

## SONOTRACK™

*A sound idea!*

### Recording, Analysis & Playback of Ultrasonic Vocalizations



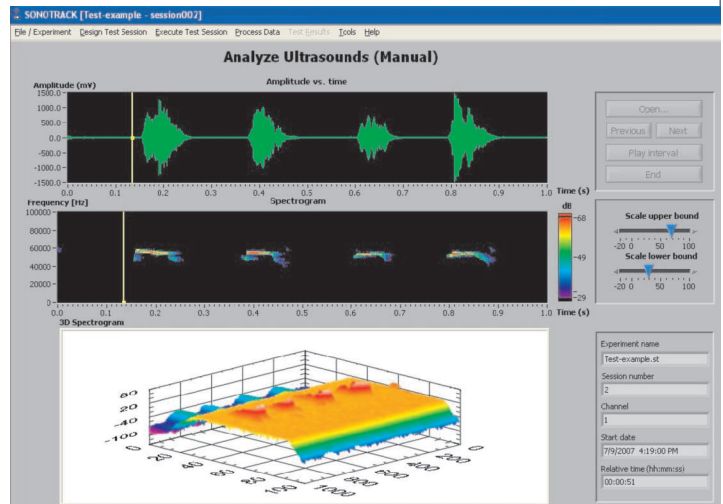
SONOTRACK is the first full spectrum ultrasound recording, analysis and playback system on the market, specifically designed for use in animal research laboratories. SONOTRACK is easy to use and opens possibilities to measure pain, distress, anxiety, comfort, social interaction and general animal welfare based on ultrasonic vocalizations (USV).

#### The SONOTRACK system

SONOTRACK is a non-invasive measurement system that uses the latest technology to record and analyze the full range of ultrasounds from 15 kHz to 125 kHz. SONOTRACK applies highly sensitive microphones, low-noise amplifiers and the latest acquisition hardware to detect USV's that can be weak to very loud. In contrast to bat detector based systems SONOTRACK doesn't require pre-tuning and has an extremely good signal to noise ration that is not obtained with bat detectors.

The recorded signals can be analyzed with the powerful visualization and quantification tools in the SONOTRACK software. This includes several graphical presentations of the USV's, playback of ultrasonic signals in audible signals for humans, automatic USV counting in user definable frequency bands and powerful result summaries of your total experiment.

The optional Ultrasound Playback hardware and software enables you to playback recorded USV's as well as artificial sound patterns to your animals and use them as Ultrasound stimulus signals.



#### About Metris

Metris is a solution provider for automated animal behavior analysis. We offer both off the shelf and tailor made solutions for non-invasive measurement of animal behavior. All solutions provided contribute to a further Refinement, Reduction and Replacement of laboratory animal research. Metris actively works together with trend setting research institutes and companies and has several strategic alliances with other market leaders in the field of animal behavior research.

Besides of SONOTRACK Metris also offers the award winning LABORAS (for automated continuous behavior recognition and tracking of small rodents) and SLEEPSIGN (a software package that automatically identifies several sleep stages based on EEG and EMG).

#### The meaning of Ultrasonic Vocalizations

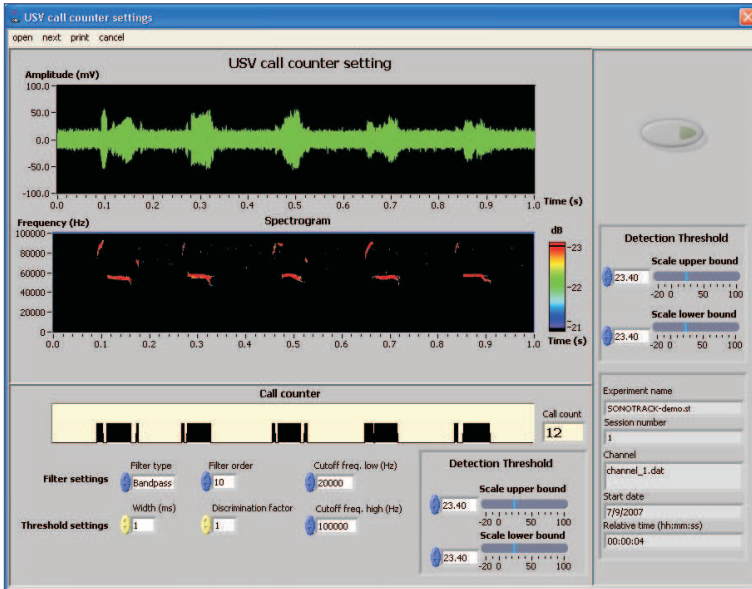
Ultrasonic Vocalizations are sounds that are well beyond the human range of hearing and are emitted by various species, mostly in the range of 15 kHz to 125 kHz. These vocalizations serve several purposes, amongst others: navigation (bats), communication and expression of the emotional well being (for example by rodents).

Rats and mice produce ultrasonic vocalizations in a variety of situations, for instance in response to stress, anxiety and pain (22 kHz) or during social interaction like sexual behavior (50 kHz). Mouse and rat pups emit ultrasounds in response to separation from their mother and litter mates. These ultrasonic vocalizations can be used as an indicator of emotional and motivational status. In animal models of stress, anxiety, pain or sexual behavior, but also in studies of well-being of animals, USV is an accepted and sensitive parameter.

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#### Unique Features of SONOTRACK

##### Full Spectrum Analysis:

SONOTRACK digitizes and stores the complete ultrasound signal, creating several unique possibilities of in-depth analysis.

##### Multi-channel continuous recording and playback:

SONOTRACK records up to 4 independent channels and can be set to record only signals above a user defined threshold. SONOTRACK plays back up to 2 independent channels of prerecorded Ultrasound signals (or artificial signals). Playback and recording can be done simultaneously.

##### High Performance microphones and amplifiers:

Sensitive microphones and low noise amplifiers guarantee detection of both low and high level USV's. Microphones can be chained together to cover bigger areas such as big cages or open field arenas.

##### High Performance 50W amplifier and speaker:

Wideband amplifiers and speakers enable realistic playback of ultrasound signals to your animals.

#### Powerful USV visualization tools:

The USV's can be analyzed by means of several graphical presentations such as 2D and 3D sonograms, frequency plots and tables can be easily copied and pasted in other applications such as Microsoft Excel. Ultrasounds can be converted to make them audible for humans and can be saved in the commonly used .AVI format.

#### Automatic USV counter:

Flexible USV counter that can be adjusted to your experiment and can quickly determine the most important USV parameters over large data sets.

#### Result Summary Generator:

Creates a compact summary of large datasets that will enable you to do efficient statistical analysis of your USV data and to get quickly to the end points of your research.



A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	
1 TEST RESULT SUMMARY																		
2																		
3	WINDOW	T.BEGIN	T.END	SESSION	CHANNEL	ANIMAL ID	TREAT-CODE	TOTAL CALLS	BAND 1 CALLS	BAND 2 CALLS	BAND 3 CALLS	AVG DURATION	MIN DURATION	MAX DURATION	AVG FREQ	MIN FREQ	MAX FREQ	
4	1	0	60		1 channel_1	pup 1 test 1	0	63	0	30	33	47.75	23	73	56031	52760	64913	
5	2	60	120		1 channel_1	pup 1 test 1	0	11	0	7	4	42.64	27	59	63620	54725	78676	
6	3	120	180		1 channel_1	pup 1 test 1	0	11	0	1	10	51.55	24	65	76522	57075	83956	
7	1	0	60		2 channel_1	pup 2 test 1	0	80	0	89	11	96.39	23	103	57132	50738	62417	
8	2	60	120		2 channel_1	pup 2 test 1	0	79	0	61	17	66.72	23	118	58262	49009	83935	
9	3	120	180		2 channel_1	pup 2 test 1	0	51	0	43	8	66.47	26	116	55734	47066	76727	
10	1	0	60		3 channel_1	pup 3 test 1	0	35	0	34	1	86.66	36	128	54213	48302	78611	
11	2	60	120		3 channel_1	pup 3 test 1	0	4	0	4	0	69.5	50	99	51240	48805	52465	
12	3	120	180		3 channel_1	pup 3 test 1	0	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	
13	1	0	60		4 channel_1	pup 4 test 1	0	9	0	3	6	46.44	30	63	67884	54777	79000	
14	2	60	120		4 channel_1	pup 4 test 1	0	23	0	19	4	44.65	23	66	60507	55054	84522	
15	3	120	180		4 channel_1	pup 4 test 1	0	20	0	19	1	50.2	23	78	66607	46542	77200	
16	1	0	60		5 channel_1	pup 5 test 1	0	116	0	110	6	54.09	23	88	56286	49552	68473	
17	2	60	120		5 channel_1	pup 5 test 1	0	74	0	70	4	70.05	23	131	53793	45297	69302	
18	3	120	180		5 channel_1	pup 5 test 1	0	31	0	31	0	77.29	33	123	51798	48402	59593	
19	1	0	60		6 channel_1	pup 6 test 1	0	43	0	41	2	75.90	32	120	53300	47179	77029	
20	2	60	120		6 channel_1	pup 6 test 1	0	71	0	63	0	75.21	23	122	55413	49467	84652	
21	3	120	180		6 channel_1	pup 6 test 1	0	91	0	71	20	88.79	29	133	57243	47500	85360	
22	1	0	60		7 channel_1	pup 7 test 1	0	34	0	26	8	54.24	26	77	60269	51462	73946	
23	2	60	120		7 channel_1	pup 7 test 1	0	57	0	46	11	53.95	23	92	58344	51605	81444	
24	3	120	180		7 channel_1	pup 7 test 1	0	14	0	11	3	46.5	26	70	58546	54540	76486	
25	1	0	60		8 channel_1	pup 8 test 1	0	6	0	4	2	86.63	30	47	69927	51260	77393	
26	2	60	120		8 channel_1	pup 8 test 1	0	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	
27	3	120	180		8 channel_1	pup 8 test 1	0	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	
28	1	0	60		9 channel_1	pup 1 test 2	0	5	0	4	1	44.8	N/A	40	49	63268	54163	79295
29	2	60	120		9 channel_1	pup 1 test 2	0	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	
30	3	120	180		9 channel_1	pup 1 test 2	0	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	
31	1	0	60		10 channel_1	pup 2 test 2	0	3	0	1	2	57	36	81	60169	50852	73421	
32	2	60	120		10 channel_1	pup 2 test 2	0	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	
33	3	120	180		10 channel_1	pup 2 test 2	0	0	0	0	0	N/A	N/A	N/A	N/A	N/A	N/A	
34																		
35																		

#### Ordering information

SONOTRACK can be delivered in several configurations. Depending on your research requirements you can choose the number of channels that can be recorded, the number of microphones per channel and the optional Ultrasound Playback module.

More information can be obtained through our website or by contacting Metris b.v. or one of our qualified distributors.

Metris B.V.