

BrainMaster EEG Systems Comparison

Package	AT-1-1.9A	AT-1-2.0	AT-1-2.5	AT-1W-2.5
Hardware	Standard 2E Module	Standard 2E Module	Standard 2E Module	2E Wideband Module
Software	BrainMaster 1.9A	BrainMaster 2.0SE	BrainMaster 2.0SE	BrainMaster 2.5
EEG Channels	1 or 2	1 or 2	1 or 2	1 or 2
AUX/HEG Channels	no	2 (optional)	2 (optional)	2 (standard)
PC Interface	Serial (9600 baud), USB optional	Serial (9600 baud), USB optional	Serial (9600 baud), USB optional	Serial (9600 baud), USB optional
Power Source	Internal rechargeable batteries (NiCAD)	Internal rechargeable batteries (NiCAD)	Internal rechargeable batteries (NiCAD)	Internal rechargeable batteries (NiCAD)
Input Impedance	1000 GOhm minimum	1000 GOhm minimum	1000 GOhm minimum	1000 GOhm minimum
Common-Mode Rejection Ratio (CMRR)	110 dB minimum	110 dB minimum	110 dB minimum	120 dB minimum
Input Noise (microvolts)	< 1.0	< 1.0	< 1.0	< 1.0
Sampling Rate (samples/second)	120	120	256	256
Amplifier Gain	20,000	20,000	20,000	20,000
A/D Converter Resolution (microvolts)	0.78 uV	0.78 uV	0.78 uV	0.78 uV
Maximum signal input (peak-to-peak)	200 microvolts	200 microvolts	200 microvolts	200 microvolts
A/D Converter resolution (bits)	8	8	8	8
Recommended Operating Frequency Range (Hz)	1.0 - 45.0	1.0 - 45.0	0.5 - 45.0	0.5 - 64.0
Minimum PC Recommended	Windows 98, ME, XP, 2000, Pentium I 90 MHz minimum	Windows 98, ME, XP, 2000, Pentium II 350 MHz minimum	Windows XP, 2000, Pentium III 650 MHz minimum	Windows XP, 2000, Pentium III 650 MHz minimum
Number of built-in digital filter bands	8	8	8	8
Digital Filters	Butterworth, 3rd and 6th order selectable, quadrature type with built-in envelope detection	Butterworth, 3rd and 6th order selectable, quadrature type with built-in envelope detection and coherence/phase computation	Butterworth, 3rd and 6th order selectable, quadrature type with built-in envelope detection and coherence/phase computation	Butterworth, 3rd and 6th order selectable, quadrature type with built-in envelope detection and coherence/phase computation
User-adjustable filter ranges?	yes	yes	yes	yes
Digital Filter adjustment resolution	0.5 Hz	0.5 Hz	0.5 Hz	0.5 Hz
Digital Filter bandwidth range	1.0 - 10.0 Hz wide	1.0 - 32.0 Hz wide	1.0 - 32.0 Hz wide	1.0 - 64.0 Hz wide
Digital Filter Envelope (Amplitude) Resolution	0.1 microvolts	0.1 microvolts	0.1 microvolts	0.1 microvolts
Do all displays and processing automatically adapt for 1 or 2 channel operation?	yes	yes	yes	yes
Autothresholding?	no	yes, selectable	yes, selectable	yes, selectable
Programmable Autothresholding Control?	no	yes, selectable	yes, selectable	yes, selectable
Screen update rate	20 per second	20 per second	30 per second	30 per second
Built-in sum-channel mode?	yes, selectable	yes, selectable	yes, selectable	yes, selectable
Simultaneous sum & difference training?	yes, selectable	yes, selectable	yes, selectable	yes, selectable
Raw EEG signal always available for visual inspection?	yes, selectable	yes, selectable	yes, selectable	yes, selectable

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Automatically store & report thresholds?	no	yes	yes	yes
Automatically store & report percent time over thresholds?	no	yes	yes	yes
Automatically store & report percent time artifact detected?	no	yes	yes	yes
Automatically store & report modal frequency?	no	yes	yes	yes
Automatically store & report coherence for all 2-channel protocols?	yes	yes	yes	yes
Automatically store & report phase for all 2-channel protocols?	no	yes	yes	yes
Built-in real-time artifact detect/reject?	yes, amplitude-based, 1000msec window	yes, amplitude-based, 250msec window	yes, amplitude-based, 250msec window	yes, amplitude-based, 250msec window
Ability to select artifact sound?	yes	yes	yes	yes
Built-in zero-delay 50/60 Hz notch filters?	no	no	yes	yes
Ability to save raw EEG?	software selectable	software selectable	software selectable	software selectable
Ability to play back raw EEG with training screens?	yes	yes	yes	yes
Ability to indicate 10-20 positions in setup files and reports?	no	yes	yes	yes
Built-in comment/notes per folder?	no	yes	yes	yes
Ability to compute/save statistics without saving raw EEG?	yes	yes	yes	yes
Are all settings automatically saved with report data?	yes	yes	yes	yes
Number of built-in protocols?	6	14	14	14
Ability to design protocols?	simple Windows selectors	simple Windows selectors	simple Windows selectors	simple Windows selectors
Ability to save/recall preset protocols?	yes	yes	yes	yes
Any combination of enhances & inhibits?	yes	yes	yes	yes
"Squash only" protocols possible?	yes	yes	yes	yes
Ability to "hot switch" protocols without interrupting session?	yes	yes	yes	yes
Ability to change (shift) frequency bands on the fly?	yes, requires returning to control screens	yes, via keyboard	yes, via keyboard	yes, via keyboard
Ability to change threshold targets on the fly?	yes, via keyboard	yes, via keyboard	yes, via keyboard	yes, via keyboard
Ability to change autothreshold percent targets on the fly?	no	yes, via keyboard	yes, via keyboard	yes, via keyboard
On-demand autothreshold update?	no	yes, via keyboard	yes, via keyboard	yes, via keyboard
Ability to autoupdate autothresholds at predefined intervals?	no	yes	yes	yes

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Ability to adjust thresholds or targets per-channel on the fly?	no	yes	yes	yes
Built-in control panels?	9 (raw, filtered, phase-space, fft, thermometer, boxes, bispectral fft, bispectral filtered, coherence)	8 (raw, filtered, phase-space, fft, thermometer, bispectral fft, bispectral filtered, coherence)	8 (raw, filtered, phase-space, fft, thermometer, bispectral fft, bispectral filtered, coherence)	8 (raw, filtered, phase-space, fft, thermometer, bispectral fft, bispectral filtered, coherence)
Built-in "technical" training windows?	1 (numbers)	6 (thermos, waves, numbers, bispectral, CSA, TrendView)	6 (thermos, waves, numbers, bispectral, CSA, TrendView)	6 (thermos, waves, numbers, bispectral, CSA, TrendView)
Built-in "game" training screens?	2 (space, brainman)	6 (space, brainman, boxflow, circles, cricket, bugrun)	6 (space, brainman, boxflow, circles, cricket, bugrun)	6 (space, brainman, boxflow, circles, cricket, bugrun)
Built-in animation training screens?	no	1 (dolphin)	1 (dolphin)	1 (dolphin)
AVI Animation Viewer	no	optional	optional	optional
Number of built-in animations	none	40+ with optional AVI package	40+ with optional AVI package	40+ with optional AVI package
Can use user-provided AVI files?	no	yes, with optional AVI package	yes, with optional AVI package	yes, with optional AVI package
Support for 2 or more monitors?	yes	yes	yes	yes
Built-in development toolkit?	yes, free for personal use	yes, free for personal use	yes, free for personal use	yes, free for personal use
User Programming Interfaces?	16-bit Visual C++, Visual Basic	16 or 32-bit Visual C++, Visual Basic, Active X	16 or 32-bit Visual C++, Visual Basic, Active X	16 or 32-bit Visual C++, Visual Basic, Active X
Does the system automatically number successive sessions?	yes	yes	yes	yes
Does the system automatically store all session data in autonumbered files?	yes	yes	yes	yes
Ability to automatically divide sessions into preset runs (trials)?	no	yes	yes	yes
Is the run (trial) length programmable?	no	yes	yes	yes
Pause option between runs?	no	yes	yes	yes
Ability to set total session time?	yes	yes	yes	yes
Available wav sound to indicate pauses?	no	yes	yes	yes
Built-in protocol processor and points counter?	yes	yes	yes	yes
Pre- and post-session baseline option?	no	yes	yes	yes
Built-in FFT analysis for percent energy, modal frequency, asymmetry?	no, amplitude only	yes	yes	yes
Are all FFT results automatically posted to statistics file(s)?	yes	yes	yes	yes
Training Coherence/Similarity	yes	yes	yes	yes
Assessment/Pure Coherence	no	yes	yes	yes
Coherence Training (up or down)?	yes	yes	yes	yes

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Phase Training (up or down)?	no	yes	yes	yes
MIDI Sounds Available?	yes	yes	yes	yes
Selectable wav sounds for reward feedback	yes	yes	yes	yes
Selectable wav sounds per component?	yes	yes	yes	yes
Combined MIDI and wav reward sounds?	no	yes	yes	yes
Support for vibrotactile output?	yes	yes	yes	yes
Number of MIDI voices available?	127	127	127	127
MIDI Modes Available?	sustained, percussive	sustained, percussive	sustained, percussive	sustained, percussive
MIDI Modulation Styles Available?	amplitude, pitch	amplitude, pitch	amplitude, pitch, on/off	amplitude, pitch, on/off
Ambient continuous plus punctate sounds for alpha/theta feedback?	no	yes, included in optional AVI package	yes, included in optional AVI package	yes, included in optional AVI package
Support for EEG-controlled photic stimulation?	yes, optional MIDIFlash system	yes, optional MIDIFlash system	yes, optional MIDIFlash system	yes, optional MIDIFlash system
Support for AUX/HEG input data?	no	yes, optional for SN 3049 and below; standard for SN 3050 and above	yes, optional for SN 3049 and below; standard for SN 3050 and above	yes, optional for SN 3049 and below; standard for SN 3050 and above
Automatic live posting of all statistics?	yes	yes	yes	yes
Are statistics available for review/printout during live operation?	yes	yes	yes	yes
Does statistics screen automatically update displayed data during session?	no	yes	yes	yes
Flexible, selectable graphic review modes?	no	yes	yes	yes
Ability to save statistics screen configuration per trainee?	no	yes	yes	yes
Are statistics automatically computed for all bands regardless of training protocol?	yes	yes	yes	yes
Built-in interface to Excel spreadsheets?	yes, 1 type	yes, 2 types	yes, 2 types	yes, 2 types
Ability to perform mini-assessments with standard configuration?	yes	yes	yes	yes
Automated support for MINI-Q Headbox with data organization and labeling?	no	optional	optional	optional
Integrated secure e-mail/disk session upload and download?	no	yes	yes	yes
Ability to automatically limit remote training to predetermined protocols?	no	yes, using remote package for remote trainee	yes, using remote package for remote trainee	yes, using remote package for remote trainee
Ability to regulate remote training by time?	no	optional with PassKeys	optional with PassKeys	optional with PassKeys

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Ability to regulate remote training by date?	no	optional with PassKeys	optional with PassKeys	optional with PassKeys
Ability to provide unlimited remote training time?	no	optional with PassKeys	optional with PassKeys	optional with PassKeys
Documentation Manual Provided?	100+ pages, PDF files on CD	200+ pages, PDF files on CD	200+ pages, PDF files on CD	200+ pages, PDF files on CD
Standard Supplies	5 gold disk sensors, paste, gel, PC cable, charger, carrying case, software & documentation CD	5 gold disk sensors, paste, gel, PC cable, charger, carrying case, software & documentation CD	5 gold disk sensors, paste, gel, PC cable, charger, carrying case, software & documentation CD	5 gold disk sensors, paste, gel, PC cable, charger, carrying case, software & documentation CD
Training videos available?	yes, 1 CD with video	yes, 3 CD's with video	yes, 3 CD's with video	yes, 3 CD's with video
FDA 510(K) Registered?	yes	yes	yes	yes
Indicated for Biofeedback?	yes	yes	yes	yes
Indicated for EEG?	yes	yes	yes	yes
Passed IEC60601 (safety/radiation)?	yes	yes	yes	yes
CE Mark (Europe)?	yes	yes	yes	yes
Interface to clinical assessment software?	no	NeuroGuide (510K registered)	NeuroGuide (510K registered)	NeuroGuide (510K registered)
Additional software available?	Brainwave Animation Pro, BrainMirror 1.0/1.1/1.2, BioExplorer, BioExplorer Enhanced Driver	Brainwave Animation Pro, BrainMirror 1.0/1.1/1.2, BioExplorer, BioExplorer Enhanced Driver	Brainwave Animation Pro, BrainMirror 1.0/1.1/1.2, BioExplorer, BioExplorer Enhanced Driver	BrainMirror 1.2, BioExplorer Enhanced Driver, NeuroCare Pro
Expansion Software Available?	(Swingle) Subliminal Sounds	(CIS) Cybernetic Interface System, (Swingle) Subliminal Sounds	(CIS) Cybernetic Interface System, (Swingle) Subliminal Sounds	(CIS) Cybernetic Interface System, (Swingle) Subliminal Sounds
Heart-Rate Variability Training?	yes, freeware BrainMaster_HRV	yes, freeware BrainMaster_HRV	forthcoming, freeware BrainMaster_HRV	forthcoming, freeware BrainMaster_HRV
Warranty?	none	90 days parts & labor (basic) 15 months parts & labor (clinical pro)	90 days parts & labor (basic) 15 months parts & labor (clinical pro)	90 days parts & labor (basic) 15 months parts & labor (clinical pro)