STIM² ™

System Configurations

STIM² may be obtained in two configurations: A **Software Only** Package and a **Complete Hardware Solution**. The primary differences between the two configurations are response timing accuracy, audio file calibration, and subject response options. The **STIM² Complete System** user requires precise control over SPL and/or a four-button response that sends response triggers to the SCAN acquisition system. The **STIM² Software Only** package will be adequate, if the above is not a requirement. The fMRI compatible systems are available for all versions.

STIM² Complete – The STIM² software is integrated with the STIM Audio System Unit. The **STIM² Complete System** has many advantages. STIM² provides the best response accuracy possible, the dB level of the sound files can be controlled by the software, and the user has the option to use the mouse, keyboard, or the four-button response pad as the subject response device. The device will send precisely timed trigger pulses to the SCAN acquisition system and these will appear as trigger type codes in the continuous data file. In addition, the user can utilize the microphone that comes with the system to record speech.

In order to control the timing and calibration of the STIM² Complete system, computers must be purchased from Neuroscan. Only by standardizing the computer platform do testing, calibration, integration and assurance of the systems accuracy become possible. If you already have an existing STIM system with Audio and wish to upgrade to a STIM² Complete System, we will be able to use your Audio Box (recalibration is required). Please contact **Sales@neuro.com** for details.

STIM² Software Only – The Software Only configuration uses the computer's hardware for all timing, triggering, and sound level control functions. Audio levels are controlled with the Window's® volume controls and an external decibel meter would be needed for accurate dB measurement. Response devices are limited to mouse and keyboard.

Windows® is a registered trademark of Microsoft® Corporation.

Timing and Accuracy Specifications

AUDIO
- Stimulus onset to trigger pulse below 220µs* allowing acquisition of Auditory Brainstem Response (ABR)

VIDEO TIMING
- Stimulus onset duration limited to two refresh cycles. For example, a 100Hz refresh rate will generate minimum stimulus duration = 20ms
- Trigger to video onset reliability ± 100µs

STIM2 with STIM Hardware

AUDIO
- Noise 106dB SNR
- Resolution 24 bits
- Rate 192 kHz
- SPL 0-120dB with .75dB steps independent channel control

VIDEO
- 256Mb RAM Minimum
- Dual monitor support
- To available refresh rate of system
- Minimum resolution 1024 x 768 higher resolution graphics card dependent
- Built in hardware acceleration with Microsoft® DirectX™ Support

RESPONSE DEVICE
- Keyboard, Mouse & 4-button hardware latched response pad for 1ms reaction time accuracy

STIM2 Software Only

AUDIO
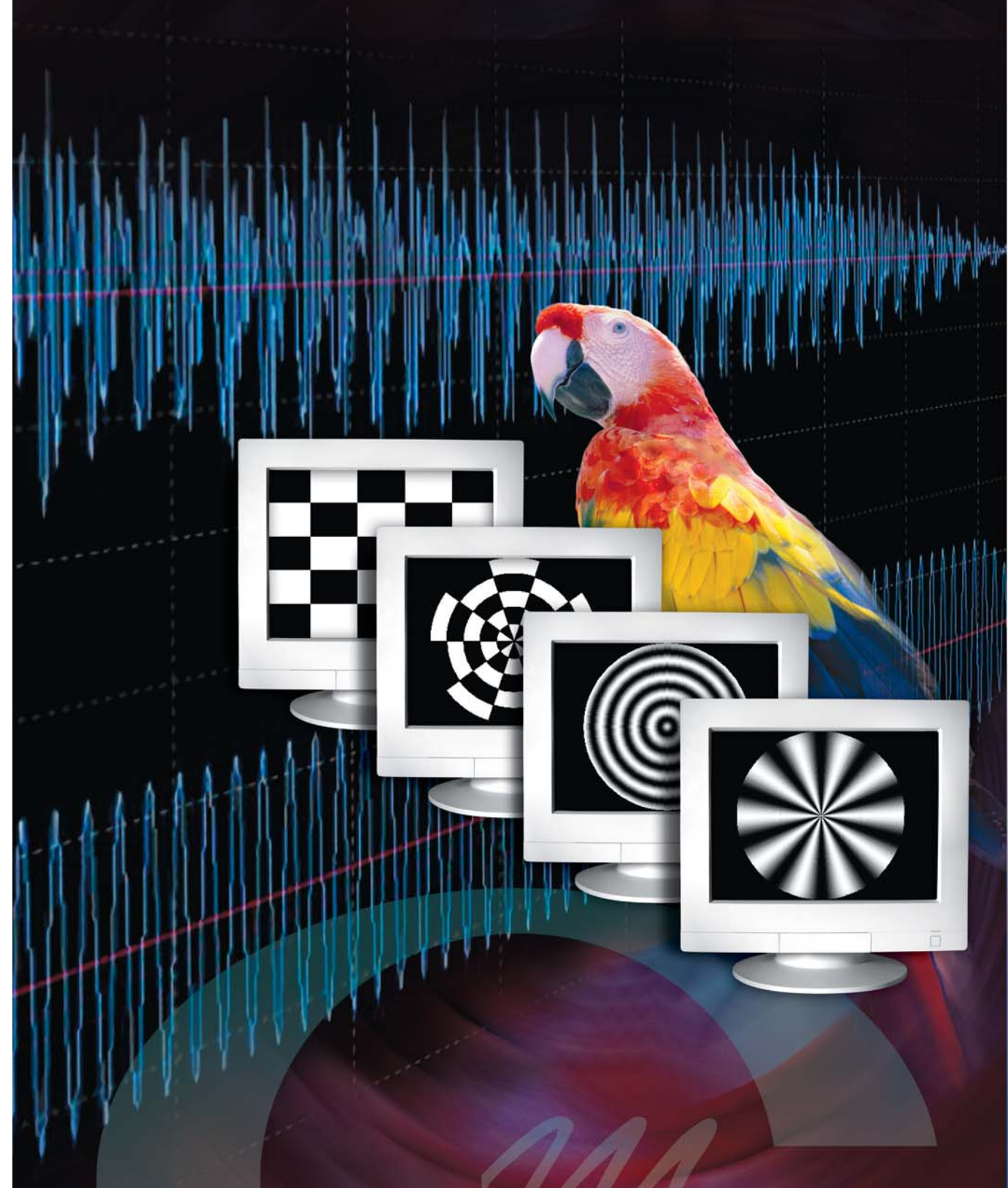- Dependent on user's hardware**

VIDEO
- Dependent on user's hardware**

RESPONSE DEVICE
- Dependent on Operating System

*Only with Neuroscan hardware
**Neuroscan cannot guarantee your timing with user supplied hardware

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THE REVOLUTION CONTINUES

STIM² ™

STIM² Simple, Powerful, Accurate Stimulus Delivery and Experimental Control Solution

COMPUMEDICS Neuroscan

STIM²™

Simple, Powerful, Accurate Stimulus Delivery and Experimental Control Solution
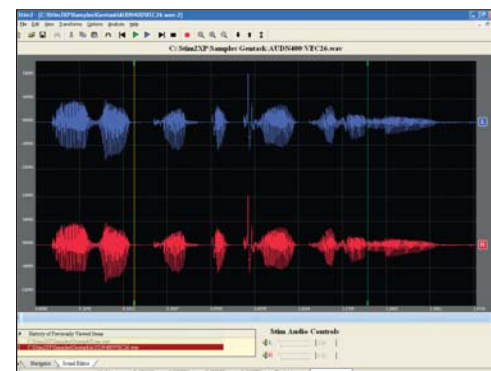
STIM² is designed to deliver scientific stimuli with all the quality our customers have come to expect from Neuroscan.

Operating under Windows® XP, STIM² provides a familiar and simple interface to design and deliver stimuli with ease and, more importantly, accuracy. STIM² provides complete control of the experiment, while delivering the highest quality stimuli.

STIM², like the original STIM system, is a comprehensive stimulus presentation system consisting of a library of sensory, cognitive and neuropsychological tasks. It is a modern tool that provides well-defined and widely known paradigms that may be used as a stand-alone package, or integrated fully with psychophysiological acquisition systems such as our SCAN 4 EEG/EP workstation, by providing synchronized trigger pulses. STIM² is a contemporary version of the original system, with greater flexibility and ease of operation with a familiar Window's® interface. Whether the user's interests lie with basic sensorimotor and perceptual tasks, more complex recognition tasks, or the most sophisticated cognitive processes, STIM² can deliver the stimuli with the precision needed for accurate analysis.
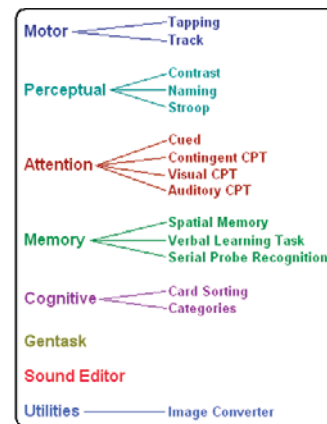
Task Library -
Fourteen tasks are pre-programmed into the STIM² software to provide a task library to build upon. Each task allows the user to modify parameters, such as, the duration, order of presentation, the inter-stimulus interval, performance feedback options, and many more. The programs are categorized into Motor, Perceptual, Attention, Memory, and Cognitive tasks. Some of the more common tasks include Finger Tapping, Stroop, Card Sorting, and Categories tasks from neuropsychology. Additional tasks include Pattern reversal, Naming, Visual tracking, Spatial memory, VIsual and Auditory continuous performance, Verbal learning, and Visual memory tasks.

Task Generation –
Creating custom tasks with ease is the most important element in a stimulus program. The Gentask utility program provides an effective tool to create the user's own tasks with no programming skills required.

Image and Sound Files -
Moving into the Windows® XP environment has allowed a major advance in the types of stimuli that can be delivered. Common audio (including WAV and Neuroscan SND files) and video (including JPG, BMP, PCX, PNG, TIF, CUT, etc., files) are easily presented. The user can create their own sounds using the Sound Editor and convert graphics file type to one handled by STIM² using the Image Converter. Audio and visual stimuli can be presented simultaneously while having flexibility in the placement of the trigger pulse in relation to a stimulus.

Audio files may be created, reviewed and modified in the Sound Editor. Trigger placement is as easy as positioning the mouse cursor

Principle categories of tasks

The STIM² Modules

Example of the behavioral results data file
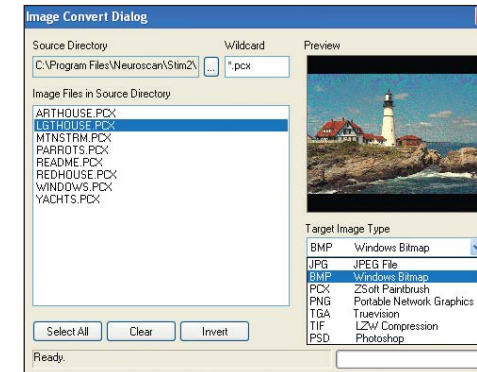
Image files are reviewed and converted to a variety of common types.

Stimulus and Response type codes set in STIM² are used in SCAN to sort on the basis of various criteria.

Example of an easily programmed file for controlling stimulus presentation.

Compatibility –
Gentask files from the original STIM are read automatically in STIM². Existing SND, CUT and PCX files from STIM are also read by STIM², with no conversion required.

Data Analysis –
Behavioral data (performance results) from the tasks are available for review in the Internet Browser, and the DAT file versions of these files can be transferred to SCAN for integration with the EEG data files (as with STIM).

Accuracy -
Accuracy is dependent upon the variation of the STIM² system the user has, as well as the computer hardware. The STIM² (STIM² Complete) system with the STIM Audio System Unit provides the greatest possible timing accuracy, with virtually no error for visual stimuli and with variance less than one millisecond for audio files. The STIM² (STIM² Software Only) system with no hardware is more variable, and timing variation will depend on computer speed, the video card, and especially the audio board in the computer. The decibel level (SPL) for audio stimuli is adjustable by .75db steps, if you have the STIM Audio System Unit. The software only version requires a decibel meter for SPL measurement.

Integration –
STIM² will integrate with fMRI, ERP and other recording devices, allowing the user to trigger external devices (such as an SEP stimulator or MRI), or for external devices to trigger STIM² (STIM² with hardware version only). The seamless integration with Neuroscan data acquisition products allow on-line averaging, sorted averages based on trial type, accuracy and latency of responses, and sequence recognition (using BATCH commands).

Gentask Editor –
One of the most popular programs in STIM is the Gentask Utility program, since it allows maximum control over stimulus presentation. The heart of Gentask is a "sequence file", a line-by-line program that governs many aspects of stimulus presentation. STIM² features a Gentask Editor that makes creating and modifying sequence files much easier.

In the sequence file, the user can set the duration of presentation, the time allowed for a valid response, the interval between stimuli, the position of the graphics file on the screen, the decibel levels for audio files (independent left and right channel settings), the correct expected response, and the trigger type code sent to the acquisition system, for each stimulus that is presented. A new drag-and-drop feature allows the user to add lines to the file with maximum ease. Additional options with the sequence file include flow control and conditional branching commands, counters, ways to build more complex stimuli, increasing/decreasing difficulty levels based on past performance, mask options, noise options, and many more.