16-bit data words that are transmitted over the USB and can be used as a sample-precise trigger source in the RECORDER software. It can be extracted afterwards by the Avisoft-SASLab Pro sound analysis software (e.g. for creating labels). The digital input functionality is not available in the 8-bit recording mode.

5 PHONES

This stereo 3.5mm mini jack connector allows to connect headphones or a small speaker for acoustically monitoring the incoming ultrasounds. A undersampling technique is being used to convert the ultrasonic sounds into audible signals. The undersampling ratio can be adjusted from the Advanced USGH Settings dialog box of the RECORDER USGH software (see section *RECORDER USGH Settings* for details).

6 TRIGGER button

This button can control the .wav file recording process in the RECORDER software. To enable this mode of operation, one of the following *Trigger* source options must be selected from the configuration dialog box:

USG TRG button auto hold : Pressing the button for more than 2 seconds will activate an auto hold mechanism (the recording continues after releasing the button and will stop once the button is pressed again). If the button is pressed for less than two seconds, it will only record as long as the button is being pressed.

USG TRG button : The software will record as long as the button is pressed.

USG TRG button inverted : The software will record as long as the button is not pressed (or as long as the external TRG signal is not active (logic high)).

USG TRG button toggled : The software will start recording once the button is pressed and continues until the button is pressed again.

7 REC indicator

This amber colored LED will flash once the device is connected to the PC. It will be switched off once the RECORDER USGH software is running the in the monitoring mode. In this mode, the REC LED indicates whether the RECORDER software is recording the incoming data onto disk.

8 Peak level meter

The peak level meter indicates the instantaneous recording level. The red OVER LED indicates clipping (over-modulation). If this happens, the gain should be reduced by turning the gain control knob to the left (anticlockwise).

9 POWER indicator

This green LED indicates that the unit is connected to the USB power supply.

10 GAIN control knob

This control knob adjusts the analog input recording level.


11 VOLUME control knob

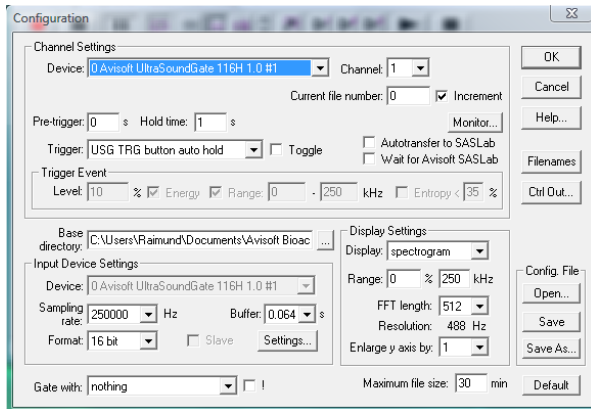
This knob adjusts the volume of the phones monitor output (5).

12 USB 2.0 interface

The supplied USB cable with the push-pull plug must be plugged in here. The USB cable should be first connected to the UltraSoundGate 116Hm and then to the computer. Make sure that the red dots on the LEMO socket and the plug are aligned. Otherwise the device can be damaged. It is also recommended to leave the USB cable connected to the UltraSoundGate when it is not in use.

RECORDER USGH Settings

The configuration dialog box can be launched from the menu Options/Configuration... or through the button 



The input sample rate can be selected from the **Input Device Settings** section. Available sample rates are 1000, 750, 666, 500, 375, 400, 333, 300, 250, 214, 200, 187, 166, 150, 125, 100, 75, 62 and 50 kHz.

The **Buffer** setting determines the USB transfer buffer size on the PC. Shorter durations will provide low real-time spectrogram display latencies but might lead to erroneous USB transfers under certain conditions.

The **Settings...** button in the **Input Device Settings** section launches the **Advanced USGH Device Settings** dialog box that provides several additional device-specific options:

Enable master/slave mode for synchronizing several devices If you use more than one UltraSoundGate XX16H device, it is possible to synchronize their A/D converter sampling clock signals by connecting them through the SYNC sockets and activating this option (a 3 pole cable fitted with 3.5mm phone plugs is required). In such a set-up, one device acts as the clock master and the other devices listen to the clock signal as slaves.

Activate slave mode for this device In the **master/slave mode**, one device acts as the master and the others as slaves. So, this option must be disabled on the unit that should act as the master and must be enabled on all other slave units (all USG XX16H devices can act either as slave or master).

Enable low power mode The A/D converter chips can optionally be operated in a power-saving mode that would increase the battery life in mobile laptop-based systems. The low-power mode slightly degrades the dynamic range performance.

Enable band-pass mode At a few sample rates (50, 62.5, 75, 150, 187.5, 200, 250, 333 and 375 kHz), the A/D converter can be configured for a special band-pass mode in which the analog input bandwidth ranges from $fs/2$ to fs instead of the normal mode from 0 to $fs/2$. This option can be advantageous for monitoring applications that require minimal .WAV files sizes. Note that the frequency scale of the resulting .WAV files will be reversed.

Turn on the polarization voltage This option activates the internal 200V polarization voltage generator of the UltraSoundGate XX16H devices and must be activated when using the CM16/CMPA microphones.

Ignore GetOverlappedResult error By default, the **GetOverlappedResult** error message will stop the monitoring/recording process. If this option is activated, the monitoring procedure will be immediately restarted, which is desired in long-term monitoring applications.

TRG out mode This option allows to change the I/O direction of the TRG socket. If activated, the TRG socket will be configured as a digital output that carries the state of the internal trigger or file saving state as selected from the **Control Output settings** dialog box (**Ctrl Out...** button). In this case, the **USG TRG button** trigger source options will not work. The **TRG out mode** option is only available on units that have the firmware version 1.1 or higher.

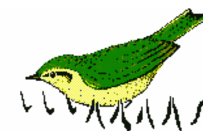
Monitor undersampling ratio This list box allows to select the desired undersampling ratio of the acoustic monitoring output (5) from 2 to 30 in steps of two. The internal D/A converter will be clocked at a rate that is equal to the selected input (A/D converter) sample rate divided by the selected ratio. The resulting output sample rate is displayed behind the ratio (= xxx Hz). For instance, if you have selected an input sample rate of 333333 Hz and an undersampling ratio of 10:1, the resulting output sample rate will be 33333 Hz. All input signal components above the Nyquist frequency (half of the output sample rate = 16666 Hz) will be folded down to the range between zero and the Nyquist frequency. For instance, a 30 kHz input signal will appear at the monitor output at a frequency of 3333 Hz.

Sound-activated recording can be arranged by selecting the **Trigger** source option **level of this channel**. For remote-controlled triggering via the trigger button on the device or via the external TRG input, one of the trigger options **USG TRG button...** can be used. For triggering by a TTL signal attached to **DIN**, select **UltraSoundGate DI**.

The Pre-trigger duration should be kept as short as possible. Long pre-trigger settings can lead to data transmission errors if the sample rate and the number of channels is high.

In order to simplify the operation of the Avisoft-RECORDER software in the field, a link to **RECORDER USGH** may be added to the Windows **Startup folder** (**Start->All Programs->Startup**). Additionally, the Avisoft-RECORDER option **Monitoring/Autostart** should be activated. This arrangement will start the monitoring process automatically after booting the laptop (the UltraSoundGate device must be attached to the USB port prior to booting Windows).

Please refer to the users guide or the online help system for further details on the Avisoft-RECORDER software.



End-user Agreement

This a legal agreement between Avisoft Bioacoustics and the buyer. By operating this device and the accompanying software, the buyer accepts the terms of this agreement.

- 1.The Device and the accompanying software is warranted to perform substantially in accordance with the operating manual for a period of 24 months from the date of shipment.
- 2.EXCEPT AS SET FORTH IN THE EXPRESS WARRANTY ABOVE, THE DEVICE IS PROVIDED WITH NO OTHER WARRANTIES, EXPRESS OR IMPLIED. THE VENDOR EXCLUDES ALL IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.
- 3.The Vendor's entire liability and the Buyer's exclusive remedy shall be, at the Vendor's SOLE DISCRETION, either (1) return of the device and refund of purchase price or (2) repair or replacement of the device.
4. THE VENDOR WILL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES HEREUNDER, INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, LOSS OF USE, OR LOSS OF DATA OR INFORMATION OF ANY KIND, ARISING OUT OF THE USE OF OR INABILITY TO USE THE DEVICE IN NO EVENT SHALL THE VENDOR BE LIABLE FOR ANY AMOUNT IN EXCESS OF THE PURCHASE PRICE.
5. This agreement is the complete and exclusive agreement between the Vendor and the Buyer concerning the device.

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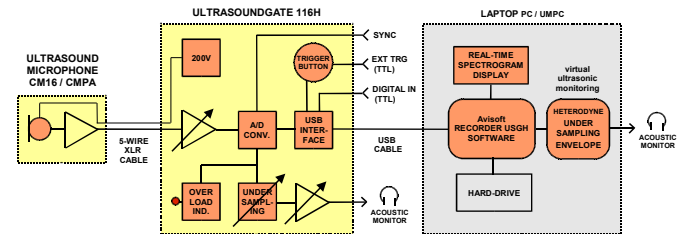


Specifications

Number of channels	1
ADC type	Delta-Sigma architecture with integrated adaptive anti-aliasing filter
Resolution	16 bit or 8 bit
Sample rates [kHz]	1000, 750, 666.6, 500, 400, 375, 333.3, 300, 250, 214, 200, 187.5, 166.6, 150, 125, 100, 75, 62.5, 50
Frequency response (-3dB)	20 Hz - 460 kHz
Input sensitivity (max trim)	-43.2dBV = -41 dBu = 6.9 mVrms
Input sensitivity (min trim)	-3.2dBV = -1 dBu = 0.69 Vrms
Gain adjustment potentiometer	40 dB continuous range
Input impedance	50 kOhm
Analog input connector	female XLR-5 socket
Other inputs	external trigger (TTL-compatible), digital input/output (TTL-compatible), SYNC in/out
Computer interface	USB 2.0, isochronous high-speed mode
Max supply current (drawn from the USB)	250 mA
Physical dimensions (W/H/D)	58 x 22 x 160 mm
Weight	200 g

Computer requirements

Windows PC with at least two USB 2.0 ports, running Windows Vista / 7 / 8 / 10 / 11



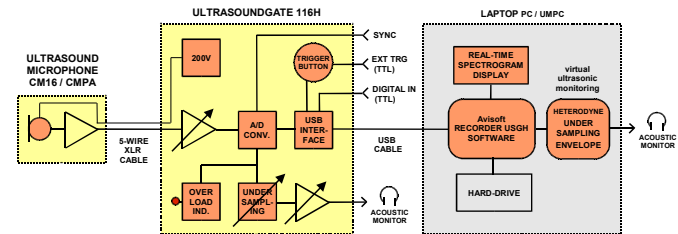
In the interest of product improvement, the specifications and/or appearance of this unit are subject to change without notice.

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Number of channels	1
ADC type	Delta-Sigma architecture with integrated adaptive anti-aliasing filter
Resolution	16 bit or 8 bit
Sample rates [kHz]	1000, 750, 666.6, 500, 400, 375, 333.3, 300, 250, 214, 200, 187.5, 166.6, 150, 125, 100, 75, 62.5, 50
Frequency response (-3dB)	20 Hz - 460 kHz
Input sensitivity (max trim)	-28.4 dBV = -26.2 dBu = 38.0 mVrms
Input sensitivity (min trim)	1.6 dBV = 3.8 dBu = 1.2 Vrms
Gain adjustment potentiometer	30 dB range with 3 dB increments
Input impedance	50 kOhm
Analog input connector	female XLR-5 socket
Other inputs	external trigger (TTL-compatible), digital input/output (TTL-compatible), SYNC in/out
Computer interface	USB 2.0, isochronous high-speed mode
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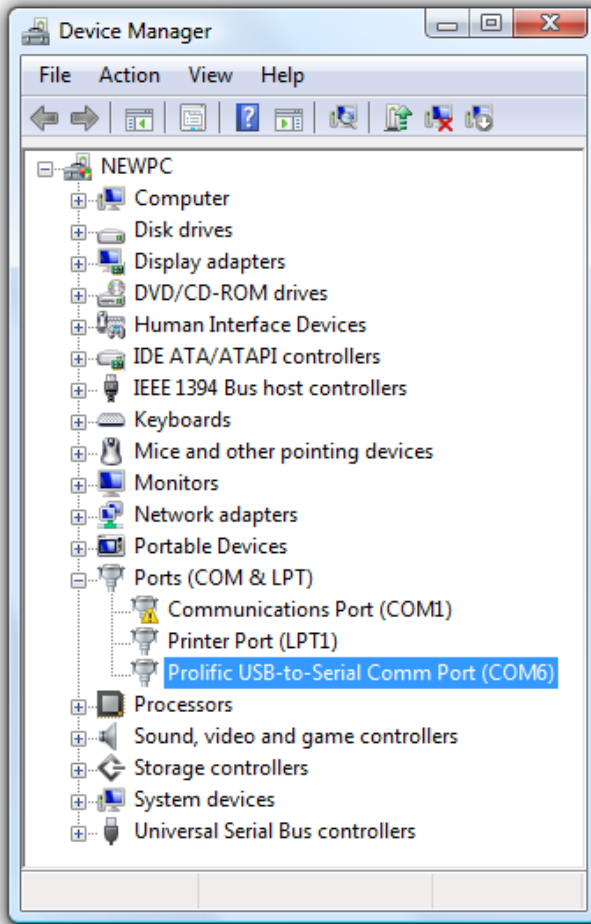
Installing the GPS Receiver

The supplied USB GPS receiver allows to log the geographic coordinates of the recorded .wav files from the Avisoft-RECORDER software.

It is required to install a device driver for the GPS receiver. This can be done from the supplied NAVILOCK installationCD, from the GPS subfolder on the Avisoft Bioacoustics CD or from the manufacturer website www.navilock.com.

Once the GPS receiver is connected to the PC, a new USB device will be detected and its "USB-Serial Controller" driver should be finally activated.

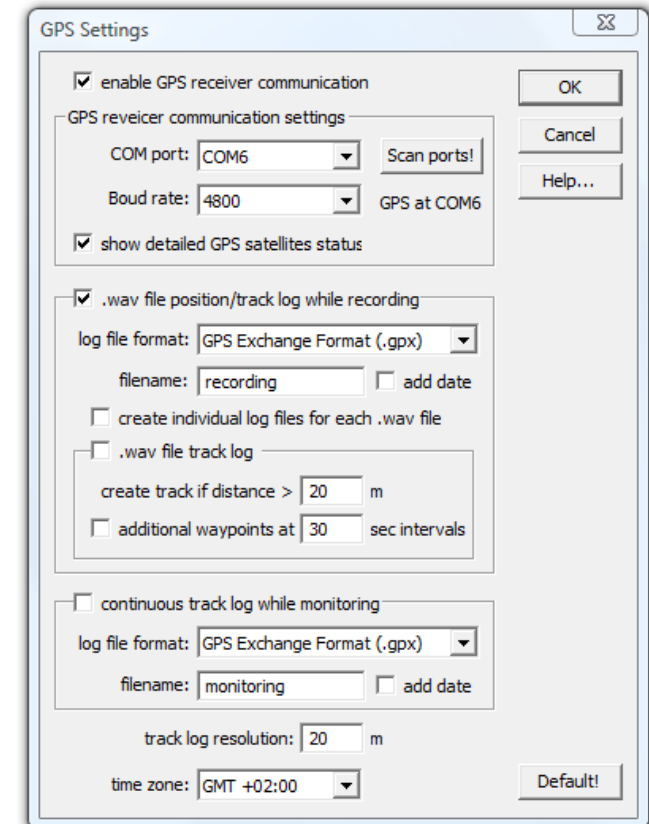
The successfully installed driver is listed on the **Ports** section of the Windows Device Manager as a "Prolific-to-serial Comm Port":



Windows automatically assigns the GPS receiver to a virtual COM port (COM6 in the above example).

The previously installed GPS receiver can then be selected from the Avisoft-RECORDER command **'Options'/GPS Settings...**. By clicking at the **Scan ports!** button in the **GPS receiver communication settings** section, the proper COM port settings for the GPS receiver should be detected automatically. Alternatively, you might select the serial port communication settings (**COM port** number and **Baud rate**) manually.

The GPS data logging mechanism is activated from the option **enable GPS receiver communication** at the top of the dialog box.



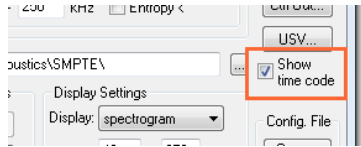
See also the RECORDER manual or click at the **Help...** button to get further information on how to set it up.

The optionally available notebook carrying frame also allows to attach the USB GPS receiver to it, which makes the entire system more convenient.

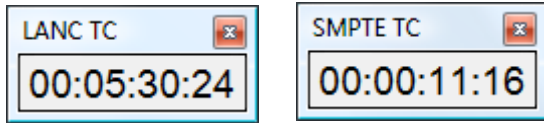
Alternatively, a battery-powered Bluetooth GPS receiver could be used, which would eliminate the additional cable connection. The principle of the data transfer is the same because the Bluetooth communication is established through a virtual COM port.

LANC / SMPTE time code interface

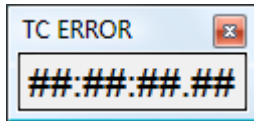
The RECORDER USGH software can decode LANC and SMPTE time code information that is fed into the UltraSoundGate digital inputs (DIN). To enable the time code signal detection / decoding mechanism, the option Show time code on the Configuration dialog box must be checked:



Once a valid LANC or SMPTE signal is detected on one of the DIN inputs, a time code display will be launched:



In case the software cannot extract a meaningful time stamp stream, a TC ERROR message is displayed:



Interfacing to LANC Time Code

LANC (RS232, 9600 baud) time code information was available on a number of MiniDV (tape-based) SONY and Canon camcorders that is no longer available on the new file-based products. The LANC signal is usually a 2.5mm stereo TRS jack (or in newer models a 10-pin A/V terminal jack, which requires an appropriate adapter cable) that can be connected to a USG DIN socket by using a custom-made interface cable that has a 3-pole 2.5 mm TRS plug at one end (with the ring pin left unconnected) and a 2-pole 2.5 mm TS plug at the other end. Such a cable is available from Avisoft Bioacoustics (part# 40122).

Interfacing to SMPTE Time Code

SMPTE time code signals are provided by a number of SMPTE time code generators, such as the model HORITA PG-2100 or TG-50/TG-50P. The output signal of these devices is an AC-coupled signal that is originally intended for recording onto an analog audio input channel. It is therefore required to convert this AC-coupled signal to the open-collector DIN input of the UltraSoundGate. A suited adapter cable with integrated amplifier is available from Avisoft Bioacoustics (part# 40123.)

The recorded time code can also be played from within the Avisoft-SASLab Pro software through a common soundcard or audio interface, which can be set up by activating the option File/Advanced playback options/Route UltraSoundGate DIO track (LTC) to the right playback channel.

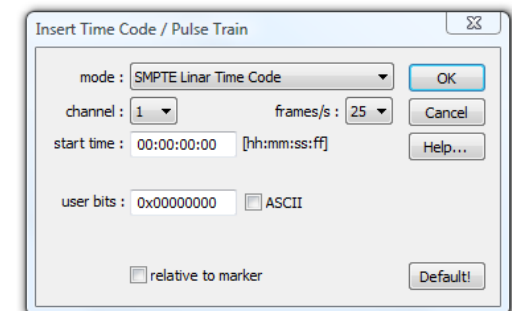
If activated, an UltraSoundGate DIO track containing linear time code (LTC) will be routed to the right channel of the playback device, which will enable synchronization with suited video playback equipment.

On multichannel .wav files, the **channel** containing the time code must be selected from the command Analyze/Time axis format... (activate the option "absolute clock time" and select "SMPTE time code on USG DI (LSB)"). In addition to that, one of the following "multichannel mode" (mono output) options must be selected from the command File/Playback settings...: "1 of N", "SUM" or "SUM mix".

For applications that require distributing the SMPTE time code signal to several UltraSoundGate units, a special Active SMPTE/SYNC distribution unit is available (part#40124) :



SMPTE and LANC time code can also be synthesized by the Avisoft-SASLab Pro software and stored into the LSB of 16 bit .wav files (*File > Specials > UltraSoundGate DIO > Insert time code / pulse train...* or *Edit > Synthesizer > Insert time code / pulse train...*). The wav files containing such a time code track can then be played through the UltraSoundgate Payer 116 and 216H, where the time code signal will be available on the DOUT socket.



Using the acquired time code

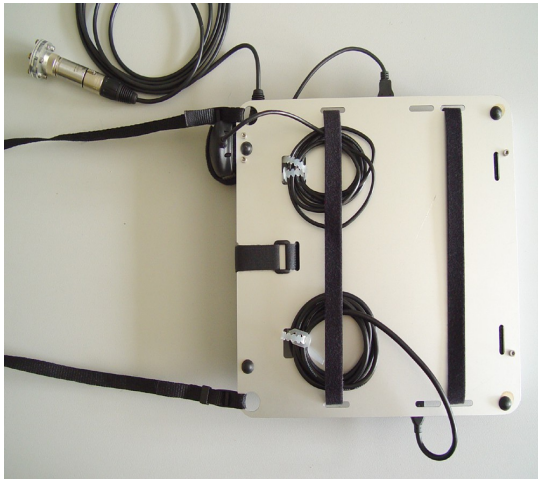
The serial time code that is acquired by the DIN input of the UltraSoundGate hardware is stored into the least significant bit of the waveform data samples.

This information can be accessed by the Avisoft-SASLab Pro analysis software by selecting the options **LANC timecode on USG DI (LSB)** or **SMPTE timecode on USG DI(LSB)** from the main window command **Analyze/Time axis format...** The time axis on both the main and spectrogram window will then represent the recorded time code. Red-coloured ticks along the time axis indicate the individual video frames.

Note that the time code track located on the least significant bits of the .wav file will be destroyed by applying any filter command, unless the option „keep DIO state“ is activated.

Setting up the Universal Notebook Carrying Frame

The Universal Notebook Carrying Frame allows to mount the UltraSoundGate 116Hm, the Navilock USB GPS receiver and a notebook computer by using the supplied Velcro tapes.



Make sure that the velco tape is atatched tightly so that the units cannot slip out. It is recommended to use a short USB cable to connect the UltraSoundGat eunit to the laptop/netbook PC.

Avisoft Bioacoustics will not be liable for any damages or losses that might arise from improperly fixed units. So, make sure that the notebook computer is fixed reliably to the frame before using it.

When using the UltraSoundGate with the carrying frame, it is recommended to add the RECORDER USGH software to the Windows Startup folder and to activate the RECORDER software option Monitoring/Autostart. In this way, the system will be ready for recording immediately after booting the computer.