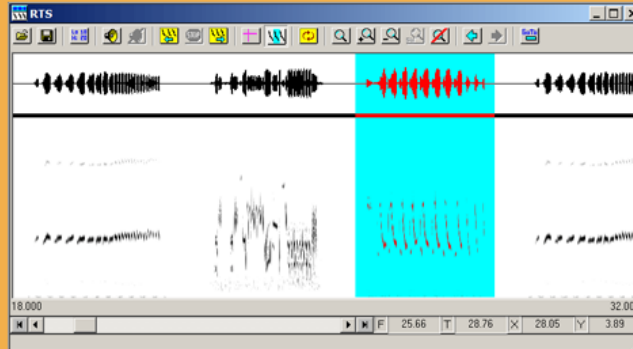


# SIGNAL<sup>tm</sup> 5

*digital signal analysis system*



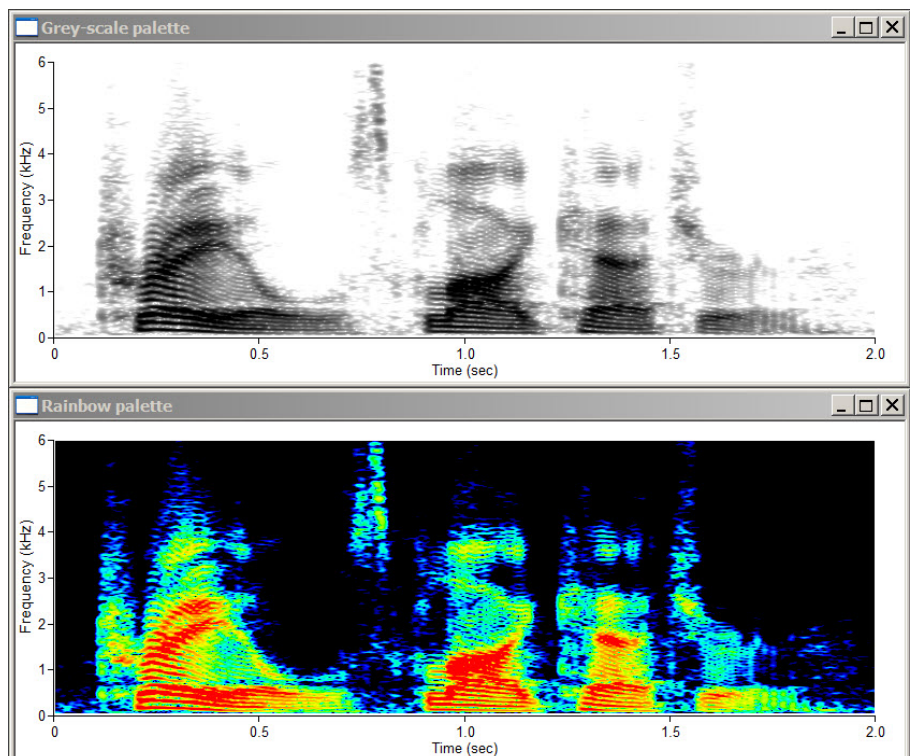
Copyright (c) 2001-2011 Engineering Design

## What's New in SIGNAL<sup>tm</sup> 5

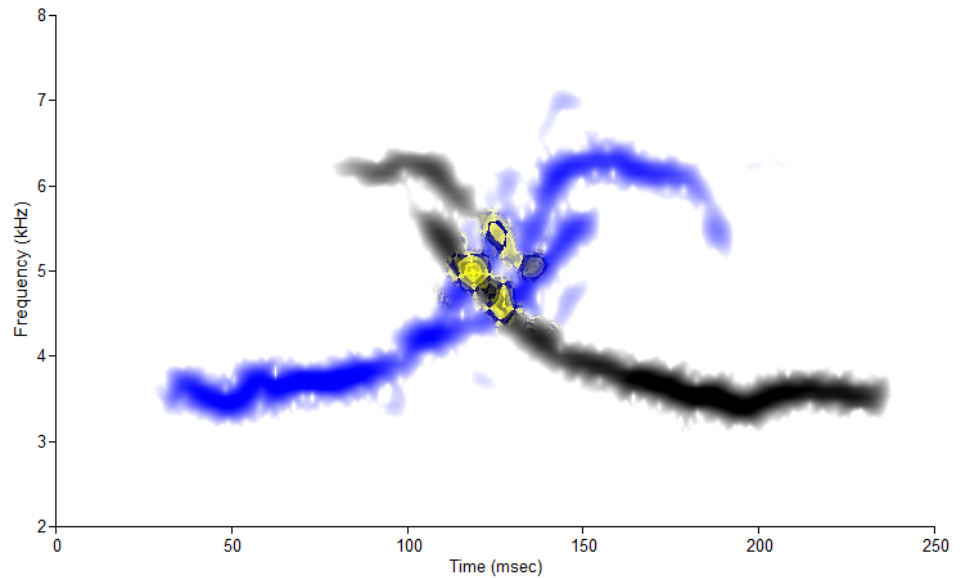
### Highlights

Here are some new SIGNAL 5 features...

**High-resolution spectrogram graphics:** draw spectrograms in 256 colors or grey levels. SIGNAL automatically detects monitor capabilities and draws spectrograms at maximum screen resolution for detailed viewing.



**Spectrogram overlays:** overlay two FT buffers "transparently", drawing the first spectrogram in greyscale, the second in blue and common content in yellow.



**Acquire signal**

Acquisition device: National Instruments DAQCard-6062E

Destination: Time buffer: 1 ☒ Display result

Settings:

Duration: 20 ☐ sec ☐ points

Sample rate: 500000 Hz

Gain: 2.0

No. channels: 1

Advanced Start Cancel

**Flexible recording and playback:** acquisition and playback can be flexibly and precisely configured for a wide variety of I/O tasks. SIGNAL 5 supports Data Translation, National Instruments and Windows sound cards.

**Programmable sound acquisition** provides timed, scheduled or continuous recording to memory or disk.

**Acquisition properties**

Data location:

☒ SIGNAL buffer ☐ Sound file

File properties:

Name: c:\myfile

Format:

☒ SIGNAL ☐ Wave ☐ AIFF

☒ OK to overwrite

Start mode:

☐ Immediate ☒ External trigger

Polarity:

☒ Low to high ☐ High to low

Options:

☒ Remove DC level ☒ Headroom report

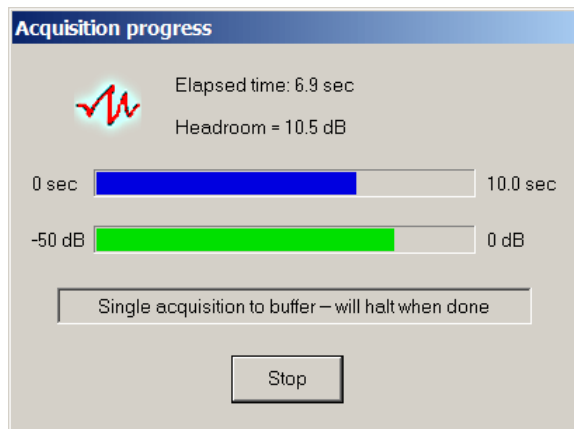
Repetition mode:

☒ Acquire for duration then halt ☐ Acquire until halted by user

Play sound on condition:

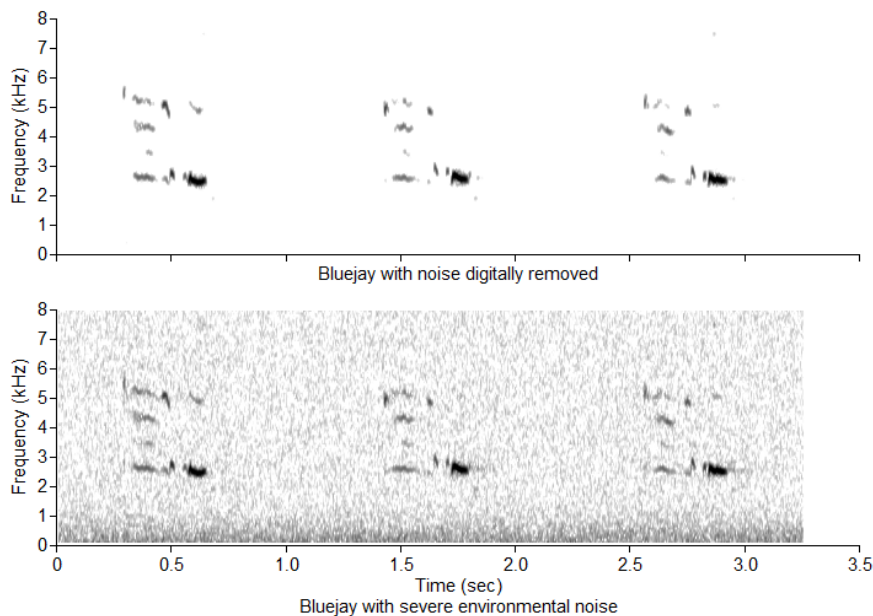
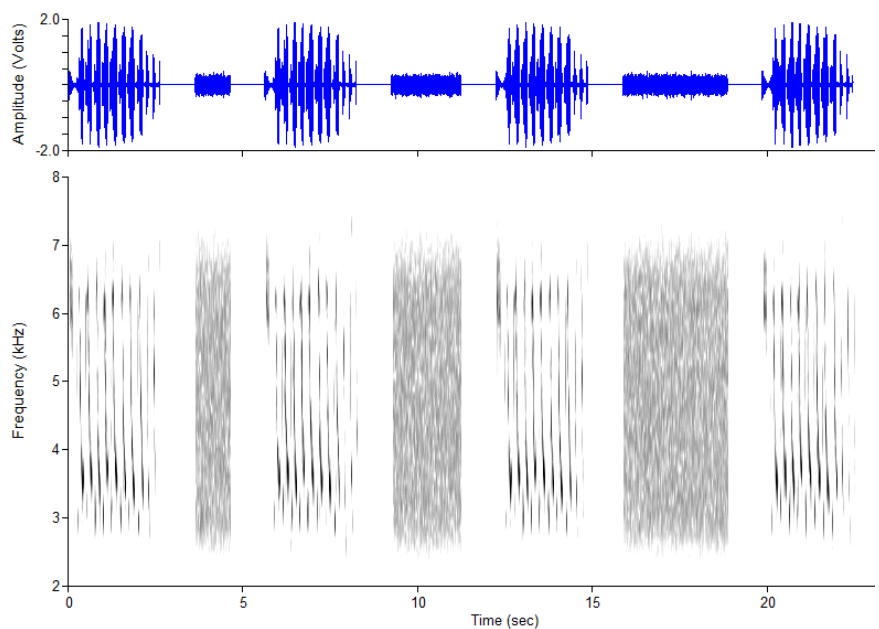
☒ I/O level overload ☒ I/O error ☒ I/O done

OK Cancel



**Real-time progress and sound level:** acquisition and playback report progress and sound level continuously throughout the I/O process.

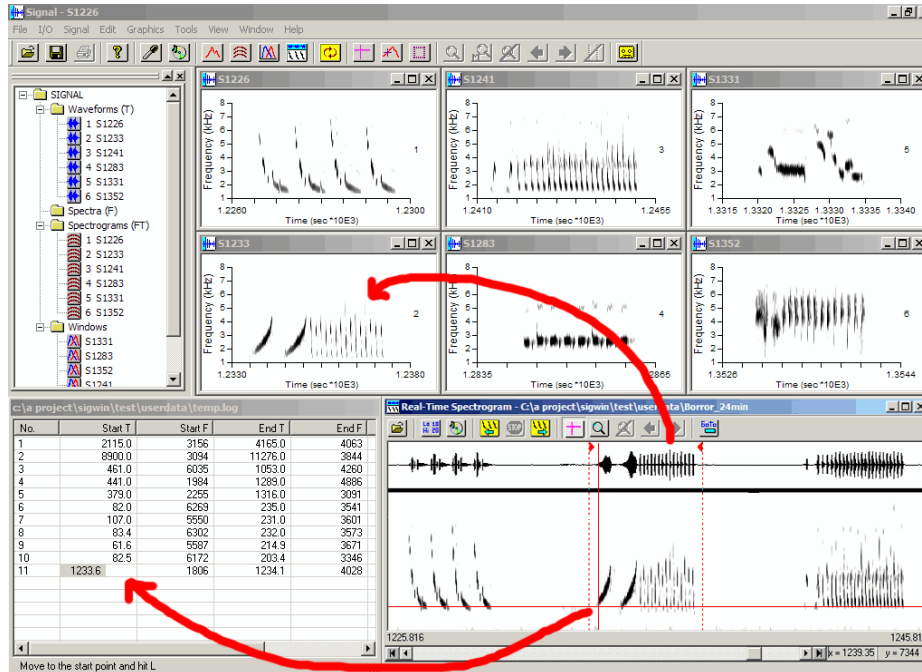
**Programmable sound playback** allows for stimulus selection, repetition, variation, timing and scheduling. Playback stimuli can be composed on the fly based on random selection, user input, or experimental inputs. These capabilities are further extended by **Experiment Maker<sup>tm</sup>**.



**Noise removal:** SIGNAL 5 provides a mathematical noise removal technique called **spectral subtraction**, which captures a spectral "noise footprint" from a signal, then removes it from a spectrogram by subtraction. Spectral subtraction can be used to remove noise from signals for use as experimental stimuli.

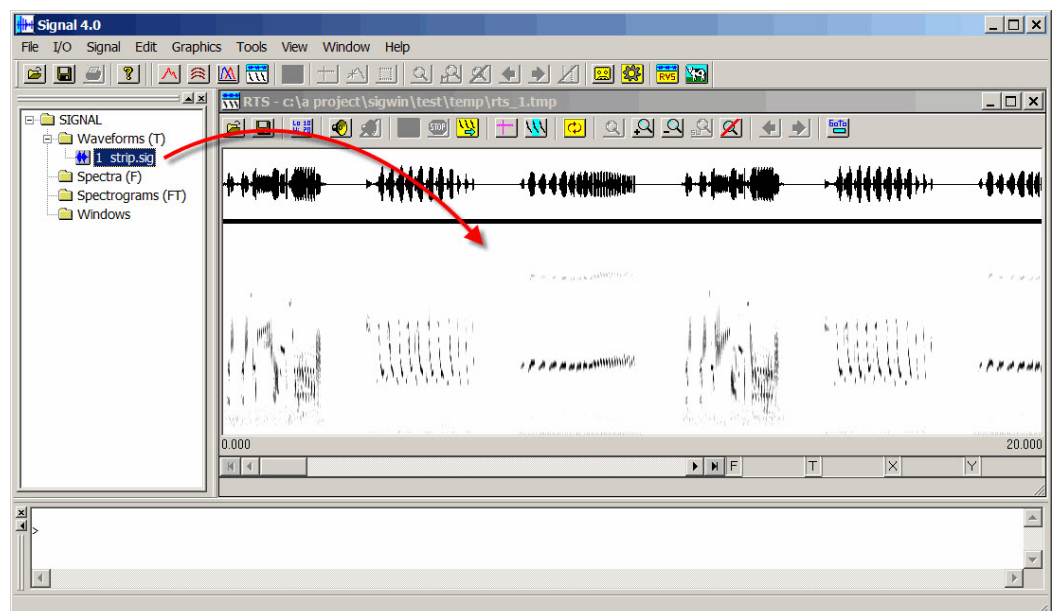
**Sound and text file I/O:** SIGNAL 5 can read and write 8-, 16- and 24-bit sound files with any number of channels. It can normalize or scale sound amplitude before sound file storage, join sound files or append to existing ones, open an unlimited number of text data files for input and output, and read and write binary data files at byte level for compatibility with any external system.

53	49	47	50	34	2e	30	33	00	00	00	40	00	00	c8	41	SIGP4.03...0..ËÄ
54	20	20	20	49	20	20	20	00	00	a0	39	00	00	00	00	T I .. 9...
00	00	80	3f	00	00	00	00	00	00	00	00	00	00	00	00	..€?.....
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	.....
00	50	c3	45	00	50	c3	46	00	00	00	00	c3	f5	79	43	.PÆ.PÄF....ÄöyC
41	6d	70	6c	69	74	75	64	56	6f	6c	74	73	20	20	20	AmplitudVolts
20	20	20	20	54	77	65	65	74	2e	31	20	20	20	20	20	Tweet.1
20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	....
00	00	00	00	20	20	20	20	20	20	20	20	20	20	20	20	08-22-1995 j...
30	38	2d	32	32	2d	31	39	39	35	20	20	6a	18	00	00	.....
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	

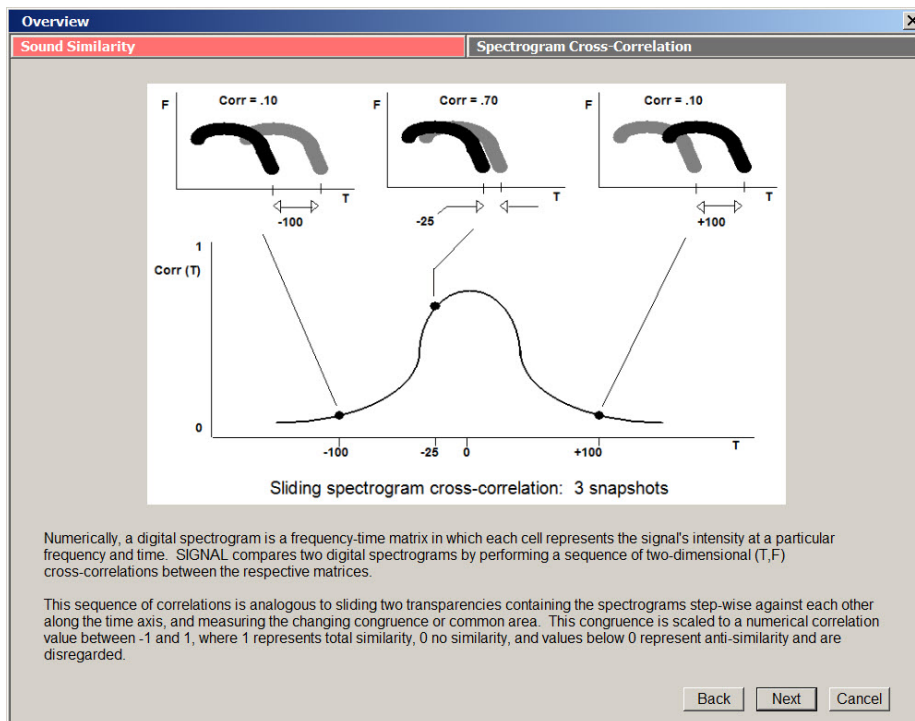
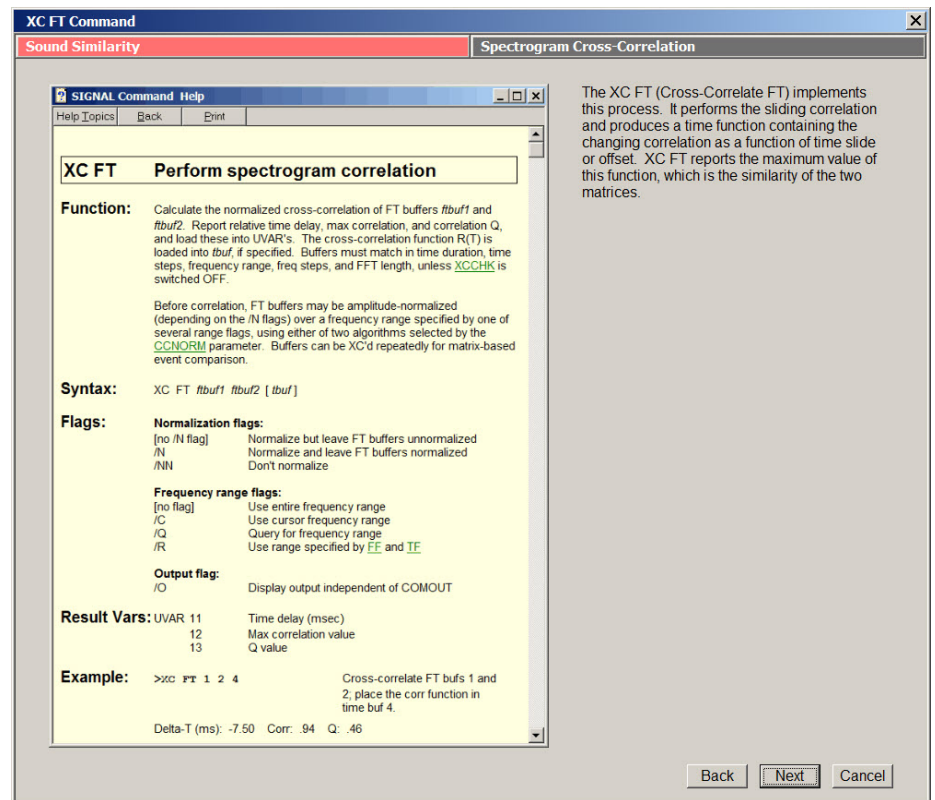


**SIGNAL/RTS integration:** graphics, measurements and signal exchange are integrated between SIGNAL 5 and RTS 5. The RTS can export sound events to SIGNAL for analysis and store screen measurements in the SIGNAL logfile.

SIGNAL 5 can display signal buffers in a scrolling RTS window for scrolling and zooming, and in an unlimited number of floating RTS windows for comparison.



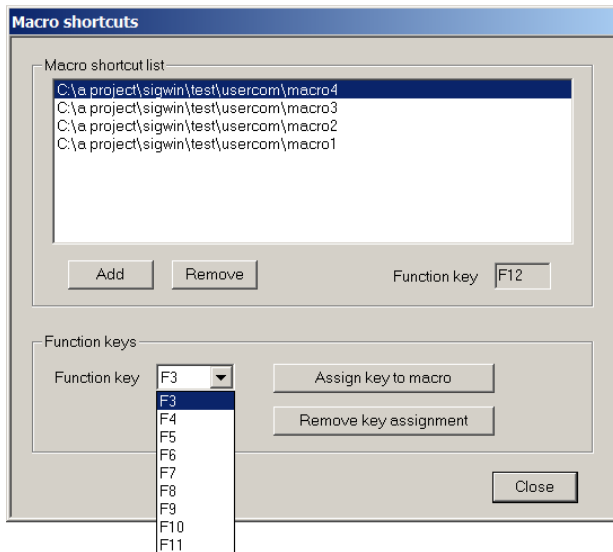
**TUTOR** is a 30-chapter interactive learning program that teaches all major SIGNAL functionalities by example. TUTOR teaches SIGNAL commands, menus, techniques and the associated bioacoustic theory. TUTOR presents a SIGNAL technique, describes its theory and usage, prompts the user for input, then displays and discusses the results.



TUTOR covers:

- SIGNAL techniques such as sound acquisition, display, and editing
- bioacoustic analysis principles such as sound sampling, Fourier transforms, and frequency resolution
- advanced research techniques, such as sound similarity; sound synthesis; and analysis of frequency contours.

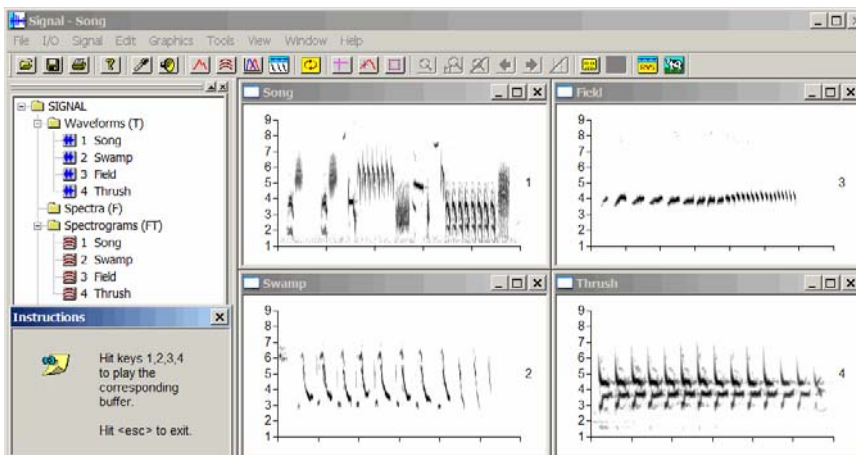
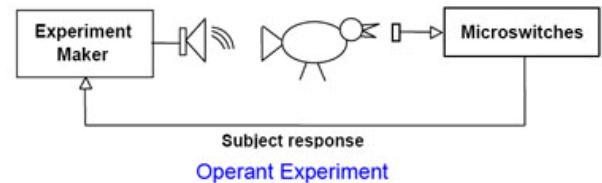
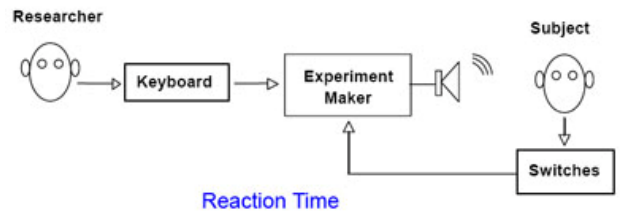
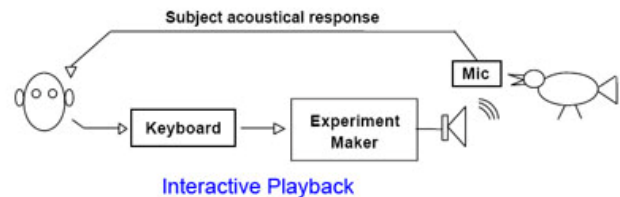




**Usability:** SIGNAL window size and location is remembered between sessions. Create a "favorites" list of user-written macros and assign to function keys for quick access. Launch multiple SIGNAL 5 sessions for comparative analyses, or to analyze signals in one session and prepare them for image capture and publication in another.

**Experiment Maker™** is an add-on module released with SIGNAL 5, adding simultaneous acquisition and playback, microsecond timing and triggering, digital I/O and keyboard control. Experiment Maker allows the researcher to construct presentation, measurement and control systems that would otherwise require months of programming.

Applications include dynamic stimulus selection, timed playbacks, adaptive playbacks, reaction time and integrated acoustic and visual testing. Playback stimuli can be constructed and selected in real-time, based on any combination of stored stimuli, random selection, user input, subject responses and experimental conditions and triggers. Stimulus choice, subject response, and experimental conditions can be logged for later analysis.



Experiment Maker can perform keyboard-controlled playback. The keyboard might be controlled by the researcher for interactive stimulus selection or by the subject for recognition and reaction time studies. A new Gaussian random signal generator provides statistical stimulus selection as well as noise signal synthesis.

# Engineering Design

Berkeley, CA USA Tel 510-524-4476  
info@engdes.com www.engdes.com