CADWELL®
Helping you help others

Cascade® IOMAX®

SOLUTION GUIDE

INTERNATIONAL EDITION

MADE IN THE USA

This guide is designed to give you a comprehensive understanding of the hardware, carts, supplies, accessories, and electrodes that Cadwell offers to support the Cascade® IOMAX® IONM system.

Dual Cascade IOMAX systems were used in a case successfully separating conjoined twins. Each twin was monitored with a Cortical Module and two Limb Modules. TEMG was key, and the monitorists gave the surgeons valuable information about the cauda.

CADWELL IS ADVANCING THE FIELD OF INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING

Cadwell's IONM hardware, software platforms, remote monitoring offerings and data management solutions are purpose-built with customers in mind. Cascade® Surgical Studio software has free updates and new licensable features added regularly as we proactively seek customer feedback. All of our Cascade product development and production is done in Kennewick, Washington, USA. Our dedicated Application Support and Service teams are the best in the industry.

Surgeries come with a risk, especially those that involve the brain, spinal cord or nerves. Intraoperative neurophysiological monitoring (IONM) is performed during many different types of surgeries to reduce the risk of irreversible neurological deficits, such as muscle weakness, loss of sensation, hearing loss and impairment of essential bodily functions. IONM involves multi-modal recording of electrical potentials from the nervous system during operations to detect adverse changes, enable corrective action, and offer surgical guidance.

Cadwell's Cascade® IOMAX® with Cascade Surgical Studio software, the culmination of nearly two decades of innovation, experience and investment, is the future of IONM.

SOLUTION OVERVIEW

CASCADE IOMAX IONM

Cascade IOMAX is a module-based neuromonitoring solution that is scalable for simple to complex cases with 8 to 80 channels, and is capable of direct cortical stimulation.

It is a robust system designed to withstand the challenging environment of the operating room. It can function as a cart-based or portable system that maximizes user-configuration choices and simplicity. Custom accessories are designed to reduce noise and increase efficiencies.

Cascade Surgical Studio® (CSS) IONM software streamlines your workflow, delivers clinical excellence, monitors all modalities, strengthens documentation, and lets you stay connected with remote live review and live chat.

The powerful software-based CadX® Surgical Simulator helps you learn or teach IONM outside of the operating room.

FEATURES AND BENEFITS

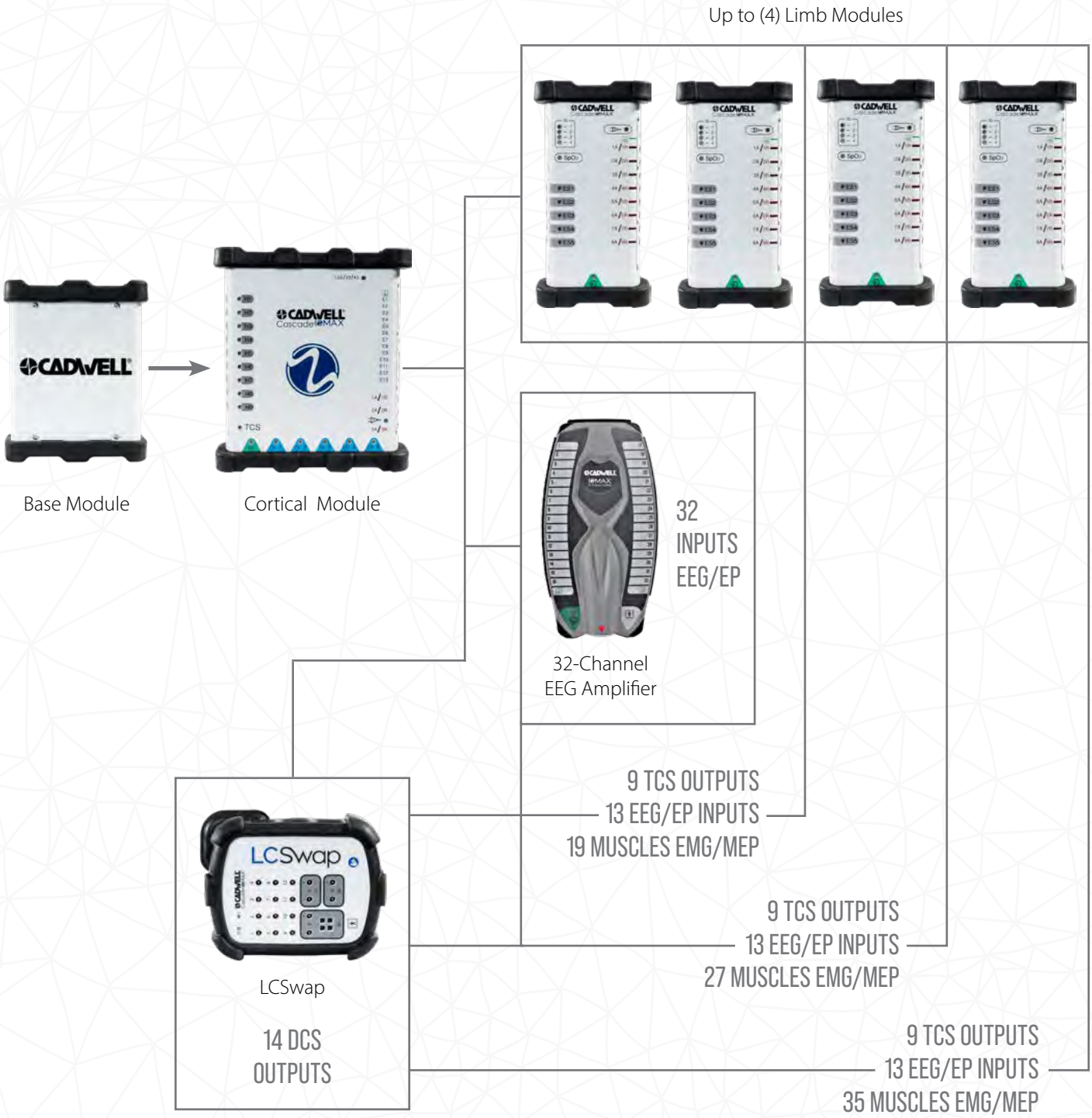
- Modular design gives greater flexibility for dynamic IONM setups
- Up to 20 E-Stim Outputs up to 100 mA lets you configure multiple stimulation sites simultaneously
- Constant current stimulation limited to 20 mA and supports cortical mapping
- Cortical Module features nine integrated TCS outputs and inputs for cortical applications. Extender pods and cables are available for Cortical Module inputs and outputs, allowing positioning of the Cortical Module away from the surgical table.
- Limb modules offer pulse oximetry inputs to rapidly detect limb perfusion levels in one to four limbs
- A single SafeT® cable connects IOMAX modules at the operating table to the surgical monitoring technologist station. SafeT cables are durable and waterproof, with quick-release metal color-coded connectors. These cables are completely interchangeable between Cortical and Limb Modules and the 32-channel amplifier, and can quick-release from both ends for quick setup and position changes.
- Cortical Module and Limb Module are waterproof and drop-proof to 1 m (3 ft)
- Integrated electrosurgical unit (ESU) detection

SOLUTION OVERVIEW

CASCADE IOMAX CONFIGURATIONS

CONFIGURE YOUR IOMAX IONM SYSTEM FROM 8-80 CHANNELS

Cascade IOMAX offers durability, simplicity, flexibility, and can be deployed as needed from basic spine to complex spine and complex neuro procedures. The system consists of a computer running Cascade Surgical Studio software, a Base Module, and any of these combinations of Cortical Module, Limb Modules, and 32-channel EEG Amplifier to create an IONM configuration between 8 and 80 channels.



PRODUCT AVAILABILITY VARIES BY MARKET.

Cascade IOMAX Cortical and Limb Modules are drop-tested for durability and water resistant for easy clean-up.

SafeT cables are waterproof and completely interchangeable between IOMAX modules. Quick-release color-coded metal connectors with protective caps ensure a long life.

Quick Adapts allow for fast and simultaneous connect and disconnect of groups of amplifier recording electrodes.

PRODUCT AVAILABILITY VARIES BY MARKET.

SOLUTION OVERVIEW

CASCADE IOMAX HARDWARE

LIMB MODULE

The Cascade IOMAX Limb Module contains an 8-channel differential amplifier, an electrical stimulator, and an SpO_2 and heart rate port.

CORTICAL MODULE

The Cascade IOMAX Cortical Module contains a transcranial stimulator, a 16-channel EEG amplifier, and ports for connecting EP stimulators and E-stimulators, Limb Modules, and amplifiers.

32-CHANNEL EEG AMPLIFIER

Record EEG and direct cortical SSEPs. Add to any existing IOMAX configuration or connected directly to the IOMAX Base Module.

BASE MODULE

The Cascade IOMAX Base Module is a required component for IOMAX power and communication

LCSWAP STIMULATOR

The LCSwap® stimulator provides a comprehensive switch matrix solution for direct nerve and cortical stimulation.

PRODUCT AVAILABILITY VARIES BY MARKET.

BASE MODULE

The IOMAX Base Module is a **required component** for each IOMAX system.

The Base Module:

- Connects to the PC and power supply
- Provides power and communication via a single SafeT® cable to the Cortical Module, Limb Module, or 32-channel amplifier at the OR table
- Allows Trigger In/Out interfacing with third-party devices

BASE MODULE POWER CORD

Provides power to IOMAX modules.

A-C USB CABLE

Provides communication from IOMAX modules to PC 1.8 m (6 ft).

TRIGGER CABLE

Optional, for triggering an external device. Plugs into Base Module.

SAFET CABLE

One SafeT cable connects the IOMAX Base Unit to bedside modules, offering simple setup and a cleaner operating room floor. Quick-release color-coded metal connectors with protective caps ensure long life. The entire cable is durable and washable. Cable lengths of 3 m (10 ft) or 8 m (26 ft) are available.

PRODUCT AVAILABILITY VARIES BY MARKET.

SOLUTION OVERVIEW

CORTICAL MODULE

The IOMAX Cortical Module is designed for close proximity to the patient's head, and is IP67 waterproof, drop-tested, and easy to clean. It contains both amplifiers and different types of stimulators, and can accommodate 16-80 channels for simple or complex surgeries. Different hardware features can be enabled by purchasing corresponding Cascade Surgical Studio software licenses and IOMAX accessories.

SAFET CABLE

Connects the Cortical Module to the IOMAX Base Module or Limb Modules. Cable lengths of 3 m (10 ft) or 8 m (26 ft) are available.

PRODUCT AVAILABILITY VARIES BY MARKET.

SOLUTION OVERVIEW

BAEP SUPPLIES

GOLD FOIL EAR TIPS

Gold foil ear tips connect to the reusable ear phone recording lead wire tubing via impedance adaptors. Available in neonate/pediatric and adult ear tip sizes.

EAR TIPS

Ear tips connect to the ear phone tubing by impedance adaptors. Available in pediatric, adult, jumbo, and various neonate/pediatric ear tip sizes.

RIGHT ANGLE INSERT EARPHONE SUPPLIES

Threaded right angle adaptors and threaded foam tips are a convenient and quick way to change out the foam ear tips.

HOOK AND LOOP CLIPS

Stick the Velcro side to Earphone Transducer, and then attach to patient gown to hold recording lead wire in place. 6 / pack.

CORTICAL MODULE: AEP, VEP AND LCS

AS AUDITORY STIMULATOR

The auditory stimulator is integrated into the Cortical Module and is an optional feature enabled by software license. The ER-3C insert headphones (sold separately) are connected by a dedicated color-coded orange cable to the AS output. Cable lengths of 1 m (3 ft 3 in) or 3 m (10 ft) are available.

PRODUCT AVAILABILITY VARIES BY MARKET.

VS VISUAL STIMULATOR

The visual stimulator is integrated into the Cortical Module and is an optional feature enabled by software license. The LED Goggles are connected to the purple VS output through a dedicated purple color-coded cable. Cable lengths of 1 m (3 ft 3 in) or 3 m (10 ft) are available.

LCS LOW CURRENT STIMULATOR

The built in Low Current Stimulator is intended for direct stimulation of nerves and/or cortex and is limited to 20 mA / 50 V stimuli. A yellow color-coded cable for connection of a single stimulation probe to the yellow LCS output is provided with the Cortical Module (probes sold separately).

The LED Goggles use disposable adhesive foam so a clean set is available for each patient.

PRODUCT AVAILABILITY VARIES BY MARKET.

SOLUTION OVERVIEW

CORTICAL MODULE: LCSWAP STIMULATOR

The LCSwap® is an optional accessory for the LCS output of the IOMAX Cortical Module and provides a comprehensive switch matrix solution for direct nerve and cortical stimulation. Twelve outputs can be independently assigned in the software as anode or cathode; it also includes two paired outputs for hand-held probes (P1, P2). An additional connector (P3) is present for possible future feature expansion. The LCSwap connects by a color-coded SafeT Cable to the LCS output on the Cortical Module.

LCSWAP TEST ARRAY

The LCSwap Test Array allows for the verification of LCSwap stimulator functionality using the built-in Cascade Surgical Studio Diagnostic suite.

LCSWAP SAFET CABLE

Connects the LCSwap to the Cortical Module.

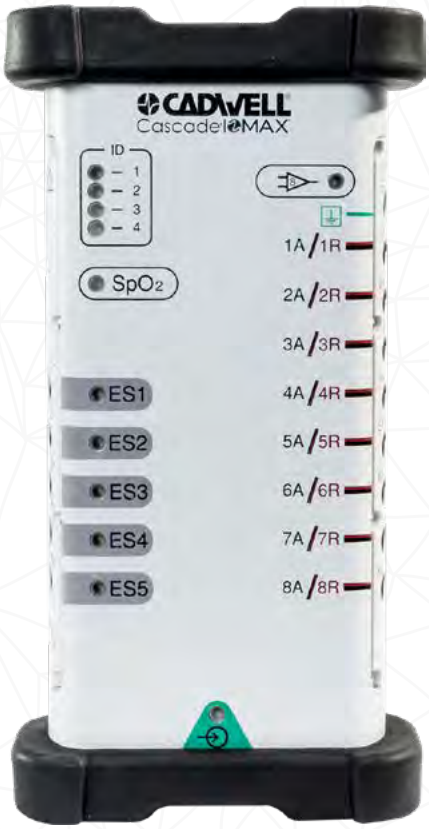
PRODUCT AVAILABILITY VARIES BY MARKET.

SOLUTION OVERVIEW

LIMB MODULE

The Cascade IOMAX Limb Module is designed to cover all of the IONM needs at the limbs and contains an 8-channel differential amplifier, an electrical stimulator with five switchable paired E-Stim outputs, and connection for measuring SpO_2 and heart rate. The Limb Module is IP67 waterproof, drop-tested, and easy to clean. Use one or two Limb Modules independently with the IOMAX Base Unit, or combine one to four Limb Modules with the Cortical Module. Each requires a SafeT cable.

SpO_2 and E-Stim View



Cascade IOMAX Limb Module Front View

Amplifier View

SPO_2 AND HEART RATE

Rapidly measure and monitor pulse oximetry and heart rate, and detect limb perfusion levels in up to four limbs. SpO_2 must be enabled in each Limb Module to record SpO_2 from multiple sites. SpO_2 sensors sold separately.

Bottom View:
A SafeT cable connects the IOMAX Limb Module to the Base Module or Cortical Module.

PRODUCT AVAILABILITY VARIES BY MARKET.

SOLUTION OVERVIEW

32-CHANNEL EEG AMPLIFIER

The Cascade IOMAX 32-channel amplifier is designed to record EEG and direct cortical SSEPs, and can be added to any existing IOMAX configuration or connected directly to the IOMAX Base Module with the standard SafeT cable. It is compatible with Cascade Surgical Studio software v2.5SP1 or higher.

SAFET CABLE

Connects the 32-channel amplifier to the Cascade IOMAX Base Module, Cortical Module, or Limb Module. Cable lengths of 8 m (26 ft) or 3 m (10 ft) are available.

PRODUCT AVAILABILITY VARIES BY MARKET.

CASCADE IOMAX POSITIONING GUIDE

CASCADE IOMAX POSITIONING EXAMPLES

Accommodate any surgical table for simple and dynamic product positioning with Cascade IOMAX accessories.

EQUIPMENT KEY: EXTENDER PODS · BED RAIL MOUNTING HANGER · CHAINS · C-CLAMP BRACKET

NEURORADIOLOGY

JACKSON FRAME AND IV POLE

PRODUCT AVAILABILITY VARIES BY MARKET.

DIVING BOARD

HINGED

PARK BENCH

PRODUCT AVAILABILITY VARIES BY MARKET.

SOFTWARE - MONITORING

CASCADE SURGICAL STUDIO (CSS)

CSS IONM software enables all-modality monitoring for SSEP, EMG, TEMG, MEP, EEG, DWave, and TOF.

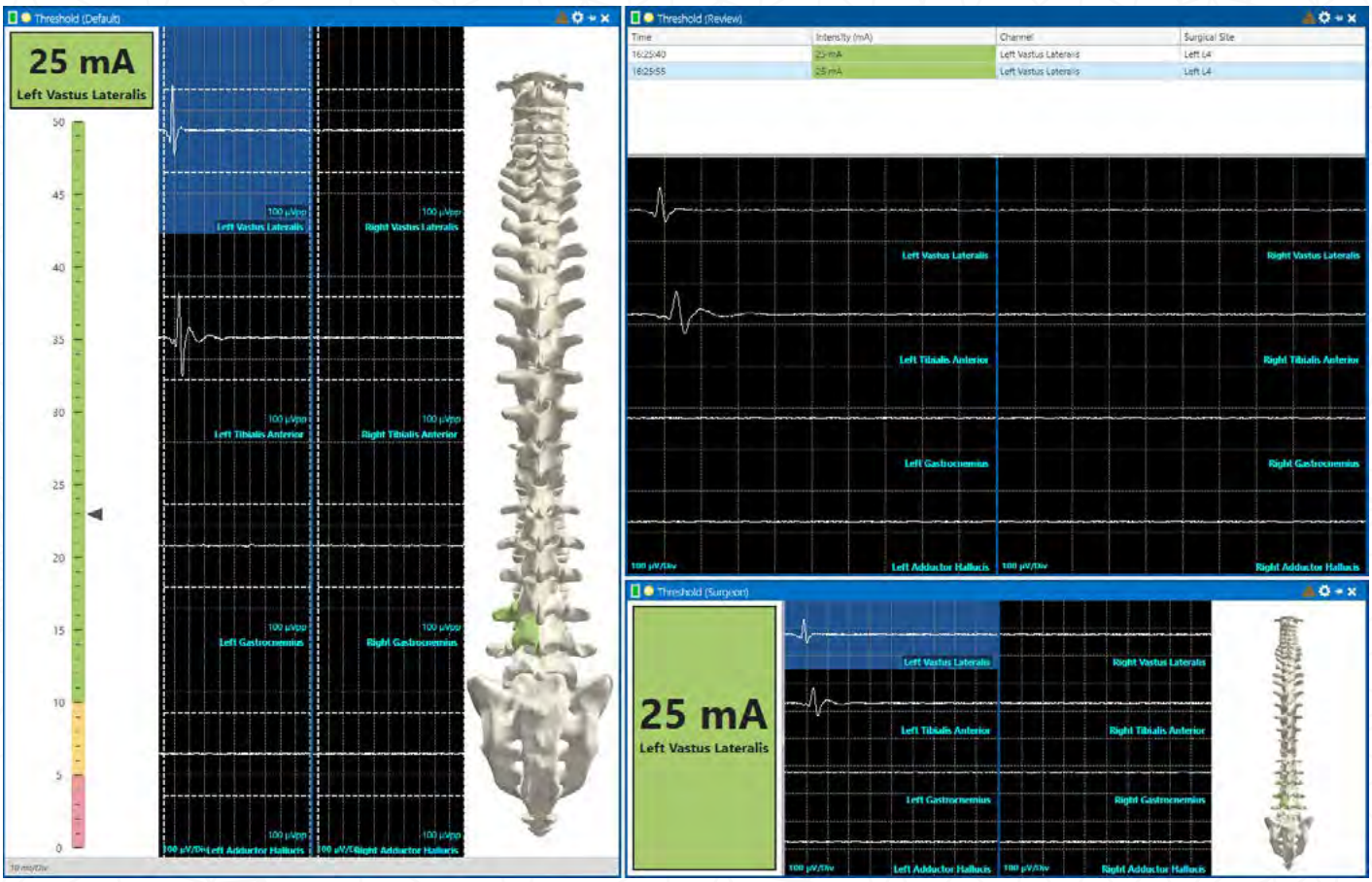
CSS BENEFITS

- Streamlined IONM workflow
- Simple hardware-first procedure setup
- Capture critical IONM information
- See it how you want it with window docking
- Capture full screen screenshots at every event with CadCapture.
- Deliver clinical excellence
- Monitor all modalities
- Strengthen IONM documentation
- Remote monitoring and integrated live chat
- Optimize quality IONM management
- Feature requests deliver directly to product development
- Citrix Ready (CSS v3.5 SP3+)

CSS SOFTWARE LICENSES

- Cascade Surgical Studio IONM
- TCS TransCranial Stimulator Single Fixed Pair
- TCS-9 TransCranial Stimulator with Montaging
- SpO_2 Measurement
- EEG, DSA, CSA, and EEG Trending
- VEP
- VEP + Goggles
- BAEP
- BAEP + Insert Earphones
- Video
- Remote Monitoring / Direct Connect (for acquisition PCs)
- Reader (for reader PCs)
- Case Data Export
- Automatic Threshold Detection
- CadX Simulator Educator

CITRIX Ready

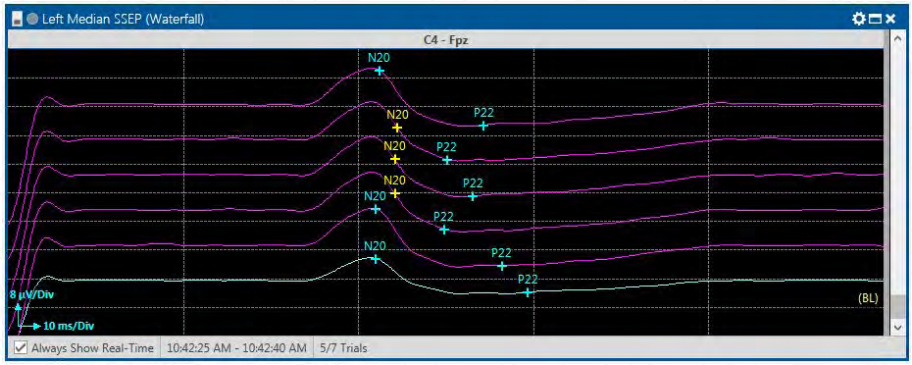


AUTOMATIC THRESHOLD DETECTION

Fast and accurate pedicle screw threshold testing can be achieved using Automatic Threshold Mode with a specially-designed anatomical interface and dedicated surgeon view (license required).

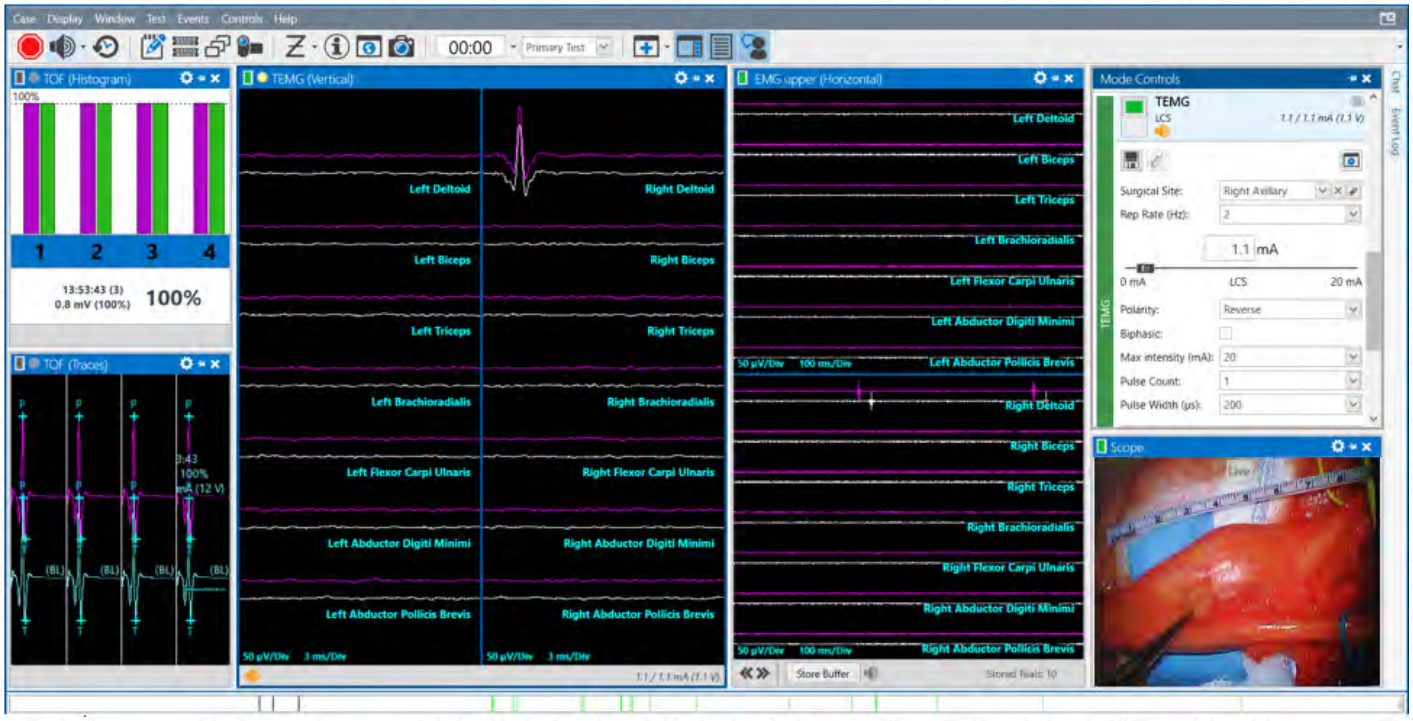
IMPROVED USER EXPERIENCE

Focus on what's important with cursor alerts (shown here); windows you can move, dock, and pin; multi-monitor support; and touch screen capability. Most display, acquisition and averaging settings can be adjusted on the fly during data acquisition. You can also add comments remotely and save EMG audio to improve the reviewer experience.



PRODUCT AVAILABILITY VARIES BY MARKET.

SOFTWARE - MONITORING



OPTION FOR MULTIPLE VIDEO STREAMS

Integrate an on-screen display from an external video source in CSS (software license and additional hardware required).

MODE-CENTRIC PROCEDURE SETUP

Complete modes (custom or CSS defaults) can be dropped into a protocol in a single step, with all channels, stimulators and amplifiers configured properly. CSS software intuitively assigns channels to modules, and gives users the freedom to specific stimulation parameters.

EEG, CSA AND DSA TRENDING DISPLAYS

Quickly visualize EEG data over time with enhanced analysis of EEG frequency.

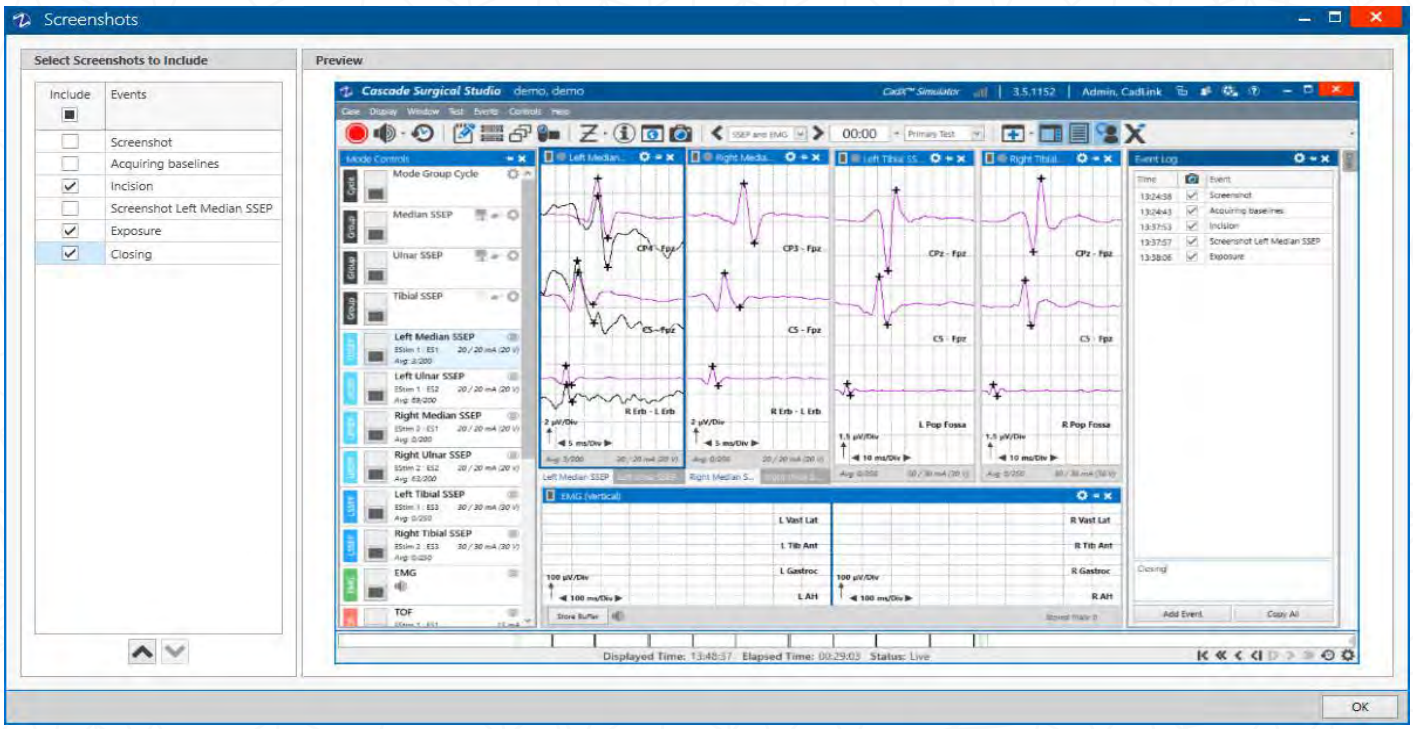
USER-SPECIFIC COLOR PREFERENCES

Each user can choose their color preferences for trace window background (light shown above, dark shown to the left), as well as grids, cursors, labels, markers, highlights, cursors, alerts, and more.

TIMERS

Utilize two independent timers with visual and auditory alarms for threshold. Easily track clamp times or use as a reminder to trigger a stimulus.

CITRIX Ready

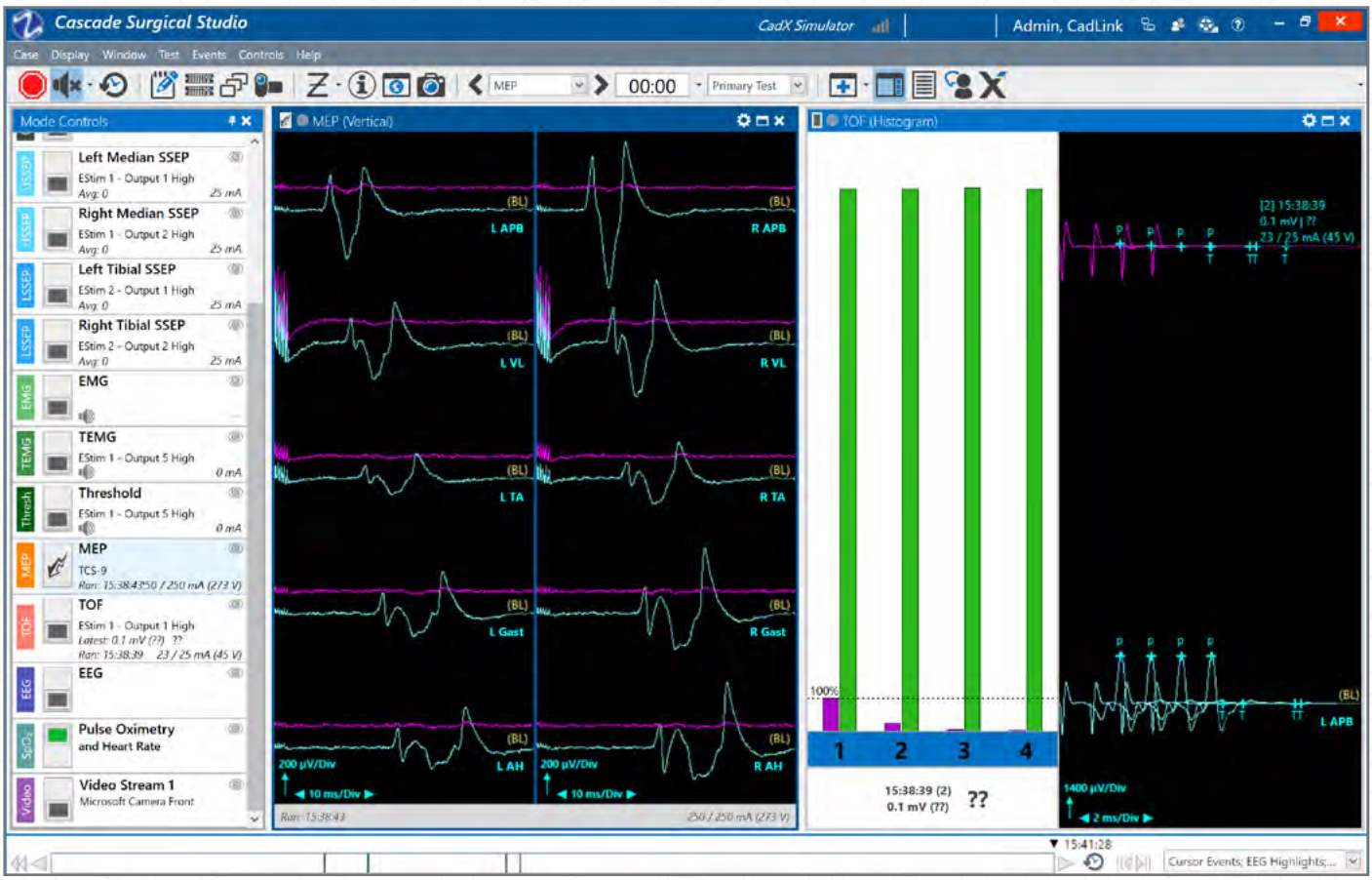


CASE DATA EXPORT FOR ANALYSIS

Case Data Export provides a method for exporting detailed information from one or more cases into a JSON file. Exported case data includes patient and case information fields, trace data with associated information (i.e. mode, channel, stimulus, and cursor details), events and chat, pulse oximetry data, and more.

Options are available to exclude certain types of data such as patient name or specific types of modes. Ideal for research settings, you can now export waveform data, events, and more to EDF+ for analysis in third-party software (license required).

SOFTWARE - IONM SIMULATION/TEACHING

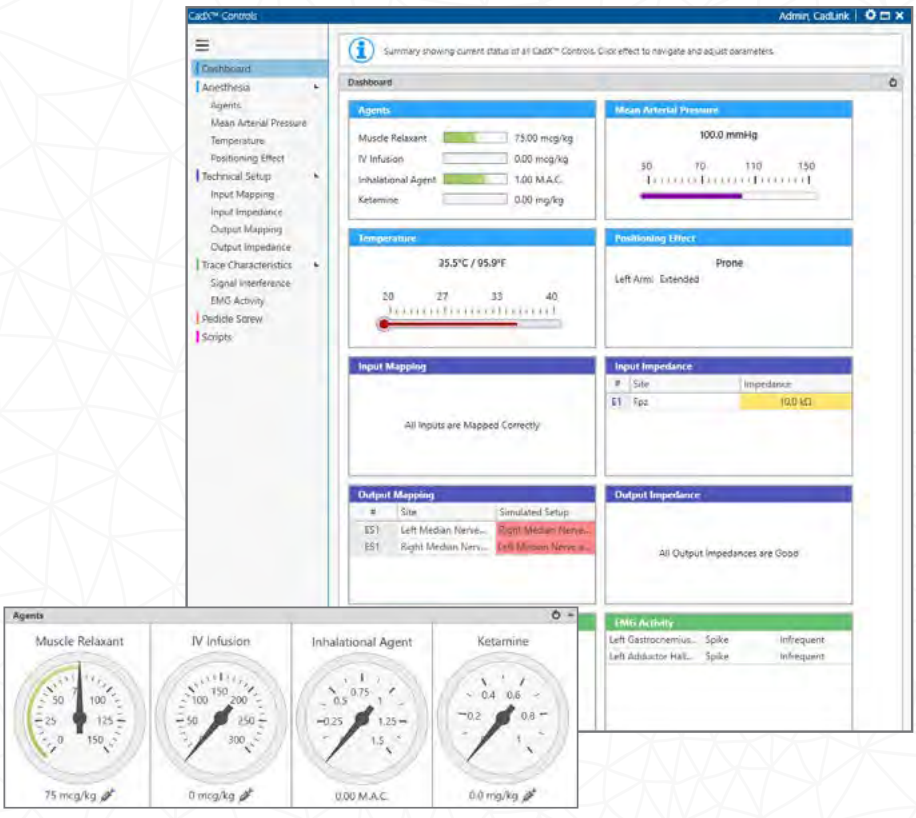


CADX SURGICAL SIMULATOR

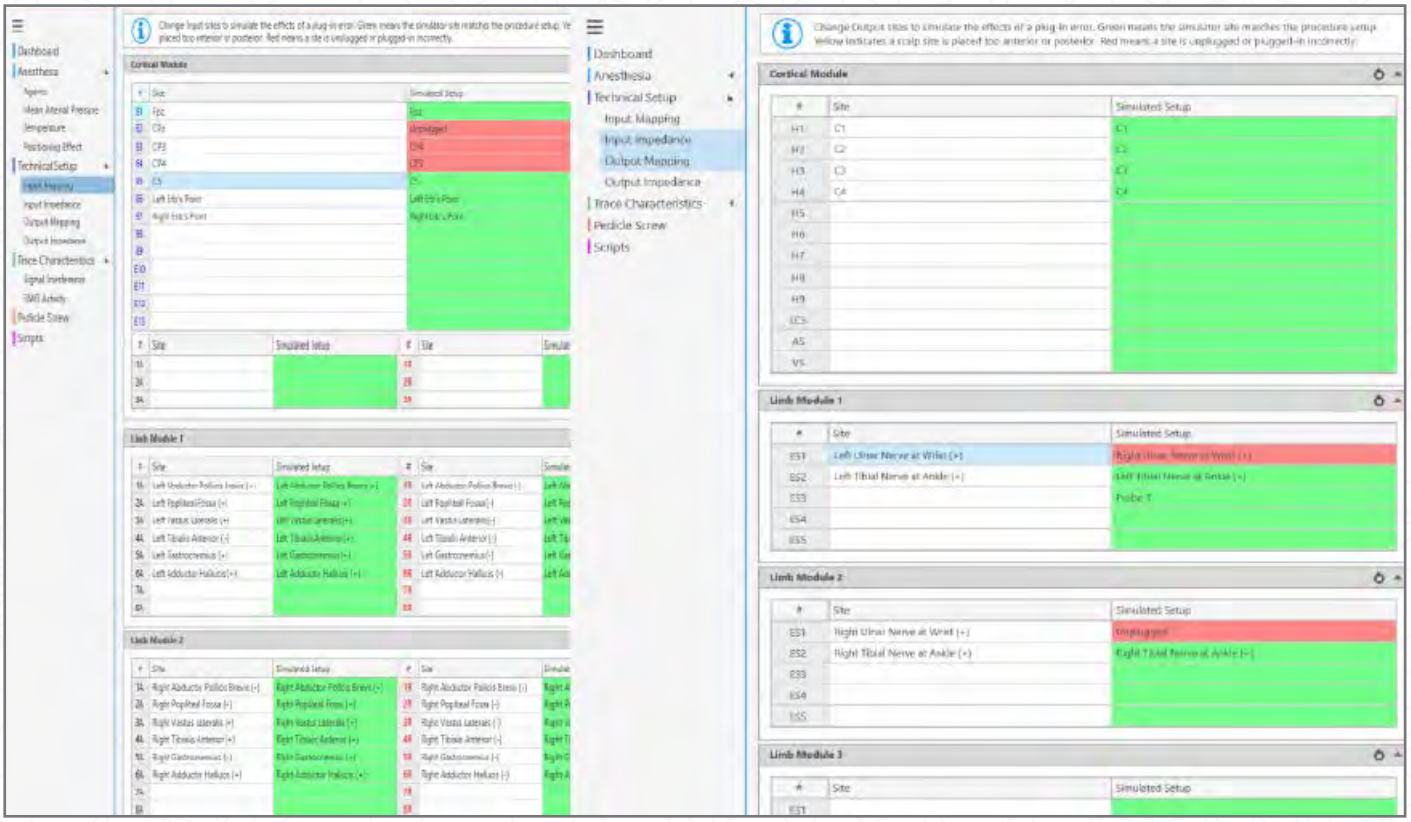
CadX® Surgical Simulator is a comprehensive training and teaching tool that uses the same procedure setups and software functions as you use in the OR.

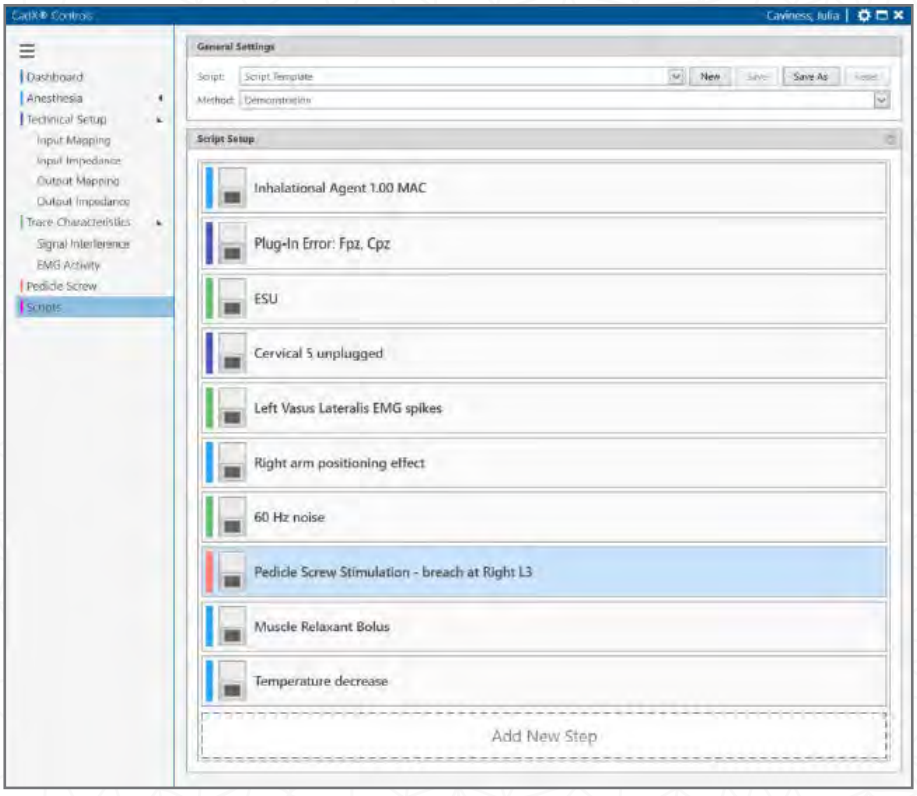
CadX software lets you manipulate the patient control panel to create real-world scenarios for demonstration and assessment purposes. You can simulate realistic IONM data to demonstrate anesthesia effects, surgical effects, technical setup errors, trace characteristics (physiological or not), pedicle screw stimulation, and more.

CadX is software-based and requires no hardware.



PRODUCT AVAILABILITY VARIES BY MARKET.


Dashboard
Anesthesia
Technical Setup
Input Mapping
Input Impedance
Output Mapping
Output Impedance
Trace Characteristics
Pedicle Screw
Scripts
Cortical Module
Limb Module 1
Limb Module 2
Limb Module 3
Site
Simulated Setup


CadX® Controls
Caviness, Julia
Dashboard
Anesthesia
Technical Setup
Input Mapping
Input Impedance
Output Mapping
Output Impedance
Trace Characteristics
Signal Interference
EMG Activity
Pedicle Screw
Scripts
General Settings
Script:
Script Template
New
Save
Save As
Delete
Method:
Demonstration
Script Setup
Inhalational Agent 1.00 MAC
Plug-In Error: Fpz, Cpz
ESU
Cervical 5 unplugged
Left Vasus Lateralis EMG spikes
Right arm positioning effect
60 Hz noise
Pedicle Screw Stimulation - breach at Right L3
Muscle Relaxant Bolus
Temperature decrease
Add New Step

Cascade® IOMAX®

C2 CART DUAL MONITOR, HORIZONTAL OPTION

- Horizontal dual monitors can swivel 270° for surgeon view and fold forward into a "clamshell" for transportation and storage.

C2 CART DUAL MONITOR, VERTICAL OPTION

PRODUCT AVAILABILITY VARIES BY MARKET.

CARRYING CASES

TRAVEL CASE

The travel case is an extremely robust wheeled carry case that adheres to most airlines' carry-on size requirements. It can fit a complete 48-channel Cascade IOMAX system together with a laptop PC and accessories. This waterproof hard case has a TSA-approved lock, wheels, and a retractable handle. Safeguard your Cascade IOMAX system for storage and transport.

SOFT LAPTOP CASE

Mobilize your laptop with this soft laptop case with zipper 35 x 40 x 7 cm (14 x 16 x 3 in).

SMALL DUFFEL BAG

Store cables and accessories in this duffel bag with zipper 30 x 40 x 15 cm (16 x 12 x 6 in).

PRODUCT AVAILABILITY VARIES BY MARKET.