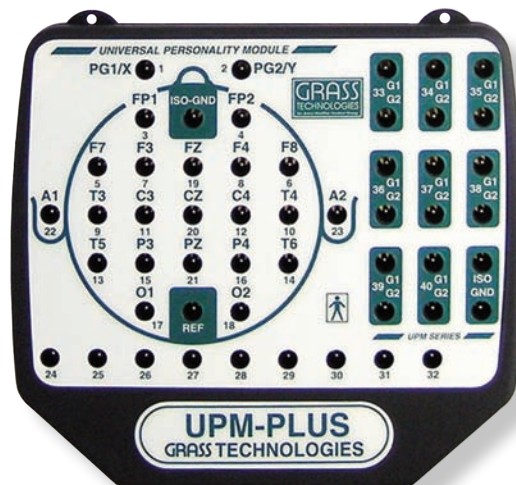# Lab-based & Portable EEG Systems

- Routine & Extended EEGs
- Dependable Hardware & Service
- Neuromonitoring Trending Option
- Sleep Diagnostic Capabilities

EEG Systems
Powerful & unique EEG systems

With over 75 years experience in designing and manufacturing reliable, high-quality instrumentation for the neurodiagnostic community, Grass brings you the Comet-PLUS systems, and continues to provide complete solutions for all of your EEG monitoring needs.

These powerful, easy-to-use EEG systems consist of the high response 57-channel AS40-PLUS Amplifier System, a quick disconnect headbox with electrode inputs designed especially for routine EEG, and TWin EEG Record and Review Software. These flexible systems upgrade easily to also record PSG studies. Powerful Panorama digital video, Neuromonitoring frequency trending, and SzAC seizure/spike analysis software options are available.

Features

- Compact design that is rugged, lightweight, and easy to use
- On-board analog to digital conversion for interference-free recordings
- Easily connect to any PC with the on-board Ethernet port
- Flexible enough for both EEG and PSG applications
- 40 AC channels and 4 DC channels built-in
- Optional pulse oximeter for SpO2, Rate, PPG, and Plethysmogram
- Easy, identifiable electrode input with the International 10-20 placement layout
- On-board impedance checking and calibrations at the amplifier system
- Easily mounted next to a patient bed or attached to a mobile cart

Comet-PLUS XL Lab-based EEG

Comet-PLUS XL is a complete EEG system designed to satisfy the needs of the physician's office, hospital, or medical center. Ready to use, Comet-PLUS XL is supplied with the latest high performance PC and Photic Stimulator. Select from various mobile carts, cameras and monitor sizes to suit your individual needs.

Comet-PLUS Portable EEG

Comet-PLUS Portable EEG system is supplied with the latest high-performance laptop computer.

A wide selection of accessories can be added.

Comet-PLUS XL EEG with optional Panorama video, IT9 mobile rack cart, and 24" flat panel monitor

Our Natus Brand Promise
Trusted Customer-Focused Technology

Natus Neurology is your partner in advancing patient care. An international leader, Natus offers a comprehensive line of healthcare equipment and products used for screening, detecting, treating, monitoring and tracking common and uncommon neurophysical patient conditions. Natus Neurology works closely with you to improve patient lives.

Accurate, fast and easily retrievable information is vital. Natus Neurology has years of experience developing electrodiagnostic systems that help providers get the right information for the best patient care. Reliable condition assessment depends on the caliber of equipment used and directly affects how quickly treatment can be administered. Paired with the improved ability to efficiently access, archive and retrieve electronic medical records, Natus can help you increase the quality of care, improve safety and streamline workflow.

Amplifier System
Reliable, state-off-the-art

Grass amplifiers are world-renowned in the field of neurophysiology for their quality, reliability, simplicity, and serviceability. At the heart of the Comet-PLUS EEG is the AS40-PLUS Amplifier System. The amplifier system is designed specifically for the EEG and PSG monitoring lab and combines the latest digital design techniques with years of amplifier design and manufacturing experience.

The AS40-PLUS is a compact 57-channel amplifier unit. There are 40 AC channels and 4 DC channels built into the system. An optional 8-channel DC input module, patient event button, and and optional pulse oximeter allow for an additional 13 channels of data. This flexibility allows for wide range of physiological parameters to be monitored and recorded.

The amplifier system provides for patient safety isolation, signal conditioning (physiological signal amplification and filtering), and digitization. Communications with a host computer are accomplished using TCP/IP protocol over Ethernet network or dedicated cable. A host computer, using TWin software, sets the sample rate, starts and stops the data transmission, monitors the digital data, and stores it to hard disk.

An intuitive user interface with LCD screen is present with the amplifier. From the amplifier itself, a user is able to implement such features as electrode impedance checking, amplifier calibration, and photic stimulator control. Also from the LCD display a user is able to obtain information such as connection status to the host computer, and oximetry/pulse rate information when an oximeter is in use.

Personality Modules: The flexible design of the amplifier allows different Personality Modules to be used. The UPM-PLUS Universal Personality Module is supplied with the amplifier in Comet-PLUS EEG systems.

The UPM-PLUS has 32 referential EEG inputs, 1 reference input, 1 patient ground and 8 bipolar AC channels for a total of 40 channels. The Personality Module's design allows for an easy disconnect/reconnect to the amplifier system.

An optional SPM-PLUS, Sleep Personality Module, is also available.
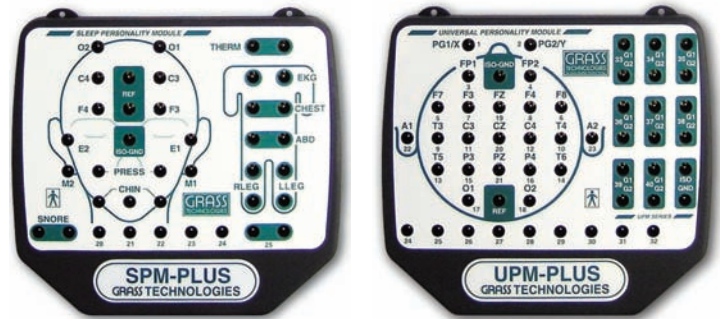
Photic Stimulator: Photic Flash for Photic Activation during EEG Procedures – The Photic Stimulator is an arm-mounted photic stimulator that is designed for photic activation of the EEG and routine clinical procedures in visual evoked potentials. The Photic Stimulator generates flashes of white light by means of a light-emitting diode (LED) array which switches on and off.

Support and Service:
All Grass instrumentation is backed by a strong support staff ready to respond to all of your needs. Technical support is available 24 hours a day, 7 days a week. Request information on our Customer Support Plans. Training is also available.

Comet-PLUS XL EEG with All-In-One PC and optional IT-10 mobile rack cart

TWin® EEG

Flexible, easy-to-use software

TWin offers the most flexible configurations to suit the needs of your lab. This multi-functional Windows®-based software permits recording and analysis of routine EEG and PSG studies as well as long-term epilepsy monitoring. TWin is the universal software used in Grass clinical systems.

Flexibility: TWin EEG will meet your specific needs, requirements and preferences. Easy to use tools allow the user to customize notation lists, montages, event definitions, keyboard triggers, photic stimulation sequences, waveform display views and more.

Montages: Create virtually unlimited montages, off-line or in real-time, with the intuitive Montage Editor. The Montage Editor uses a graphical head-stamp interface for programming scalp montages, plus an Invasive Electrode montage creator which will automatically name the electrodes, create referential output montages, and create bipolar output montages by Row or Column. User-defined average-reference montages, channel types, and trace colors can also be defined. The Montages used for a given study are also stored with the EEG data for retrieval during review or in the future when reviewing archived data.
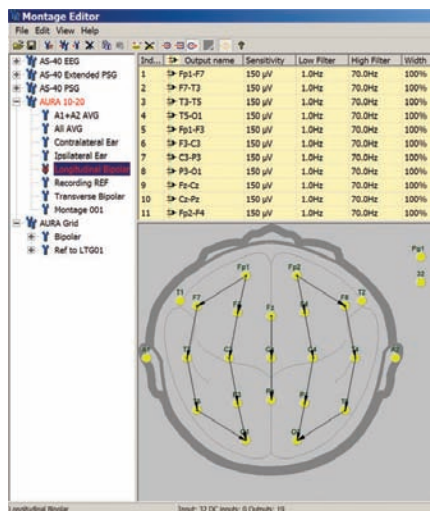
User Profiles: Use Profile Manager to configure a profile for each technician or doctor using the system. Their montage, trace color, record configuration, review setup, and other preferences are stored and loaded at any time. Specific test applications and parameters can also be saved as different profiles.

Recorder: The EEG, Video, and SzAC spike and seizure recording modules open with just a double-click on the TWin "Start Recording" icon. Easily perform impedance checks, calibrations, and montage adjustments. Entering user-defined events and annotations is as simple as a single keystroke.

Reviewer: Easily bring up a patient study for quick review with TWin's intuitive Database Explorer. Utilize keyboard or on-screen controls to navigate through a record. Amplitude and measurement tools, along with zoom capabilities allow the user to accurately analyze specific waveforms. Potential Mapping and Spectral Analysis tools are included with TWin for advanced data review.

TWin export functions allow output of information (raw data, graphics, and text to standard formats-(including ASCII and EDF), as well as direct links to programs in Microsoft Office® for report generation and database management. TWin can also import EDF files.

Patient & Study Database

TWin's Database Explorer allows efficient manage of patients and studies. Fully integrated with TWin acquisition/review/report software and Patient Scheduler, the Database Explorer allows the user to:

- Launch TWin Acquisition and Review
- Search, sort, and query patient and study information
- Add user-definable fields which can be queried
- Define and save frequently used queries
- Link to, and easily access other files (Word, Reports, images, etc.)
- Quickly archive study data to CD/DVD/USB Drives
- Track patient progress
- Track activity of laboratory staff and referring physicians

This HIPAA compliant software is password protected, allows multiple users and log-ins, allows user access levels to restrict features, and tracks user activity.

Remote Video/EEG Review

TWin EEG software is Citrix compatible. Having TWin EEG installed on the lab's or hospital's Citrix Server allows multiple and simultaneous users to review video and EEG data from virtually anywhere in the world from any PC with Internet access.

TWinLOOK® Review Software

- Review patient data anywhere
- Friendly, easy-to-use interface
- Ideal for sharing data with colleagues
- Compatible with Microsoft PowerPoint®
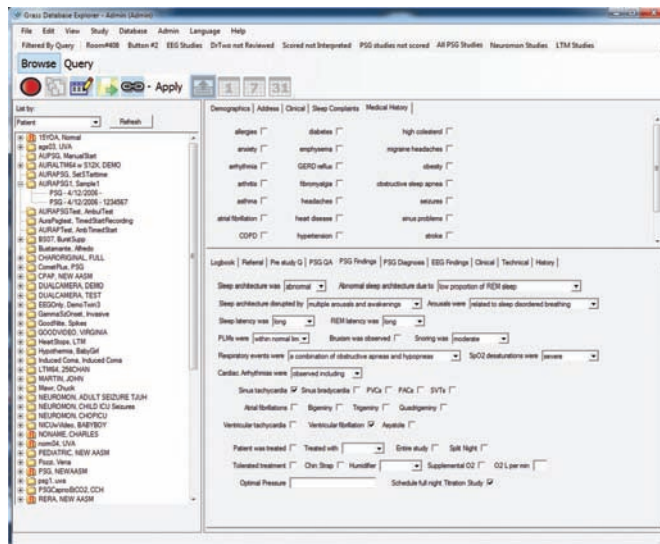
With the TWinLOOK review-only software, Video/EEG, EEG, or PSG recordings can be reviewed on any Windows® XP/7 computer, without the need to purchase additional software. TWinLOOK offers a friendly interface that allows the user to review studies recorded on any TWin-based acquisition system. The user can change montages and adjust filter and amplitude settings, review synchronized video, view annotations and reports. TWinLOOK can be incorporated into PowerPoint slide shows for presenting video/EEG samples. Video and EEG will automatically start and stop playing based upon user editing. TWinLOOK also allows physicians and hospital to send data acquired in their laboratory to others for review, facilitating exchange of data with referring physicians, colleagues, collaborators, and/or to obtain second opinions.

Optional Software Add-ons

Panorama® Digital Video & Audio Software

- Grass MPEG4 video compression for high resolution video with ultra low data rates

- Full window resizing during acquisition & review

- Overlay: up to full screen digital video display with waveform data appearing over the video image with transparent background

- Virtual Pan & Zoom features during acquisition & review

- Digital brightness, contrast and color saturation controls during record and review
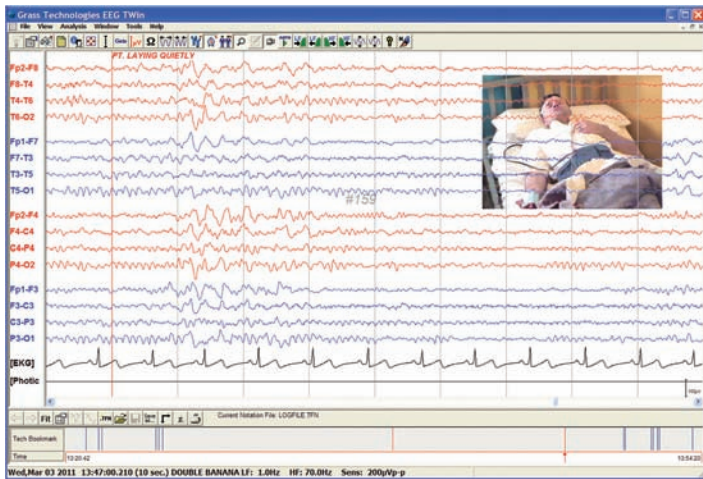
Panorama Digital Video uses the latest Grass MPEG4-based video compression. Grass digital video compression permits the highest resolution with the lowest storage needs. The compression techniques are optimized for smooth network functionality and it uses a self-adjusting variable data rate depending on the amount of motion in the picture, while maintaining the same level of quality. Lower data rates require lower disk storage space and result in faster data transfer.

The Overlay feature, unique to TWin, allows display of the video image behind the waveforms with a transparent background. This allows you to see both the patient image and all of the waveform traces. Video and EEG can be viewed in real-time from remote locations (Nurses' station, physician's offices, etc.) over the network. A complete line of portable or wall/ceiling mounted cameras, infrared illuminators, audio systems and monitors are available.

SzAC® Seizure & Spike Analysis Software

SzAC is an on-line seizure and spike analysis software package. SzAC's utility is proven to reduce review time of long-term EEG recordings, allowing the person reading the study to quickly view events of interest without having to page through the entire recording.

SzAC was the first commercially available seizure and spike detection program. It has continued to evolve and improve through Grass' ongoing development. The default detection parameters are optimized for minimal false positive and false negative results, however the user can adjust parameters as needed.

During review, the SzAC review timeline graph allows a 24-hour recording to be viewed at a glance. Marks indicate patient pushbutton events and automatic detections. Clicking on these marks will bring up the corresponding page of EEG for visual confirmation of the event. Quickly jump from one event to the next.

The SzAC Timeline is also used for pruning and editing recordings and for marking video and EEG events of interest for saving and archiving.
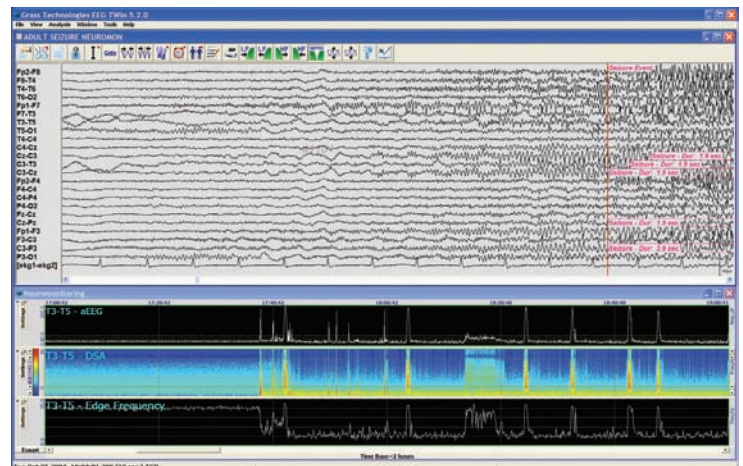
Optional Software Add-ons

Patient Scheduler Software
integrated with the TWin Database for complete lab management

The Grass Patient Scheduler is a friendly, add-on software application for patient scheduling, and facility and staff management. The scheduling software is fully integrated with our TWin and Database Explorer programs.
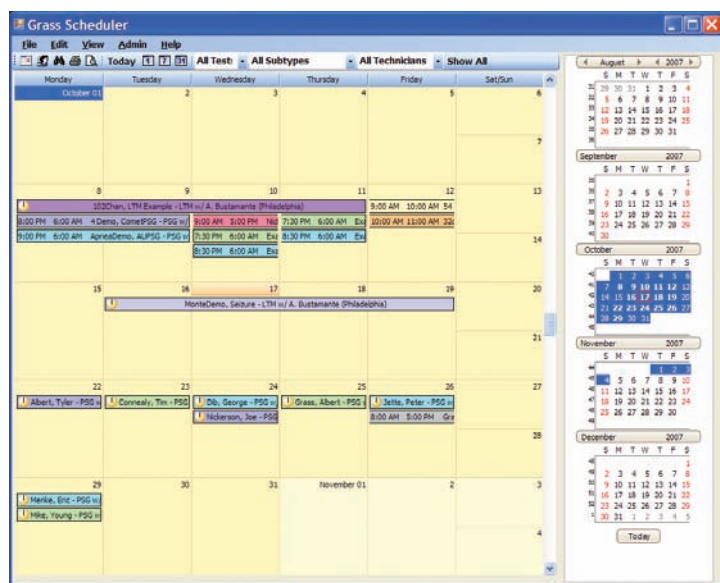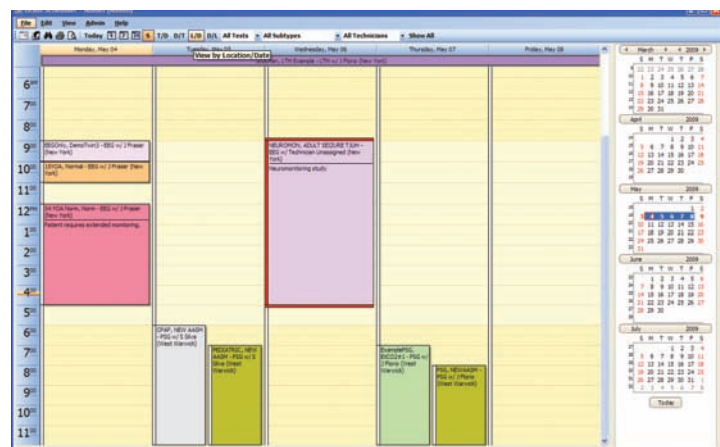
From Patient Scheduler:

- Quickly schedule patients
- Assign staff or equipment to the patient
- Launch a TWin Acquisition
- Select daily, weekly and monthly views
- Block-out dates, staff or equipment

TWin Portal Software
for HL7 interface to the Hospital Information System

TWin Portal runs as a service to facilitate the exchange of patient and study information with a hospital's information system (HIS). TWin Portal waits for HL7 messages and returns messages when appropriate. Information can be transferred to the TWin database and Grass Scheduler applications.

The TWin Portal configuration utility will assist in the setup of the TWin Portal service.

NeuroTrac III Neuromonitoring Software
for amplitude, frequency and burst-suppression trending

TWin Neurotrac-III Neuromonitoring Software is designed for computing and displaying long-term trends of EEG features during continuous EEG monitoring in the ICU, NICU, OR or Seizure Monitoring units. The software module can be used with acquisition systems configured with any of Grass' amplifiers.
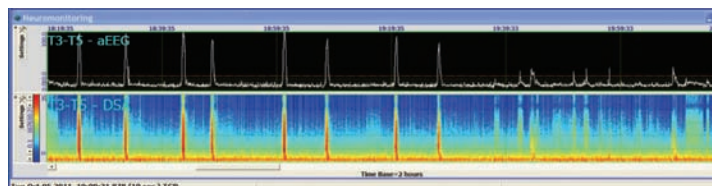
TWin Monitor2 Software
for remote video/EEG real-time viewing and system control

TWin Monitor2 Remote Control/Viewing Software installed on any record or review station uses standard TCP/IP protocols to broadcast in-lab, in-hospital or over the internet. After logging in, an image of the TWin Monitor host screen is broadcasted to the viewing computer. To the remote user TWin will operate the same as if it was installed on the remote PC. TWin Monitor2 uses encryption and authentication for information that travels over the network, which is an added benefit to comply with HIPAA regulations.

Allows the user to:

- Remote view EEG data over the local area network.
- Remote view the same recording system from different locations.
- Remote control and operate the EEG recording system (record or review).
- Score PSG records from home or other locations.
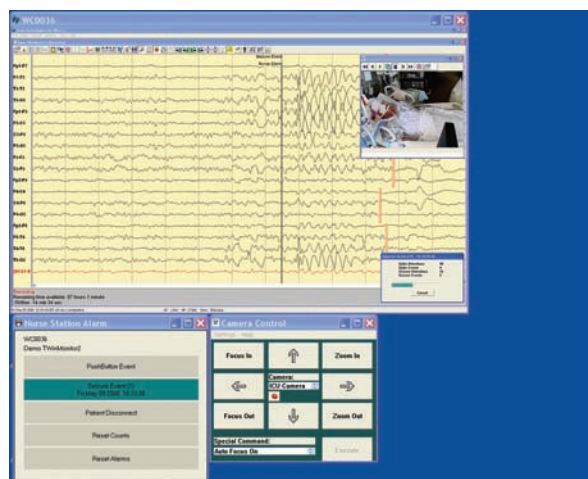
Electrodes & Accessories

A complete line of high quality genuine Grass electrodes, electrode application products, sensors, digital impedance meters, etc. are available to suit all of your needs.

For your shopping convenience these items may be purchased from our Online Store or your local r epresentative.

Specifications:

Amplifier	Grass AS40-PLUS with 44 channels of data (expandable to 57*): 32 referential EEG inputs (AC), 1 reference input, 1 patient ground, 8 bipolar AC channels, 4 auxiliary DC, 4 pulse oximeter channels, and 1 event input. *Maximum data channel count is determined by the type of AC and DC input modules in use.*
AC Input Signal Range	*Referential and Bipolar AC channels:* 4 mV peak to peak full-scale *Differential DC voltage tolerance:* 500 mV maximum
DC Input Signal Range	±2.5 V
Input Characteristics	≥20 Megohm impedance, all inputs including reference All referential and bipolar AC inputs electrically isolated from earth ground
Frequency Response	*Standard Bandwidth:* 0.5 Hz to 100 Hz, -3 dB, 0.1 to 100 Hz recoverable with TWin *Respiratory Bandwidth:* 0.015 Hz to 100 Hz, -3 dB
Amplification	*AC channels:* 1200 ±2%
Vertical Resolution	16 bits (0.06 µV/bit)
Sampling Rate	800 samples/second/channel, simultaneous sample and hold. Data stored at 200 or 400 samples/second, user definable via TWin software
CMR	>80 dB, all AC channels, at 50/60 Hz
CMRR	>80 dB (signal ref), >100 dB (earth ref)
Noise	<2 µV peak to peak referred to input
Impedance Test Mode	*Referential inputs only:* range, 1 kohm to 100 kohms, 10%
Calibration Signal	*Referential inputs only:* 500 µV peak to peak (5Hz) and 50 µV peak to peak (0.1Hz) ±2%
Patient Bias Current	*Maximum:* <4 nA *Typically:* 300 pA
Event Input	1 pushbutton patient signaling input
Photic	1 photic (flash unit) control line
Connectivity to Host PC	Standard Ethernet, TCP/IP protocol
Power	Medical-grade Isolated Power System
Physical Size	*AS40-PLUS Amplifier System:* approximately 7"W x 6"H x 2"D (17.8 x 15.3 x 5.1 cm) Weight: 2.3 lbs (1.1 kg) *Personality Module alone:* approximately 5.5"W x 5"H x 1"D (14 x 12.3 x 2.5 cm) Weight: 0.4 lbs (0.2 kg)
Software	Powerful and user-friendly TWin record, review and analysis EEG software
Operating System	Windows® 7
Regulatory	*AS40-PLUS Amplifier System:* certified to UL2601-1, IEC 60601-1, IEC 60601-1-1, IEC 60601-1-2, IEC 60601-1-4, IEC 60601-1-6, IEC 60601-2-26, CAN/CSA22.2.No.601.1; CE marked to EC MDD (93/42/EEC), Referential and Bipolar AC (patient) inputs isolated, Type BF

Ordering Information:

Comet-PLUS XL 44-Channel lab-based Digital EEG Record & Review System (Model CMXL-PLUS-E)

Software includes: Grass TWin EEG acquisition and review software, vArchiving software, Windows 7 Professional, and Microsoft Office

Hardware includes: Grass AS40-PLUS Amplifier System (57-channel**) with adjustable quick-release arm, Universal Personality Module, 10-foot (3 m) Tether, Medical-grade Power Supply, Latest high-performance PC-based acquisition system (network ready), Keyboard, Mouse, 20-button programmable keypad for notation entry and system operation, Cabling Kit, and PS60/LED Photic Stimulator with adjustable arm for flash lamp and cables, Medical-Grade Isolated Power System.

Archiving: DVD+/-RW Archiver, internal

Comet-PLUS 44-Channel Portable Digital EEG Record & Review System (Model CMP-PLUS-E)

Software includes: Grass TWin EEG acquisition and review software, Archiving software, Windows 7 Professional, and Microsoft Office

Hardware includes: Grass AS40-PLUS Amplifier System (57-channel*) with Universal Personality Module, 10-foot (3 m) Tether, Medical-grade Power Supply, Latest high-performance Laptop-based acquisition system (network ready), Cabling Kit, and ACS-20749 Carrying Case.

Archiving: DVD+/-RW Archiver, internal

Comet-PLUS XL 44-Channel Digital EEG Record & Review System (Model CMXL-E-APC)

Software includes: Grass TWin EEG acquisition, review, analysis, reporting and archiving software

Hardware includes: Grass AS40-PLUS Amplifier System (57-channel**) with Universal Personality Module, 10-foot (3 m) Tether, Medical-grade Power Supply, and Cabling Kit

Computer: HP All-In-One PC, Windows 7, Keyboard, Mouse, and 16-button programmable stick keypad for notation entry and system operation

Archiving: DVD+/-RW Archiver, internal

Comet-PLUS EEG recorder (Model CM-PLUS-E) base only includes:

TWin EEG Record and Review software, 44-channel AS40-PLUS Amplifier System with Universal Personality Module, 10-foot (3 m) Tether, and Power Supply (provide your own PC or laptop).**

** Grass personnel must approve all personal computers or laptops used with the Comet-PLUS base unit. Please contact Grass with any questions.
All specifications subject to change without notice.

Mobile Rack Cart Options
Several mobile rack cart sizes are available

BIO-LOGIC • DANTEC • DELTAMED • EMBLA • GRASS • NICOLET • SCHWARZER • STELLATE • TECA • XLTEK

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