SIERRA Summit
EMG/NCV/EP

Advancing medical technology to help you, help others.

CADWELL®

Experience The Cadwell Difference – Since 1979

The benefits of owning a Cadwell system are numerous. Our development team understands and delivers what you need. Everyone at Cadwell stands behind our products, and we all have the same goal - to keep you as a loyal, devoted customer long into the future.

Innovative Neurodiagnostic Instruments

John Cadwell, BSEE, MD designed the first microprocessor-controlled EMG instrument. In 1979, he and his brother Carl, DDS, formed Cadwell Laboratories, Inc. and began selling their device. Since then, Cadwell has been a leader in the development and manufacture of innovative and reliable instruments for neurophysiology. Many of these instruments have been providing decades of service to their owners.

Numerous patents are held by Cadwell, including those for magnetic stimulators, cable shielding designs, neural network analysis of EEG, and database designs. Today, still located in Kennewick, Washington, John and Carl continue ownership of the company and come to work everyday to develop and market products ranging from EMG to EEG to PSG to IONM instrumentation and more. Cadwell has a firm hold of its identity and a dedicated focus on neurophysiology.

Advancing medical technology to help you, help others.

Our Most Advanced EMG/EP Instrument (The New Standard)

The Sierra® Summit™ is the latest in a long line of successful Cadwell products. It combines the Sierra Wave's ease of use with innovative advancements in acquisition and stimulation technology to offer the most flexible, reliable and clinically functional system on the market today. The Summit is offered in either a 2, 6, or 12 channel configuration and is proudly designed and manufactured at our Kennewick, Washington facility. The Summit is built with the same lasting quality and reliability customers have come to expect from Cadwell.

The Summit can be configured as a portable or desktop system. The portable version comes with a laptop computer and soft-sided carrying case. The desktop version comes with a desktop PC and an LCD monitor or all-in-one PC. We offer both lightweight and hospital-grade equipment carts to complete the system.

Sierra Summit with laptop, two channel amplifier, and StimTroller *Plus*™. Also available with a twelve channel amplifier and second StimTroller *Plus*.

Standard Features of the Sierra Summit

- Base Unit with dedicated keypad and knob controls (requires a computer)
- Dual high-power speaker system with software equalizer
- Handheld StimTroller *Plus*™ (3 programmable buttons, remote stim and control)
- 2, 6, or 12 Channel Amplifier configurations
- USB Footswitch
- EMG protocols (free run and capture mode) - Buffer Playback with audio (up to 10 minutes) - Unlimited Buffer Storage - Programmable Muscle Scoring - EMG snapshots within the published reports
- QEMG
  - MUP Tool
  - Single Motor Unit Analysis
  - Multi-Motor Unit Analysis
  - Interference Pattern Analysis

- EMG Guided Injection Protocol
- NCV (motor, sensory, mixed, inching)
- F Wave / H Reflex
- AnatomyVIEW™
- Side-to-Side Comparisons (NCV, F, H, EP)
- Blink Reflex
- RNS (1 or 2 channel acquisition)
- SEP (upper, lower, dermatomes)
- Autonomic Studies
  - Heart Rate Variability (RR Interval)
  - Sympathetic Skin Response (SSR)
- Programmable Study Lists
- Tabular Data Summary View
- QuickReport™ MS Word® based report generator
- Auto Findings Composer (automatic comparison to norms and creation of sentences for NCV, F, H, EMG and EP findings)
- EP Analysis (add, subtract, average, grand average, invert)

- EMG to AVI Converter (convert EMG to video/audio files)
- DataLAB™ (calculate user-defined relationships)
- ASCII Output Utility (all test protocols)
- CadLink™ Database (management of patient files and user settings)
- Compatible with Sierra Wave data files and user settings
- Internal Calibration Signals
- Hardware Diagnostics Suite (diagnostic routines for the amplifier, electrical stimulator and keypad)
- Electrode Continuity Check (built into amplifier)
- Comprehensive Application Help Topics
- Free Technical Phone Support
- Lifetime Software Upgrades
- Soft-sided Carrying Case
- Starter Electrode Kit
- Reader Software

Sierra Summit keypad

Optional Software

- CadLink™ Server Software (centralized data storage and administration of user settings for all Summit acquisition and reader systems on the network)
- Single Fiber and Macro EMG
- Motor Unit Number Estimation *(MUNE)*
  - Assisted Incremental Technique
  - Multiple Point Stimulation Technique
- AEP (ABR, MLR, LLR, ERG, VEMP, ECochG)
- P300
- VEP – includes LCD calibration sensor

- Advanced Stim/Trigger capability
- HL7 Interface for EMR connectivity
- Data Interface Toolkit (API for developers)

Optional Hardware

- 2nd Electrical Stimulator
- Skin Temperature Probe
- Reflex Hammer
- Trigger Out/In Interface Cable (3.5mm stereo to 2x RCA)
- Amp/Stim Switchbox (Injection Studies)
- LED Goggles
- Remote Input Box and Cable (6/12 ch. amplifier)

Summit utilizes durable, color-coded connectors with protected pins

Sierra Summit rear panel

Cart Configurations

Point-of-Care

Shown here is a 2-channel Sierra Summit with a laptop computer on the lightweight Point-of-Care cart. A printer can be placed on the shelf and supplies stored in the bin. Mounting brackets for an amplifier arm are located on either side of the top shelf. The articulated arm holds the amplifier, StimTroller *Plus* and also provides a convenient needle holder. The placement of the stimulator and needle holder can be reversed. Snap-on cable covers on the arm protect the amplifier and stimulator cables while providing a clean appearance. The top shelf height is adjustable via hydraulic lever for use while standing or sitting. Options include a pull-out keyboard shelf, footswitch holder and an additional storage bin.

Amplifer bracket with 2 channel amplifier, stimulator and needle holder

Narrow Trolley

Shown here is a 12-channel Sierra Summit with a low profile PC on the Narrow Trolley cart. This cart features a foam handle and large locking wheels for easy manuevering. Cable management is provided inside the trolley's twin legs. The PC and a printer can both be placed on the large bottom shelf. The middle shelf holds the Sierra Summit base unit, while the top shelf remains free and can be used as a convenient writing surface. The LCD monitor mounts on a sturdy, adjustable pole on the rear of the top shelf. An optional isolation transformer can be installed on the basement shelf. Other options include a pull-out keyboard/mouse tray, storage drawer and an accessory bag which mounts on the back of the cart.

Don't need a cart? The Sierra Summit, amplifier, StimTroller *Plus* and cables all fit into our custom carrying case. For even greater portability, upgrade to the wheeled carrying case.

Multi-Modality Configuration

Maximize your diagnostic offerings by configuring Easy III EEG and Sierra Summit EMG/EP software on the same PC. Pictured here are the 12-channel Sierra Summit and 32-channel Easy III amplifiers on a Narrow Trolley cart. An all-in-one computer frees up the bottom shelf for a large printer or additional storage space.

Hardware Diagnostics

The Sierra Summit includes a comprehensive hardware diagnostic suite. Reduce troubleshooting time by easily verifying the proper performance of the amplifier, electrical stimulators and base unit keypad. You can save or print the test results for your maintenance notebook. Calibration signals, with four voltages and two frequency settings, are also available in all test protocols.
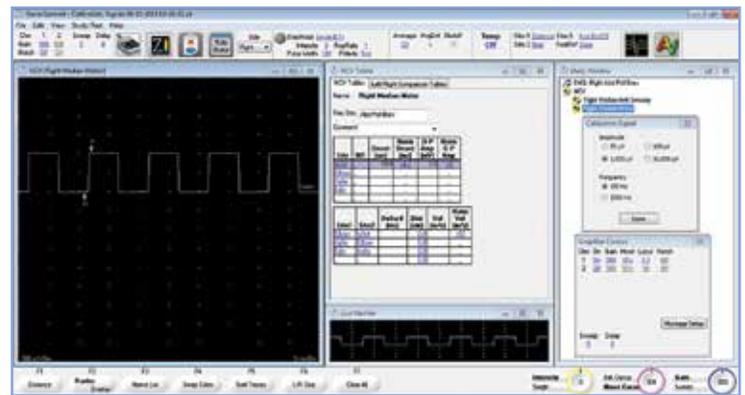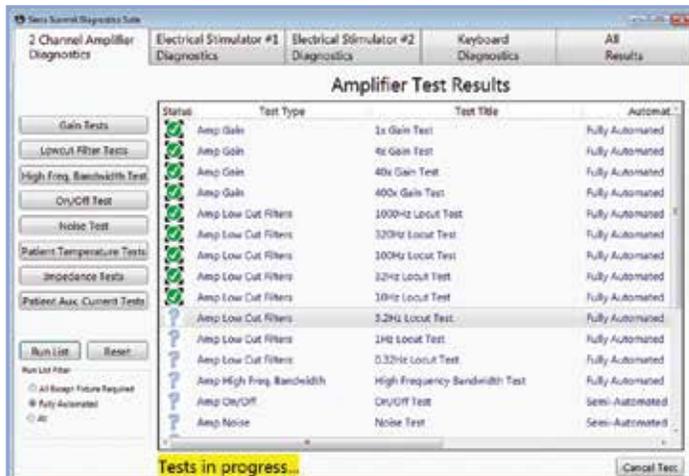
NCV Test Protocol
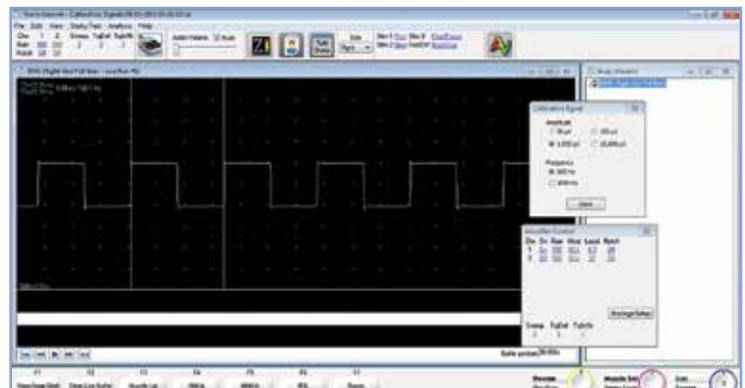
EMG Test Protocol

Amplifiers

Cadwell has long been recognized as producing some of the world's finest neurophysiologic amplifiers; and the Sierra Summit amplifiers are no exception. Either 2-, 6-, or 12-channel configurations are available. The same amplifier is utilized for the 6-channel configuration, with the maximum number of channels limited by software. Each amplifier features fast artifact recovery and very low noise. Analog-to-digital conversion is done inside the amplifier, eliminating the amplifier cable as a potential noise source. Each amplifier has superb RF immunity and excellent signal quality. Temperature measurement, impedance, on/off switch and calibration signals are built-in. The 12-channel amplifier has four non-switched and eight switched channels. The eight switched channels can use any of the 20 inputs available in the modified head pattern on the amplifier or optional remote input box. All 12 channels can be used simultaneously for data acquisition.

A unique electrode continuity check (Electrode Check) is built into each amplifier, so you can easily confirm if one of your electrode leads is good or bad.

StimTroller *Plus*™
Programmable Stimulator and Test Controller

The StimTroller *Plus* reduces test time by providing commonly used functions on the remote handheld stimulator. A typical study can be performed without having to reach back to the base unit keypad or mouse. Three programmable buttons allow customization to suit your technique.

Functions include:
- Single or repetitive pulse delivery
- Polarity reversal
- Intensity adjust
- Trace storage
- Distance entry
- Test selection
- Start/stop EMG acquisition
- Store EMG snapshot
- EMG gain control
- Move back and forth within EMG buffer

- Playback of EMG buffer
- Probes can be removed to connect standard bar and ring electrodes. Or leave probes in and use our Quick Connect Adapter. Other probe styles include:
    - Small diameter, round tip
    - Large diameter, pointed tip
    - Felt pad tip
    - Large diameter, round tip (shown here)
- Adjustable stimulus probe angle and width for easier and faster access to all stimulus locations
- Three programmable buttons can be assigned test specific functions.

Labels (stimulator diagram):
- Programmable Button 3
- Removable/Adjustable Angle Stimulator Probes
- Quick Connect Area
- Polarity Indicator
- Reverse Polarity Button
- Single Stim / Hold for Repetitive
- Intensity Adjust / Distance Wheel
- Store
- Programmable Buttons 1 and 2
- Angle Adjust Button

User Interface

Clean, reliable and fast best describe the Sierra Summit user interface. Use either the custom keypad with its function keys and soft knobs, or the mouse - whichever is most convenient for you. Combined with the StimTroller *Plus* and programmable footswitch, you have all the controls you need without having to drill down through seemingly endless menus.

Advanced features are available from the pull-down menus at the top of the screen or by accessing the context menu (mouse right-click) over each window. A plug-and-play USB communication interface to the Summit base unit provides compatibility and upgradeability in a rapidly changing PC environment.
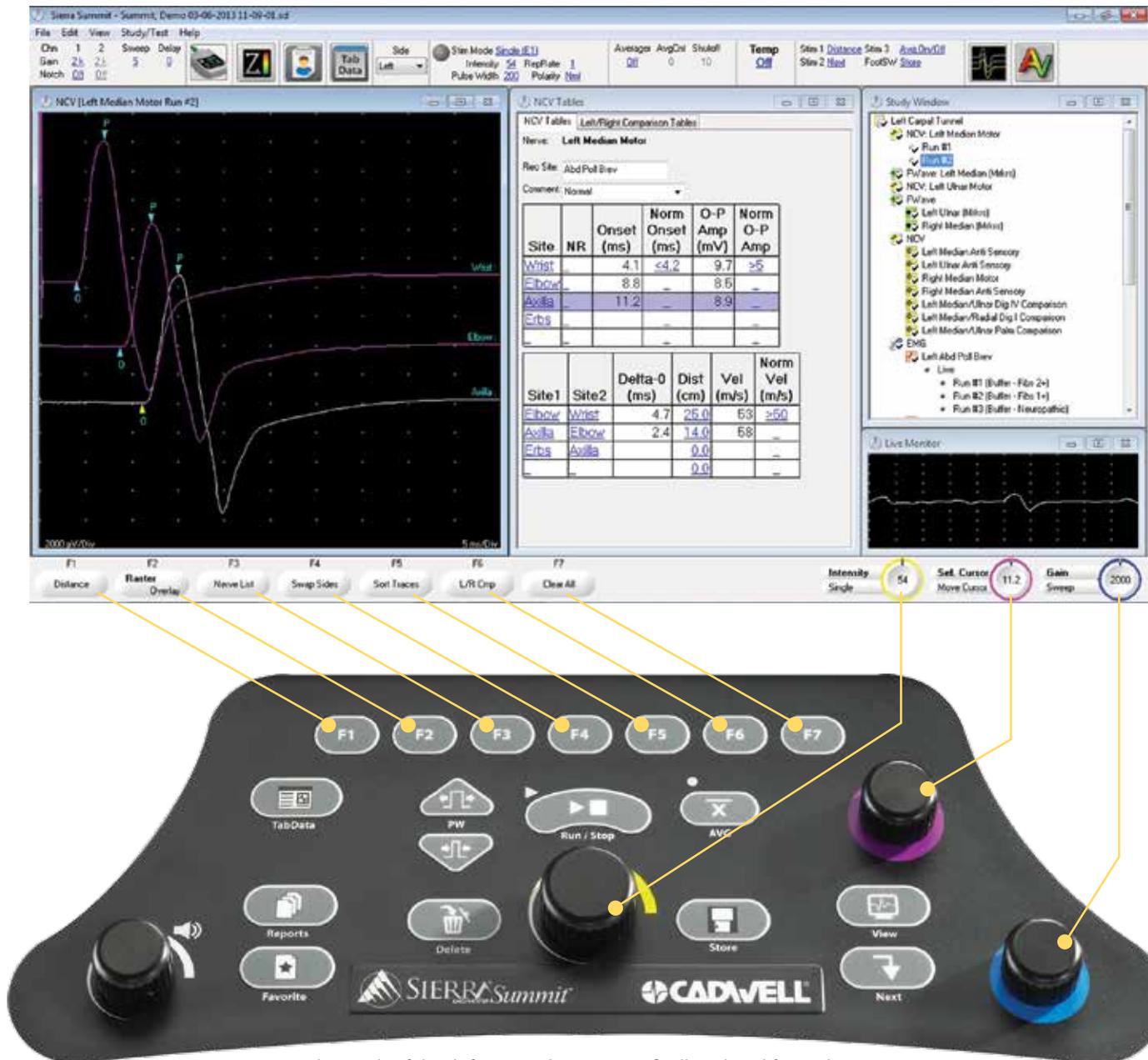
F key and soft knob functionality are specifically tailored for each test
protocol to maximize ease of use and facilitate rapid data acquisition

Software
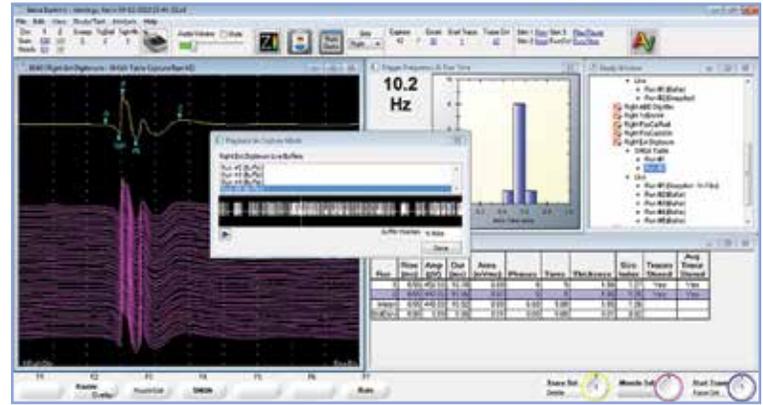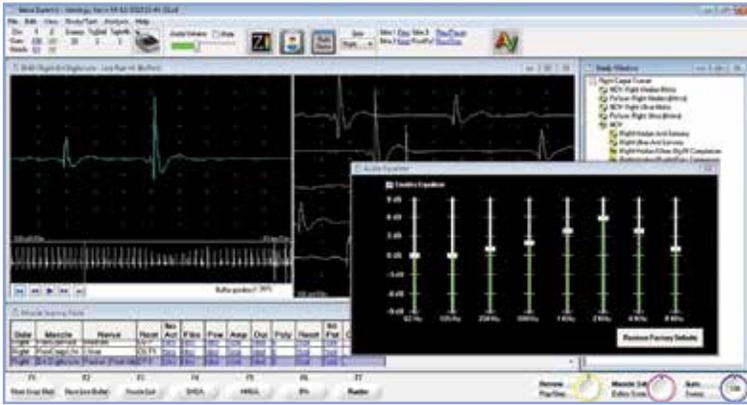
Standard EMG protocol includes both Live and Capture data acquisition modes with easily accessible muscle scoring table and audio equalizer controls, allowing you to fine tune the audio signal to your listening preference. Up to 10 minute Live EMG Buffer with unlimited storage and playback. Full-screen or raster displays. Manual MUP tool and single Motor Unit Analysis for quick documentation of interesting motor unit potentials.

Spontaneous or Stimulated **Single Fiber Analysis** using either real-time peak latency detection or voltage crossing. Records up to 100 consecutive discharges and displays #blocks, MCD, IPI, and frequency. Review and editing can be done real-time or offline. A Fiber Density calculator is included.
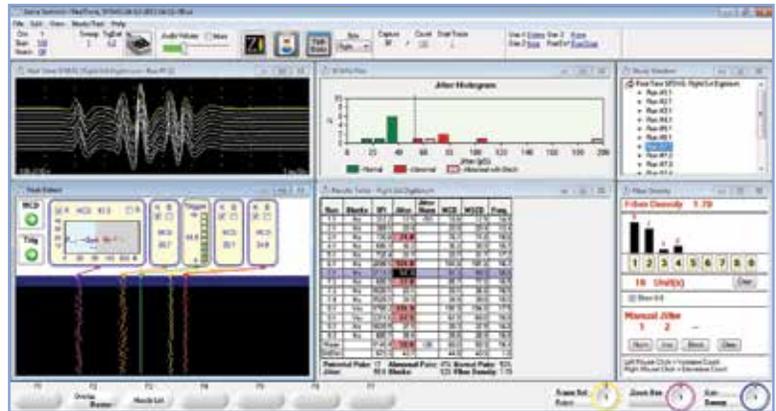
Interference Pattern Analysis: Quantifies the electromyographic interference pattern and displays the results on color-coded plots. Analysis includes Amplitude vs. Turns, Envelope vs. Activity, and Number of Short Segments vs. Activity. Normative reference "clouds" provided for several muscles. IPA provides a basis for classifying the interference pattern as normal, neuropathic, or myopathic. Can be performed real-time or offline.

Multi-MUP Analysis: Signal decomposition and template matching is used to extract, identify, and sort motor unit action potentials from an epoch of EMG. Typically 1 to 6 motor units can be extracted from one 10 second epoch. Includes flexible editing features and summary display of all acquired MUPs. Can be performed real-time or offline.
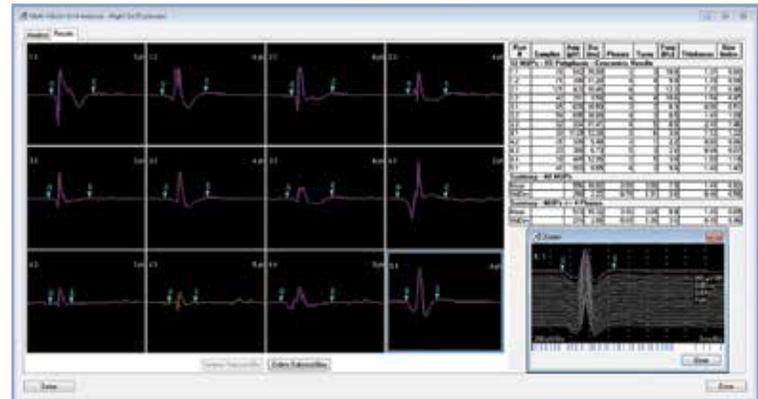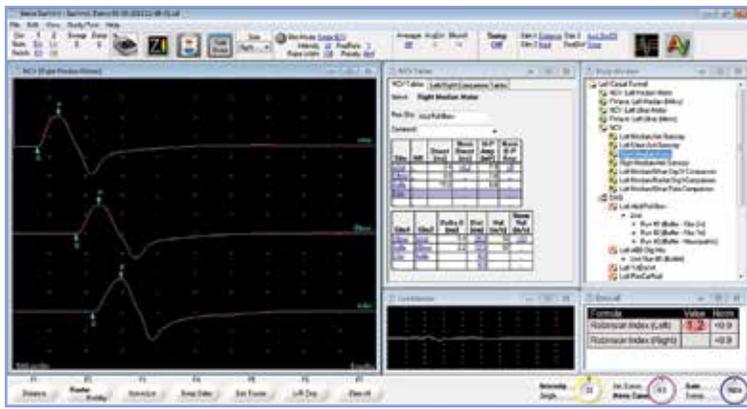
Automatic cursor placement and **Left vs. Right comparisons** in NCV, F, H, and Evoked Potential test protocols. Live Monitor window facilitates identification of artifacts or poor electrode connections. On-line comparison to reference data and identification of abnormal values. Unlimited number of traces displayed per test protocol.
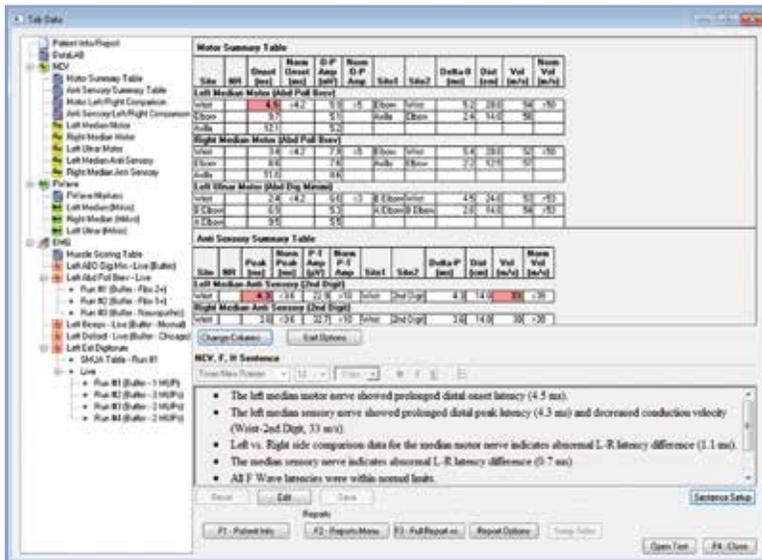

Unique **Tab Data Summary View** provides quick and convenient review on all acquired traces and tabular results. Adjust cursor positions, change distance measurements, and easily review and playback stored EMG without having to return to the specific test protocol. Cadwell's unique Auto Findings Composer compares the patient's values to your norms and creates findings sentences for NCV, F, H, EMG, and EP's.

AnatomyVIEW feature displays the EMG muscle scoring and NCV results on a 3D color-coded anatomical model. Green indicates normal findings and varying levels of yellow-orange-red indicate abnormal results. The models can be rotated and resized quickly using the mouse. This graphic can be included in reports.

Repetitive Nerve Stimulation by manual or automatic delivery of programmable stimulus trains. Results include comparison of both amplitude and area for all responses in the train. Supports stimulation frequency up to 50 Hz and 1 or 2 channel recording.
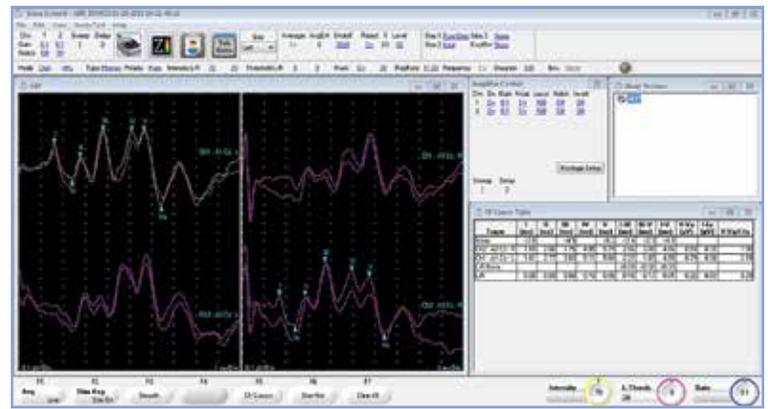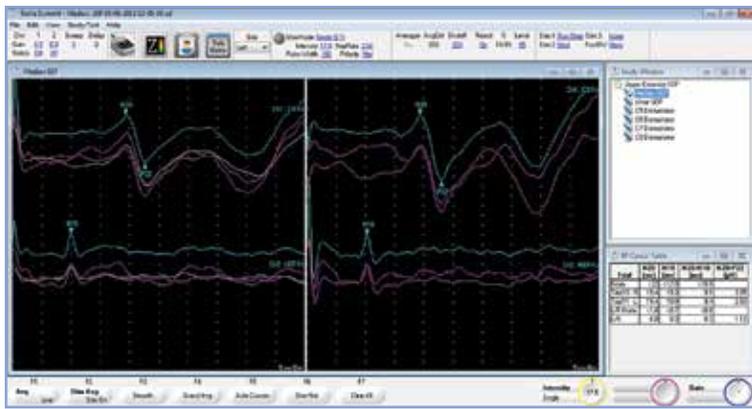
Evoked Potentials include somatosensory, auditory, and visual modalities with display and storage of unlimited number of waveforms. Auto-cursors for marking important waveform features with automatic side-to-side comparison and highlighting of abnormal values. Normal or Odd/Even averaging modes. Adjustable artifact rejection and support for third-party stimulators via Trigger In/Out.

Cadwell's industry leading **Report Generator** utilizes Microsoft Word® and includes customizable modules for entry of patient history, physical exam, impressions, and more, without having to type at the keyboard. Reports include tabulated data, waveforms, anatomical displays, and results of Auto Findings Composer. Templates can be customized to suit your individual needs.
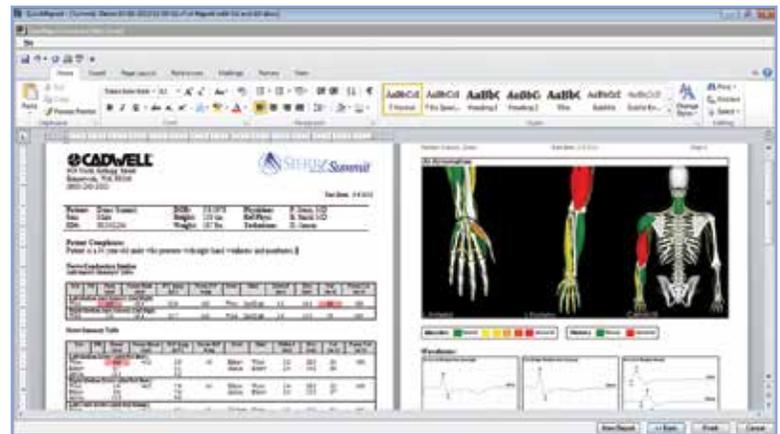
Autonomic Studies include RR interval and Sympathetic Skin Response. RR Interval includes automatic or manual calculation of max/min ratio and support for normal and deep breathing, valsalva maneuver, and 30:15 ratio.

Advanced Studies include Macro EMG, MUNE (motor unit number estimation) and multiple stimulus configurations utilizing the two independent electrical stimulators with adjustable train lengths and delays.
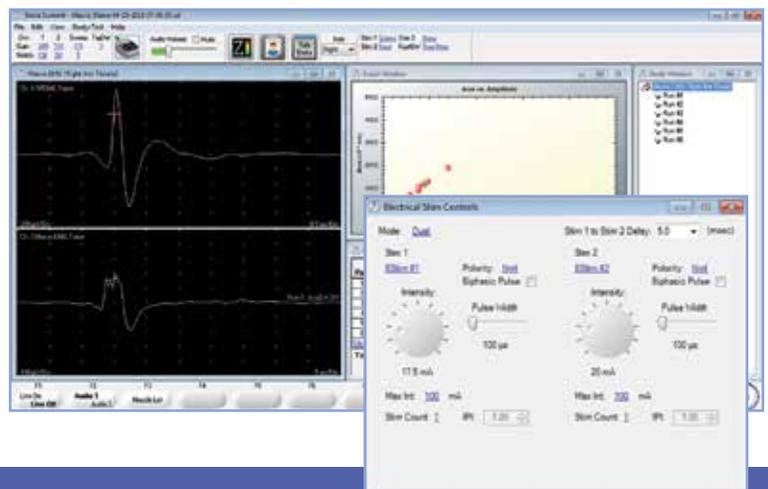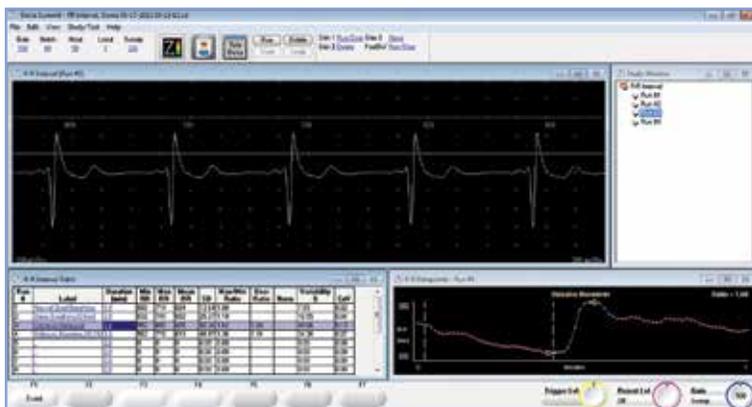
CadLink™ Database
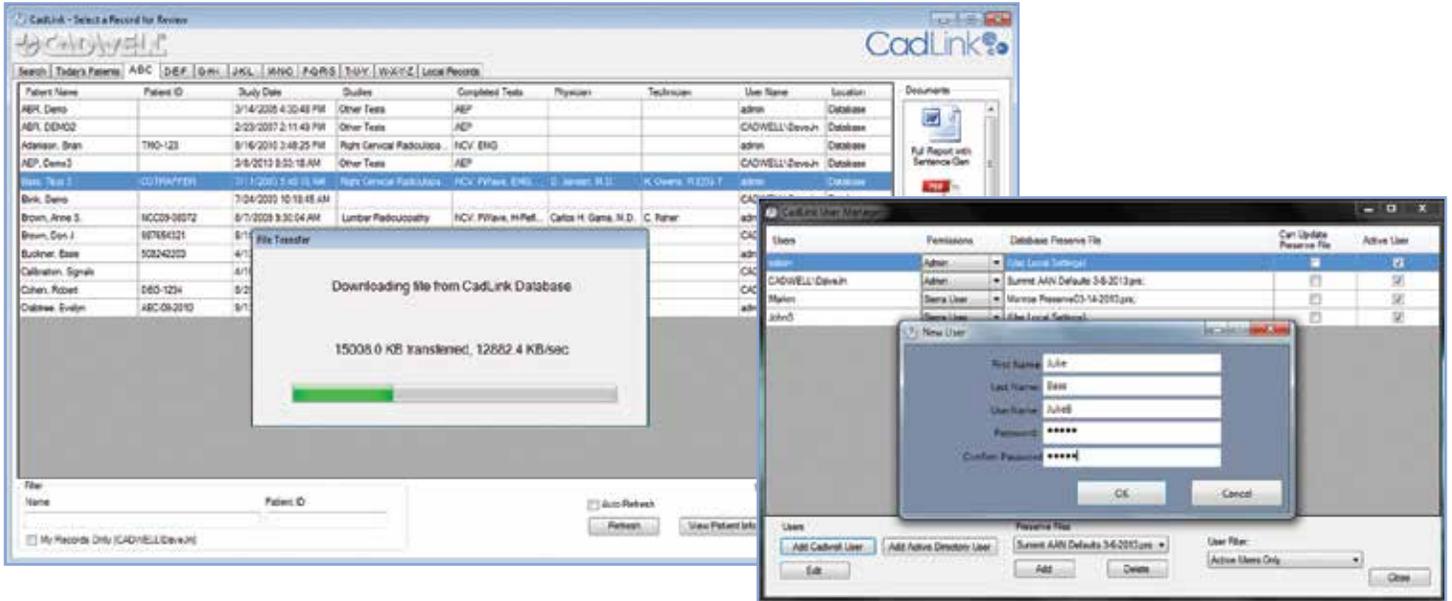
Designed for easy setup and operation in either the private practice or large neurodiagnostic laboratory setting, the CadLink database organizes, manages and secures your patient files and customized user settings. View your patient records in multiple ways - alphabetically, by day, by month, by year, by physician - whichever is convenient. Complex searches can be accomplished using the advanced search capabilities. Import supplementary documentation, such as symptom drawings, pictures or patient history forms and save them with the record. CadLink supports multiple users; each with their own test settings and report templates.

Networking

Add the CadLink Central Server module and you can seamlessly network multiple Sierra Summits and Reader stations. Patient records are available from any acquisition or review station on the network. Complete the exam and then finish the report later in the comfort of your office. The receptionist can also be included on the network so that patient information can be input at check-in or final edits can be made to reports. Change a test setting or report template on one Sierra Summit and it is automatically available to all systems on the network.

Exam Room 1

Reception

Exam Room 2

Reader station in physician's office
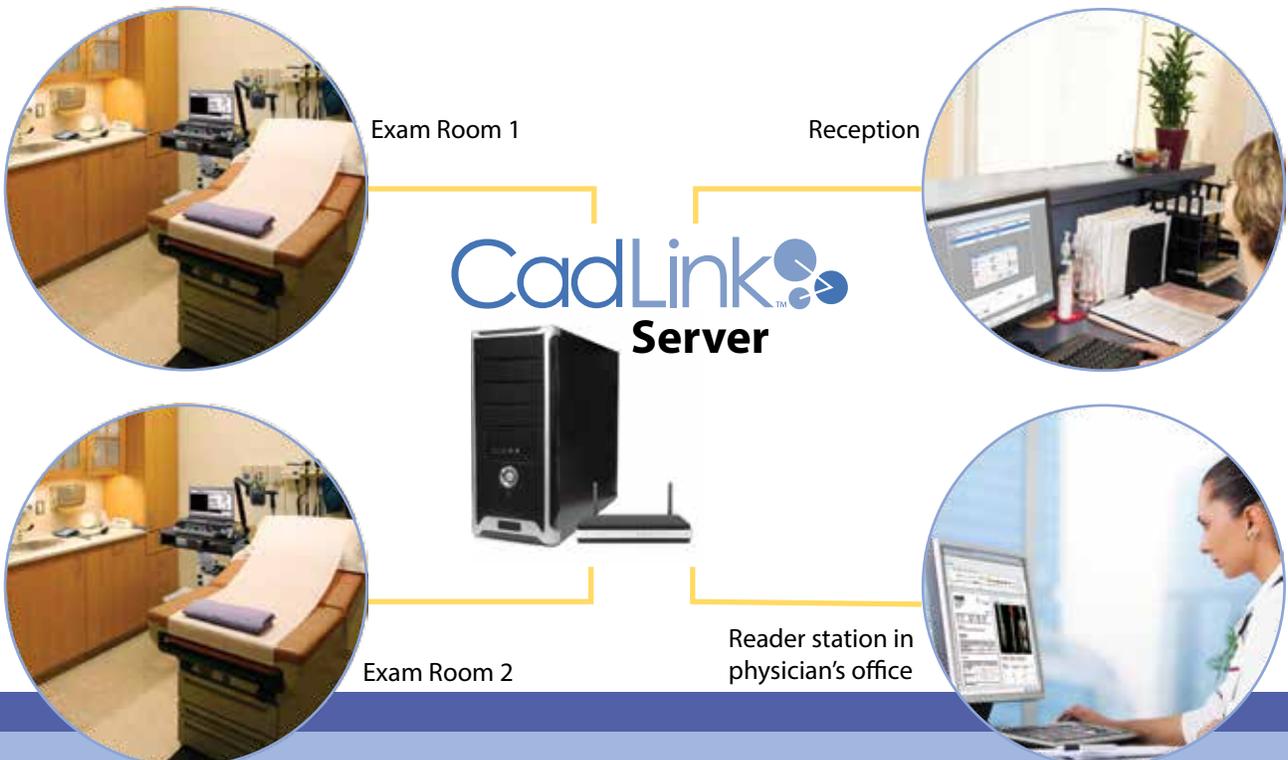
Your Time is Valuable
Here Are Three Reasons the Sierra Summit Will Save You Time
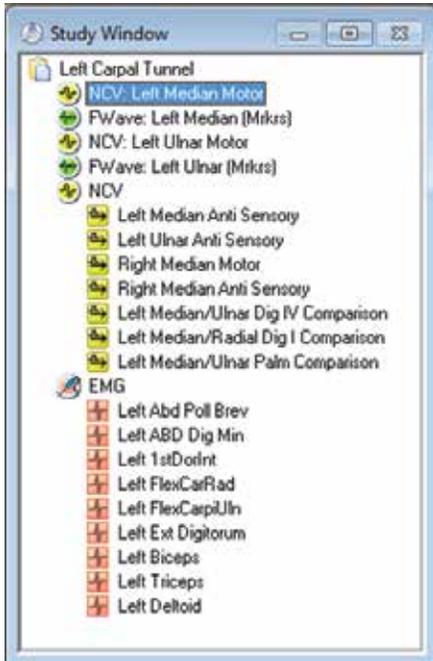
1. Reduced Testing Time

• **Perform NCV, F/H tests without touching the keypad.**
Select nerves, acquire traces, store traces, and enter distances using programmable buttons on the StimTroller *Plus*.

• **Easier access to stim locations.**
Angle of stimulus probes is adjustable and the polarity of the probes is reversible. And with our Quick Connect Adapter, you don't need to remove the probes to attach a bar or ring electrode.

• **Eliminate the time of moving between screens.**
Study lists allow you to perform a complete study from one screen, saving button pushes and time.

• **Adapts to your testing style.**
Most functions can be performed using button pushes or the mouse. You decide which makes you more efficient.

2. Rapid Review of Results

• **One button push displays all data.**
Numbers and waveforms from every test are available from one screen. Click on a test to review the waveforms or adjust cursors.
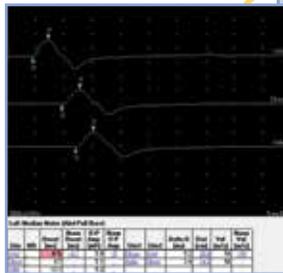
• **Faster data review.**
Abnormal findings (based on your normal values) are automatically highlighted but can be adjusted if needed for each patient.

• **Eliminates the time it takes to write a summary paragraph.**
Auto Findings Composer writes the summary of findings paragraph for you based on the highlighted values you have determined to be abnormal in both NCV and EP tests, and even summarizes your EMG scoring for the report.
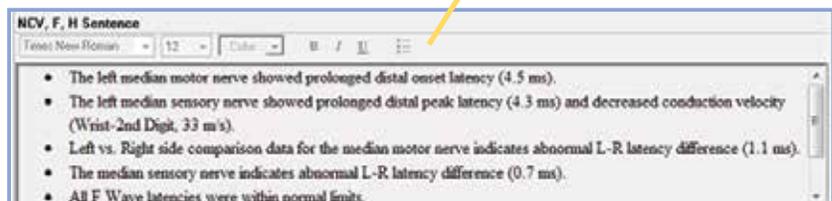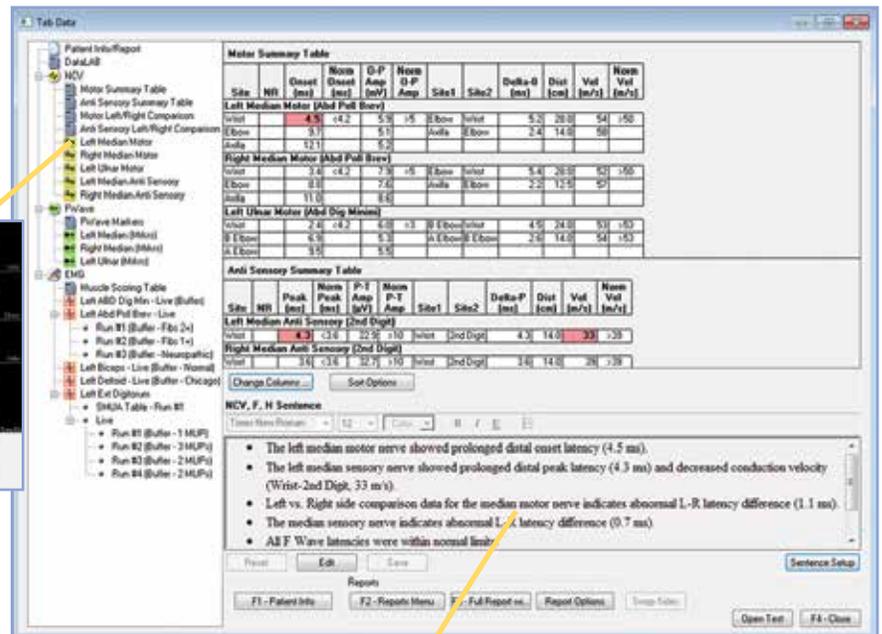
Finding shown here in bulleted format.
Numbered or paragraph formats also available.

3. Your Personalized Reports without Typing

- **Unique Reports.**
  We will design templates in your own style, not ours. Templates can be designed for EMG/ NCV testing only or even more complex full consultation reports.

- **Eliminate dictation or typing.**
  Your custom report templates will allow you to generate reports simply by using the mouse and selecting from a list of choices.

- **Easily email reports.**
  All results and findings are automatically transferred to Microsoft Word, and are saved in *.doc, *.docx, or *.pdf format.

- **EMR friendly.**
  Easy integration with patient's electronic medical record. Sierra Summit is network ready and has an optional HL7 Interface.

Use the mouse to make selections
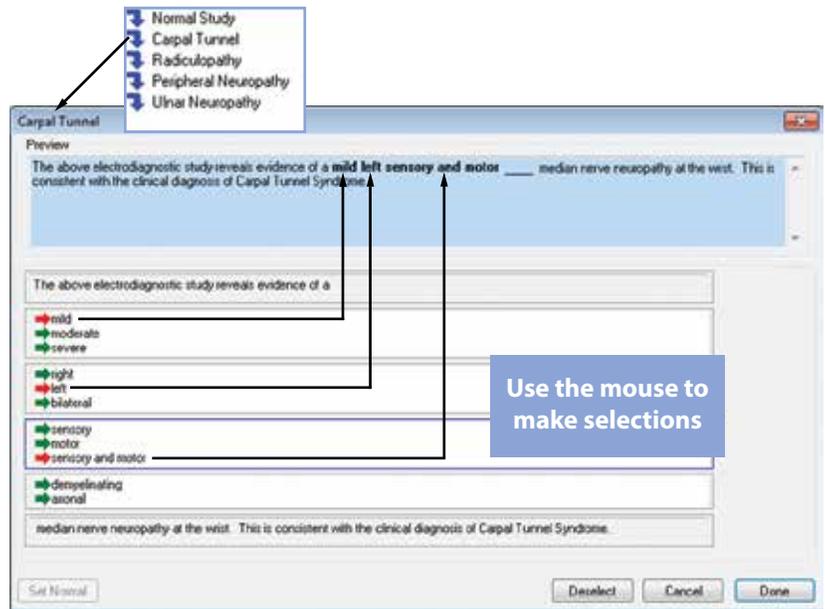
The Carpal Tunnel Impression template has been selected.

Easily insert your office header and logo.

This entire section was created without using the keyboard.

All result tables can be included with abnormal values highlighted. Waveforms optionally included.

Cadwell Customer Support

REMOTE ASSISTANCE

Cadwell is focused on making you a satisfied, loyal customer for years to come. Our telephone support is second to none. We answer every call during business hours with a real person. Our in-house employee technicians are trained professionals. Our web-based support program allows our technicians to troubleshoot real-time – as if they were in your office. Our flexible service contracts will meet your specific needs. Just ask.

Supplies and Accessories - www.estore.cadwell.com

Cadwell has a complete range of quality, reliable supplies as well. From Monopolar and Concentric to Injectable and Single Fiber needles; disposable and reusable surface electrodes for NCV, EMG and EP. We are your one-stop source for everything neurophysiology related.

Quick Connect Adapter
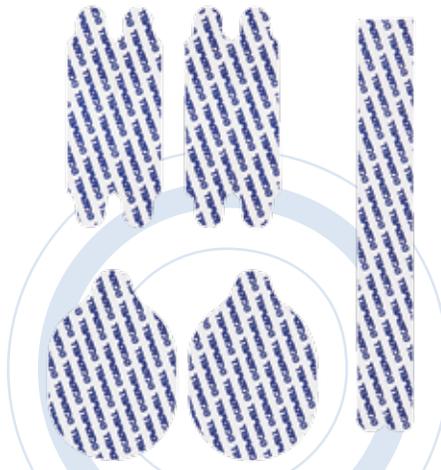
Cadwell Disposable Patient Pak Refills and Starter Kits (Improved Hydrogel)

Shielded Interconnect Cable

Ambu® Neuroline Disposable Monopolar Needle Electrodes With Detached Lead Wire

Stim Probe Extension

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