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NEW D360 Computer Controlled 8-Channel Patient Amplifier



The D360 amplifier has been designed to conform to the Medical Devices Directive

Digitimer are pleased to announce the introduction of our new computer controlled 8-channel isolated amplifier and filter system designed for use on human subjects in the clinic or clinical research environment. The D360 has been designed to conform to the Medical Devices Directive (MDD) through implementation of the EN60601 Standard and is suitable for applications such as electro-encephalography (EEG), evoked potentials (EP) and electro-myography (EMG)

recording. Multiple D360 amplifiers can be controlled by a single computer via the Windows™ 9x/NT compatible software. A small A5 sized patient connection unit with touch-proof sockets provides initial differential pre-amplification of the signals. LEDs on this unit and an on-screen display allow the operator to monitor individual electrode impedances. Each channel can be independently switched on, amplified and filtered through the software interface.

In Need of Constant Stimulation?

Our range of isolated stimulators has recently been enhanced by the arrival of the new DS3 Constant Current Stimulator and a redesigned version of the classic DS2A Constant Voltage Stimulator. Both units still maintain the compact and easy-to-use features of the very popular DS2A-Mk.I, however, you can now choose whether to



Constant current DS3

apply a constant current or constant voltage stimulus. In some circumstances it is preferable to use a constant current device such as the DS3. If electrode impedance varies greatly during or between constant voltage stimulation, the actual amount of current passing through the preparation will also vary, making an experiment less reproducible. A constant current unit such as the DS3 will supply a

reproducible current pulse which is unaffected by any changes in input impedance.



DS2A-Mk.II

effect that can lead to stimulus loss.

Both the DS2A-Mk.II and the DS3 now allow external control of the stimulus pulse duration through a TTL compatible BNC input.

It should be noted that these stimulators are not intended for human use, as they do not meet the requirements of the medical devices directive. We offer the DS7A and D185 stimulators for human applications (see page 2).

Another feature of the DS3 is an output discharge (clamp) circuit, which operates after each pulse. This prevents charging up of the preparation during trains of stimuli, an

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See Inside for **Acquisition Amplification Cell Injection Iontophoresis Noise Elimination Manipulation Micro-Incubation Patch-clamp Perfusion Stimulation Software**

In Development at Digitimer

DS5 Stimulator Developed for Clinical Nerve Excitability Studies

Digitimer have recently embarked on the development of an isolated bipolar stimulator suitable for clinical nerve excitability studies. Such studies are important in that they provide us with a greater understanding of diseases of the peripheral nervous system, such as diabetic neuropathy, carpal tunnel syndrome (CTS), amyotrophic lateral sclerosis (ALS) and motor neuron



DS5 stimulator

disease (MND). The new DS5 stimulator is being developed in collaboration with Prof. Hugh Bostock at the Sobell Department of Neurophysiology within the Institute of Neurology, London. The unit is designed to allow computer control of stimulus amplitude and timing parameters and will be capable of bipolar stimulation with a constant current output of up to 50mA.

Your Idea, Our New Product ?

We are always interested in hearing from scientists or engineers in the academic or commercial world who are looking for a means to manufacture or market a new product or product idea. In the past, Digitimer have been approached by a number of customers who have had particular requirements which were not fulfilled by equipment available at the time. Using our design and production expertise as well as our knowledge of the requirements of the medical device directive and CE certification procedures, we are often able to provide a solution for our customers. This can be in the form of either modifications to existing products or the development of new ones. The most recent example of this level of collaboration is the D380 Dye Marker (see page 3) which is an inexpensive iontophoretic device allowing neuroanatomists to easily dye label cells.

Clinical Products Update

Neurophysiological Monitoring



Digitimer reports on the distribution partnership recently forged between ourselves and Alpha Omega (see page 6). As well as manufacturing a range of biomedical research equipment for neurophysiological recording, Alpha Omega manufacture a clinical neurophysiological navigation and recording system (**NeuroTrek**) which is designed for use prior to neurosurgical procedures such as

DBS implantation or Pallidotomy. The system provides all electrophysiological instrumentation for single unit recording from up to 5 electrodes. Features include impedance monitoring, micro and macro stimulation, single unit detection and spike sorting. The NeuroTrek system is FDA cleared and is an approved medical device for use in Europe.



The NeuroTrek workstation

Transcranial Motor-Evoked Potentials Help Prevent Paraplegia



D185 MultiPulse Cortical Stimulator

".. It's already saved at least one 9-year-old girl's spinal cord .."
(CDY, 1999)

"During operations for TAAA, monitoring of motor-evoked potentials is an effective technique to detect spinal cord ischemia within minutes."
(PdH, 1997)

The Digitimer D185 MultiPulse Stimulator has now been protecting the mobility of patients undergoing spinal or aortic aneurysm surgery around the world for over five years. The D185 was designed with a number of important safety features to limit the energy to the patient, whilst not hindering the successful monitoring of the important motor pathways when the spinal cord is at its most vulnerable. During this time the D185 has performed flawlessly, with no reported incidents during its use. Our website lists a number of papers and other publications that we can mail upon request.

The DS7A and Peripheral Stimulation

The Digitimer DS7A Constant Current, High Voltage Stimulator is used all over the world for stimulation of nerves and muscles of patients, researchers and volunteers! The unit provides a precise, reproducible square wave stimulus of up to 100mA from a 400V source. Usually sufficient for most needs, but for those more demanding (higher current) needs, we offer the DS7AH which can deliver up to 1A of stimulation. This has often been used for stimulation of the human quadriceps with large surface area electrodes during exercise tests.



DS7A High Voltage Stimulator

The NeuroLog Range Continues to Expand

The NeuroLog system provides scientists with a compact, modular and extremely reliable system suitable for use in a wide range of research applications. The innovative design uses precious laboratory space efficiently while allowing the user to easily control many experimental parameters. The modular nature of the system allows your equipment to evolve hand in hand with your experimental needs. Some typical applications include:



The NeuroLog system

Intracellular and extracellular recording / Spike detection / Electrical stimulation / Pulse and train generation / Multi-channel EMG or EEG recording / Pressure and other transducer-based recordings.

Please request a copy of our **NeuroLog brochure**, which provides detailed information about each of the various modules and includes a range of application notes.



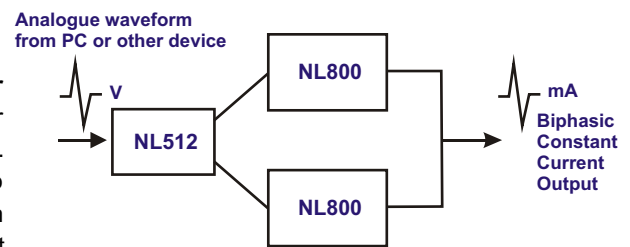
NEW NL412 Pulse

The NL412 is a remote trigger generator ideally suited for triggering the start of experiments, gating a train of pulses or used as a "Buzz" box for intracellular recording with the NL102G DC preamplifier. The remote positioning of the NL412 makes it more convenient for use during micro-electrode manipulation than the front panel button on the NL102G. Our NL102G DC Pre-amplifier is now supplied with the NL412 as standard, however, existing users of the NL102G can have their pre-amplifier modified to accept the NL412. Please contact Digitimer for further details.



NEW NL512 Biphasic Buffer

The NL512 Biphasic pulse buffer is the interface between a bipolar signal and two of the NeuroLog NL800 Isolators. This "current out for voltage in" system provides a bipolar, isolated, constant current stimulus. The NL512 features a high input impedance and four input ranges to allow a number of different modules, or an external signal (such as from the ADC in a computer), to be used for the input signal. A GATE input allows multiple units to be connected to a single analogue source with each channel being digitally enabled separately.



NL512 Application: Computer-controlled constant current stimulation

D330 MultiStim: Multichannel Stimulation

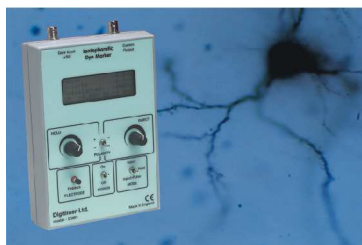


D342

If you are interested in multichannel *in vitro* stimulation, then look no further than our D330 range. We can provide you with systems which can incorporate timing and pulse parameter control or allow external control. Stimulators for constant voltage (0-100V) or constant current (0-500mA) output are available. Systems can be based around a 19" rack mountable case or a half width benchtop unit. Because the D330 systems are modular, the user can add more channels or timing controls at a later date. The addition of the **NEW D342 Dual Bistim module** now means that the polarity of a pair of channels can be alternated during a train of stimuli, preventing electrode oxidation or tissue polarisation.



An 8-channel D330 stimulator



D380 Iontophoretic Marker

D380 Iontophoretic Marker: Cell Labelling Just Got Easier!

The D380 iontophoretic marker provides a compact easy-to-use solution for dye labelling of cells or injection of pharmacological agents. Electrophysiologists often use an existing patch-clamp amplifier to provide current to carry out such tasks, however, if these techniques are not being used in the laboratory alternative iontophoretic devices are prohibitively expensive. The D380 provides a cost effective answer, delivering currents of up to $\pm 12\text{nA}$, with a holding current of up to $\pm 6\text{nA}$. A deblock button provides a means of removing blockages from the end of electrodes and an LCD display allows continuous monitoring of several parameters.

Step Out in Style with the SCAT-01 Stepper

The SCAT-01 Programmable Stepper provides a complete system for precise micro-electrode manipulation; a compact EPSON HX-20 computer, stepper interface, stepper device and micro-manipulator. Micro-electrodes can be accurately (with $2\mu\text{m}$ steps), reproducibly and rapidly ($3\mu\text{m}/\text{ms}$) moved into position, facilitating extracellular or intracellular recording in the CNS or periphery without tissue dimpling or cellular damage. The powerful stepper motor is electrically quiet and can position heavy headstages as easily and accurately as their lighter counterparts. Complete software control allows recall of step patterns and storage of experimental parameters such as time and depth. TTL pulses can be sent from and received by the interface, allowing full integration into your setup.



SCAT-01 Stepper

HEKA Elektronik continue to manufacture cutting edge electrophysiology and electrochemistry instrumentation. Their range now includes the MIM3 micro-manipulator, the PIP5 two-stage pipette puller and a choice of EPC patch-clamp amplifiers. Along with this hardware, an array of software is available for electrophysiologists to acquire, transform, analyse and present data.

As the first manufacturers of patch-clamp amplifiers in the world, HEKA pride themselves in continuing to develop patch-clamp technology, with the help of a number of eminent

electrophysiologists. HEKA manufacture the classic EPC7 amplifier, its successor the EPC8 which features software control of certain parameters and the fully computer controlled EPC9. The EPC9 has an Instrutech ITC-16 interface built into the unit, reducing noise levels and cabling requirements. It is available as either a single, double or triple version, allowing recording from up to 3 cells simultaneously.



The EPC8: Manual or digital control



The PIP5 pipette puller

Pipette manufacture is simple and reproducible with the PIP5 pipette puller which incorporates a temperature controlled heating element. A two-step vertical pull is capable of producing highly consistent patch pipettes or intracellular recording electrodes.

Micro-electrode manipulation is achieved with the MIM3 3-axis micro-manipulator. Joystick controlled and available with optional hardware and software to permit video control and imaging, the MIM3 is also compatible with any of the major microscope brands.

Software requirements of both PC and Macintosh users are well satisfied by HEKA. Together with their own range of acquisition and analysis software packages, exported HEKA data files can be read by Igor Pro, Origin and Sigmaplot and Bruxton software (see below), all of which are available from Digitimer.



The EPC9 Double: Two amplifiers in one unit



The MIM3 micro-manipulator



Pulse provides a software interface for the EPC9

- PULSE** Patch-clamp acquisition software specifically for the EPC9 but can be used with any telegraphing amplifiers, including the EPC7 and EPC8.
- PULSEFIT** Patch-clamp analysis software for data collected with PULSE.
- PULSETOOLS** Analysis of PULSE data including amplitude histograms and leak subtraction.
- TIDA** 8-Channel acquisition for patch-clamp or extracellular recording.
- PULSESIM** Single channel kinetics simulation software.
- X-CHART** 8-Channel chart recorder, ideal for monitoring parameters over longer time courses.
- FURA** For photometric measurements such as Ca²⁺ imaging in parallel with electrophysiology.
- VIDEO PATCH** Realtime video imaging software.



Acquisition Interfaces and Digital Data Recorders

The HEKA amplifiers are complemented by the Instrutech data acquisition products. Instrutech not only manufacture the ITC-16 as used in the EPC9 and the PCI-16 interface card, but also two VCR-based data recorder devices, the VR-10B (2-channel) and VR-100B (8-channel). The VR-100B digital data recorder allows a number of analogue channels to be acquired at unequal sampling rates (totalling 94.4kHz) together with cue marking, a voice channel and ASCII text recording. In addition, Instrutech also provide a powerful solution to video image processing in their DVP-32 system.

Bruxton Software for the Electrophysiologist

Bruxton Corporation provide software for acquisition, analysis and organisation of your data files. Their software is also compatible with HEKA and Axon equipment. Visit their website (www.bruxton.com) for more detailed information, downloadable demo versions of their software as well as data analysis and acquisition review articles.

- ACQUIRE** (Win & Mac) Multichannel data recording program (up to 6.5MHz continuous sampling), features control of external devices such as perfusion systems or filter wheels.
- DEVICE ACCESS** (Win only) Provides device support for Instrutech ITC-16 and ITC-18 interfaces.
- DATA ACCESS** (Win & Mac) Allows data collected in pClamp, PULSE or ACQUIRE to be accessed by common graphical software, such as Origin, Sigmaplot, IGOR Pro or Excel.
- DATA BOOK** (Win only) Provides database and sorting functions to easily sort and index data files.
- TAC** (Win & Mac) Single channel analysis program, includes event detection and analysis functions.

Having problems with 50Hz Noise?



Genuine biological signal contaminated with 50Hz noise



The Hum Bug from Quest Scientific



The Hum Bug removes the unwanted mains noise

Too Good to be True...No, Just a Hum Bug 

How often have you had problems removing 50Hz noise from your rig? If your answer is never, then read no further. However, at some point, many electrophysiologists do come across mains noise which they find difficult to remove. Enter the **Hum Bug** from Quest Scientific, a 50Hz noise eliminator. The **Hum Bug** is NOT a filter and

therefore does not introduce the problems associated with excessive filtering. Instead, it continuously forms a template of the 50Hz component (and associated harmonics) of your signal and subtracts it in realtime, providing you with a 50Hz free recording. Still don't believe it? Feel free to contact us to arrange a loan or demonstration.

Don't Let Poor Perfusion Form the Weak Link on Your Rig



The AutoMate Family

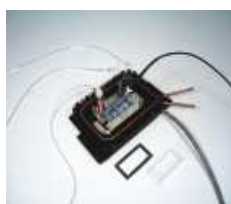
AutoMate Scientific provide a range of high quality, pressure regulated perfusion systems offering manual or automatic control. With **ValveBank**, manual control is achieved through a hand-held valve controller unit, which also offers a high level of automation. The unit can be programmed by hand or with **EasyCode** software for Windows or Macintosh. Alternatively, the **ValveLink** system allows perfusion to be controlled manually or directly by your acquisition software. Perfusion systems of 4, 8 and 16 channels are available; all featuring rapid solution exchange (10ms), 250µm or 100µm perfusion tips and micro-litre dead volume.



Gravity or Pressure Driven

Temperature Controlled Incubators

Digitimer continue to supply and support Medical Systems products in Europe. The TC-202A temperature controller can be linked to a wide range of incubators suitable for brain slice work (PDMI-2, PSMI & BSC), isolated cells in 35mm petri dishes (PDMI-2 or LU-CB1), closed perfusion for fluorescence studies (LU-CPC-CEH) or incubators compatible with standard chamber slides (CSMI). The TC-202A can provide temperatures ranging from 0 to 50 °C with 0.1°C resolution.



CSMI



LU-CB1



TC-202A & PDMI-2

NeuroPhore Iontophoresis System

Iontophoretic or pneumatic drug application is possible with the NeuroPhore BH-2 system. The flexibility of the modular design means that systems can be custom designed around the needs of your experiments. Each NeuroPhore system can be fitted with up to 5 iontophoretic or pneumatic pumps as well as the control and balance module. Other system features include: current neutralization, timing control and impedance checking.



NeuroPhore System

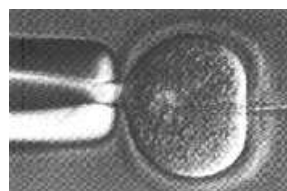
Medical Systems

In Vivo Oxygen Measurement

Phosphorescence quenching provides an easy method for quantification of oxygen levels *in vivo* and *in vitro*. The PMOD-1000 and PMOD-2000 use a non-invasive optical probe for measurement of O₂ at tissue depths of up to 3cm or in closed glass chambers. Windows-compatible software is supplied with each system and a number of phosphors and phosphor kits are available.

Cell Injection Equipment

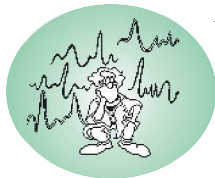
The PLI-90 and PLI-100 picolitre injectors are easy to use and are suitable for nuclear and cytoplasmic injections into mammalian or amphibian oocytes or extracellular brain injections. The PLI-90 and PLI-100 include pressure balance and clearing features, however, the PLI-100 also features a vacuum cell-holding capability.



PLI-100 "Hold" feature in use



PLI-100 Picoinjector



ALPHA OMEGA

Digitimer Ltd is now the exclusive distributor in the UK for Israel-based Alpha Omega. Alpha Omega specialise in development and manufacture of biomedical research and clinical equipment designed to record and analyse electrical activity in the central nervous system. Their product range includes multi-channel data acquisition systems, spike detection and sorting systems, amplifiers, micro-electrode manipulators and appropriate Windows-compatible software.



MCP-Multi-channel Amplifier



MSD-Multispikes Detector

Products Available:

MCP modular, multi-channel amplification. Individual control of gain and filtering for each channel. Impedance checking feature. Windows-compatible **AlphaMAP** acquisition software and hardware. Stimulus isolator allows currents of up to 10mA to be applied using the MCP software through any electrode. **MSD** online spike detection hardware and Windows-compatible **AlphaSORT** offline spike sorting software. **EPS** electrode positioning hardware and software, including various micro-driving terminal (**MT**) options, including custom designs.



Alpha-MAP Software

A New Face in Product Support

A recent recruit to Digitimer is Gareth Thompson our new Product Support Specialist. Gareth joined us in June 2000 after 5 years as a post-doctoral researcher at Leicester University. He gained his BSc (Pharmacology) and PhD at the University of Bristol, where he was involved in the field of excitatory amino acid research. He moved to Leicester in 1995 to work with Peter Stanfield, where he used patch-clamp recording to study inward rectifier potassium channels. Gareth is keen to make use of his research experience in his new role at Digitimer.

Research Papers Include:

Thompson, G.A. *et al.* (2000) Residues beyond the selectivity filter of K⁺ channel Kir2.1 regulate permeation and block by external Rb⁺ and Cs⁺. *J. Physiol.* **526** 231-240.

Thompson, G.A. & Kilpatrick, I.C. (1996) The neurotransmitter candidature of sulphur-containing excitatory amino acids in the mammalian central nervous system. *Pharmacol. Ther.* **72** 25-36.

Thompson, G.A., Jones, P.L. & Kilpatrick, I.C. (1995) The actions of a range of excitatory amino acids at (1S,3R)-1-aminocyclopentane-1,3-dicarboxylic acid-depolarizing receptors on neonatal rat motoneurons. *Neuropharmacology* **34** 857-63.



Gareth at the SFN 2000 meeting in New Orleans

Scientific Meetings Attended by Digitimer

Digitimer are regularly present at scientific meetings at home and abroad. Please visit our stand to see the latest additions to our range of instrumentation, discuss any technical issues with us or just drop by for a chat!

United Kingdom Physiological Society, British Pharmacological Society, British Neuroscience Association.

Europe European Neuroscience Association, Göttingen Neurobiology, French Society of Neuroscience.

USA American Society for Neuroscience, American Society for Neurophysiological Monitoring.

World Congress of Clinical Neurophysiology, Symposium on Spinal Cord Monitoring.

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You can now use our website to request more information on any of the products featured in *Digitimes*. Simply follow the *Digitimes* link from our homepage (www.digitimer.com), check the boxes next to the products of interest and then provide us with your contact details. We will get in touch with you or send you the relevant information as

soon as possible. Users of this service will be automatically entered into a draw for one of a number of mugs donated by the electrophysiology and electrochemistry instrumentation manufacturer HEKA. Winners will be notified by May 31st 2001. Alternatively, feel free to browse through the extensive range of product information which can be accessed through our website or contact us directly.

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