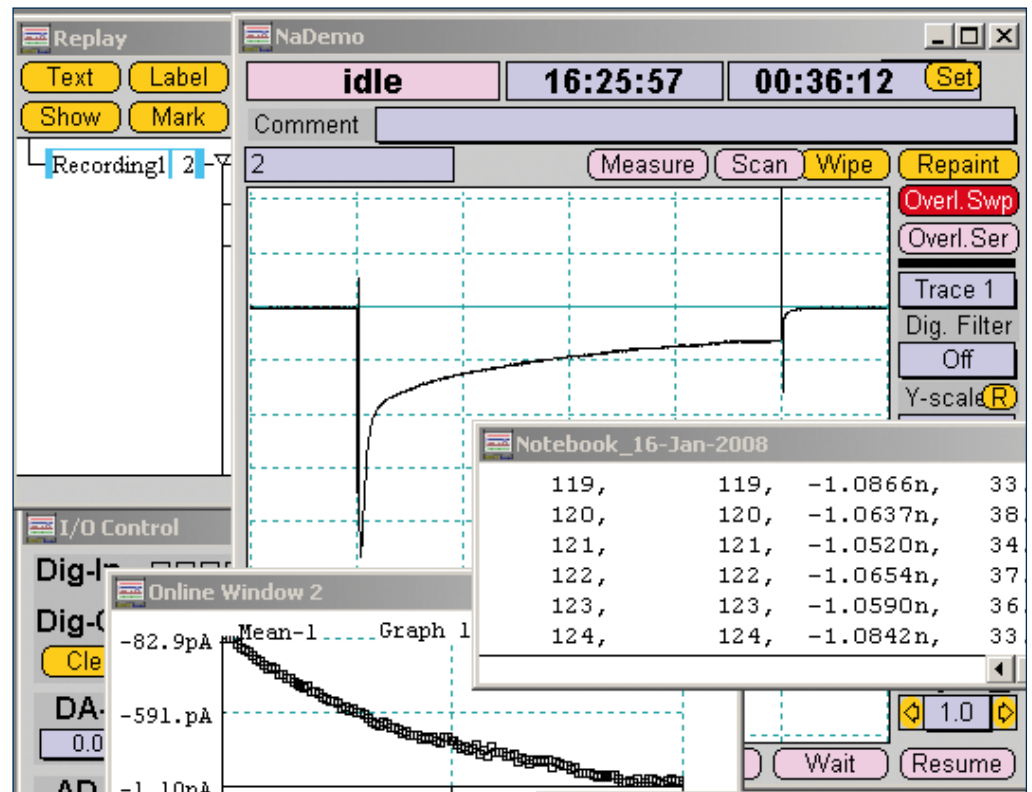




CHARTMASTER

Multi-Purpose Data Acquisition and Control Software



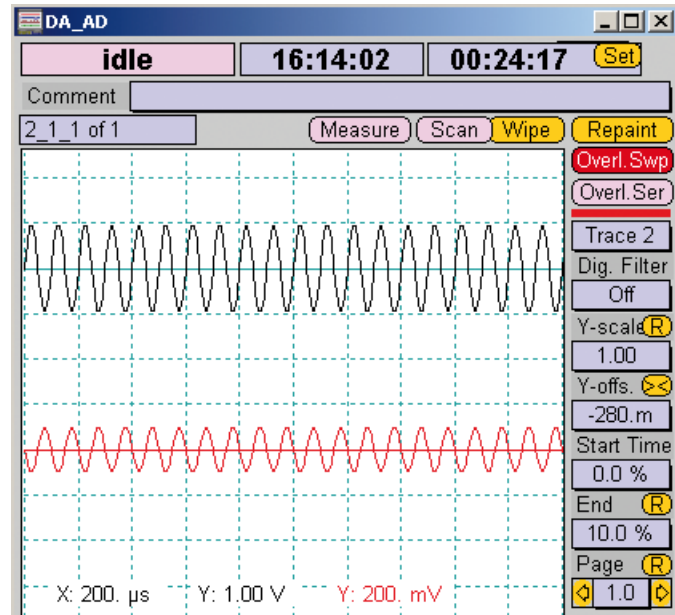


CHARTMASTER

Multi-Purpose Data Acquisition and Control Software

Introduction

The CHARTMASTER software was designed with the main objective to streamline data collection, presentation and analysis during and after an experiment. CHARTMASTER provides all of the necessary software tools that make experimental design and analysis more flexible. With CHARTMASTERs high degree of automation, experimental protocols are now possible that were unattainable with other commercial software products. CHARTMASTERs versatile design allows it to be used for any general purpose data acquisition need. In addition, CHARTMASTER can be used in conjunction with PATCHMASTER to provide even greater capabilities for elaborate electrophysiological recordings.



Main Features

- Sixteen channel high-speed data acquisition with individual data compression factors
- Digital storage oscilloscope display of all acquired channels as well as virtual traces generated by online mathematical processing
- Sixteen channel complex waveform generation with independent timing and pulse patterns
- Ten Pulse Generator global parameters quickly alter the duration and / or amplitude of pulse segments
- Control of external devices via digital triggers or serial communication protocols
- Powerful online analysis derived from any arbitrary number of functions and methods
- Macro recording / playback features and the Protocol Editor allow full experimental automation to be easily accomplished
- Data tree editor for fast review of acquired data
- Software Lock-In Amplifier
- Photometry module to control light sources and analysis of fluorescence measurements
- Batch Control for external control of CHARTMASTER from another software application
- Compatible with Windows (2000, XP and Vista) and Mac OS X (10.4 and newer, PPC or Intel processor)
- Suitable for research and industrial applications

Pulse Generator

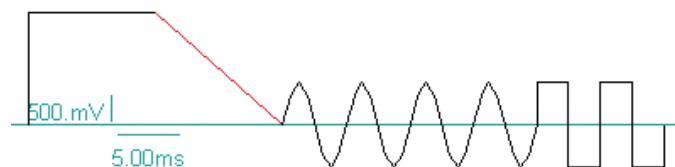
The heart of the CHARTMASTER software is the Pulse Generator. The Pulse Generator defines all of the parameters for data acquisition, waveform generation and external device control. A Pulse Generator File is comprised of any number of predefined sequences. Each sequence consists of the following parameters:

Timing: The number of sweeps, the sweep interval and the sampling rate.

DA-Channels: Multiple output channels with individual scaling factors can be specified. Each output waveform can have independent timing and pulse patterns.

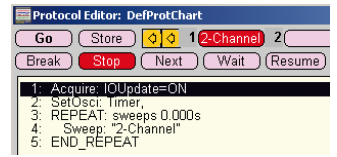
Segments: A pulse pattern consists of an arbitrary number of segments. Each segment defines the segment type, duration, amplitude, and any increment / decrement factors. Pulse Generator global variables can also be used for additional automation.

AD-Channels: Multiple input channels can be acquired simultaneously and processed (virtual trace). To reduce data storage capacity each input channel can have data compression and store / no-store options specified.



Protocol Editor

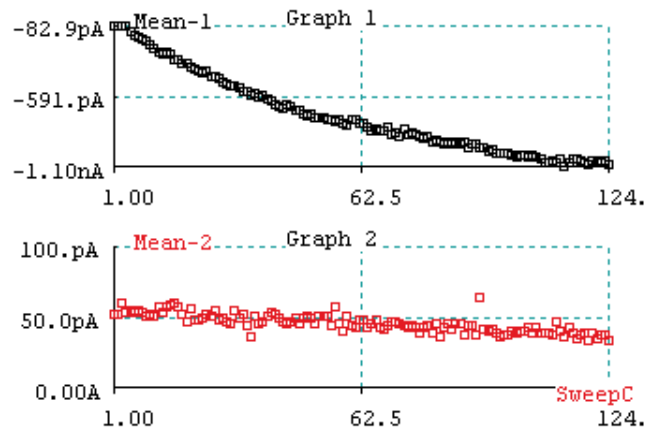
The CHARTMASTER protocol editor is a powerful feature in which complex experimental procedures can be designed, stored, and executed. This tool greatly increases the versatility of CHARTMASTER that will be appreciated by researchers asking for complex, precisely-timed experimental protocols.



The principal idea of the protocol editor is to generate a list of events or tasks which can be executed automatically. Various functions such as REPEAT Loops, input queries, or conditional statements allow the generation of complex interactive processes. In addition, the high degree of automation possibilities increases efficiency, minimizes experimental errors and is thus highly suited for both industrial and research applications.

Online Analysis

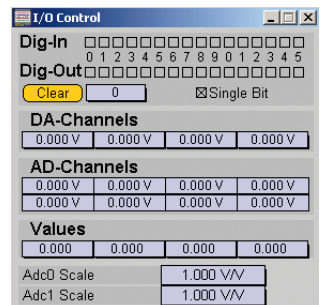
The CHARTMASTER software provides an arbitrary number of analyses that can be performed on newly acquired or stored data. Directly analyzed or derivative data obtained by application of mathematical functions on the analysis results can be displayed as several graphs placed in two independent analysis windows. This allows separation of different data types, for example, current-voltage plots can be shown separately from time lapse data (e.g. chart recording).



Analysis templates can be predefined and stored. Thus, several analysis procedures can easily be switched between and applied to incoming data types without extra editing. A direct link between Pulse Generator sequences and analysis procedures provides definition of data acquisition and analysis prior to the experiment.

I/O Control

The I/O Control window allows direct access to the hardware interface. The status of digital and analog input channels is monitored. Digital and analog output signals can be set. In addition, defined input parameters are also displayed.





Technical Specifications

Data Acquisition

- Up to sixteen input channels
- Episodic and continuous acquisition mode
- Automatic data compression (different sample rates for different channels)
- Virtual trace for mathematical online processing of acquired channels
- A break condition which can terminate all ongoing acquisition can be defined for each acquisition channel
- Selectable data format for storage (INTEGER, REAL, LONGREAL)

Waveform Generation

- Up to sixteen waveform output channels
- An output waveform can be generated with any arbitrary number of pulse segments
- Output waveform can be created from external template file
- Segment types: constant, ramp, sine, square, non-stored or continuous
- Various increment modes for segment amplitude and duration
- Segment parameters can be assigned by global variables (pgf-parameters)

Digital Oscilloscope

- Display of up to twenty different traces
- Individual display scaling, offset adjustment and visual appearance for all traces
- Individual digital filter settings for all traces
- Various labelling modes (e.g. Grids+Labels, Grids+Values, Labels only)
- Zoom
- Dimmed trace overlay
- Absolute and relative measurements with mouse click
- Individual data points can be read with scan function

Online Analysis

- Arbitrary number of user defined online methods
- Over forty predefined analysis functions
- Standard mathematical operations allow creation of user defined analysis functions
- Trace operation functions
- Two online windows with up to twelve graphs for graphical representation of analysis results
- Link of analysis methods to different acquisition sequences

Trace Buffers

- Four independent trace buffers for performing basic arithmetic operations on a data trace (i.e. add, subtract, accumulate, deaccumulate)
- Trace buffers can be displayed as a reference trace in the oscilloscope window

I/O Control

- Direct control of digital and analog outputs
- Serial command protocols for external device control
- Active monitoring of digital and analog inputs as well as input parameter values
- Direct access to global variables

Standardization and Automation

- *Macros*: A series of user defined actions can be recorded and stored as a macro
- *Protocol Editor*: The Protocol Editor allows complete experimental procedures to be easily created. Within a procedure, feedback from external inputs, amplifier controls, online analysis results or user inputs and experimental parameters can be adjusted. A protocol can be started / called from another protocol.
- *Batch Control*: The CHARTMASTER acquisition program can be controlled from another software application. This allows custom applications, with their own user interface, to take advantage of all of the data acquisition features of CHARTMASTER while adding or subtracting features specific to their requirements.

Technical Specifications

Data Integrity

- Acquired data are organized and stored in a data tree format. Multiple data acquisition runs can be stored in a single data file organized in levels of Groups / Experiments / Series / Sweeps and Traces. This allows easy review, selection and analysis of all the acquired data stored in the data file.
- CHARTMASTER's extensive software control provides a thorough set of parameters, describing the state of the recording conditions, to be stored along with the data. This allows detailed reconstruction of the experiment for exact analysis when reviewing the acquired data.

Data Export

- Export and printout of raw data traces or online analysis results
- Supported formats: ASCII, IGOR PRO (including high level layout features), MATLAB and WMF

Built-in Modules

- Software Lock-In: CHARTMASTER features a software Lock-In amplifier for time-resolved measurements of admittance
- Photometry Extension: Allows simultaneous high-speed fluorescence and data acquisition with either a TILL Photonics Polychrome, PTI DeltaRAM, Sutter Instrument Lambda 10, DG4, or DG5 light source with multi-excitation and multi-emission protocols
- Solution Data Base: Allows definition and organisation of multiple solutions. Selected solutions can be linked to the acquired data

Compatibility

- Compatible with Windows 2000, XP, Vista or Mac OS X (10.4 and above with either a PPC or Intel processor)
- CHARTMASTER can read data files created by PATCHMASTER, PULSE, PULSETOOLS or PULSESIM

Supported Data Acquisition Interfaces

- HEKA LIH 1600
- InstruTECH LIH 8+8
- InstruTECH ITC-16 and ITC-18

Minimum Computer Requirements

- Mac OS X: Macintosh G5 or faster processor, Mac OS X (10.4 and above), 256 MB RAM, available USB port, CD-ROM or Internet access
- Windows: Pentium 4 or faster processor, Windows 2000, XP or Vista, 256 to 512 MB RAM, available USB 2.0 port, CD-ROM or Internet access



HEKA Elektronik
Dr. Schulze GmbH
Wiesenstraße 71
D-67466 Lambrecht/Pfalz
Germany

Phone +49 (0) 63 25 / 95 53-0
Fax +49 (0) 63 25 / 95 53-50
Web Site <http://www.heka.com>
Email sales@heka.com
support@heka.com

HEKA Electronics Incorporated
47 Keddy Bridge Road
R.R. #2
Mahone Bay, NS B0J 2E0
Canada

Phone +1 902 624 0606
Fax +1 902 624 0310
Web Site <http://www.heka.com>
Email nasales@heka.com
support@heka.com

HEKA Instruments Inc.
2128 Bellmore Avenue
Bellmore, New York 11710-5606
USA

Phone +1 516 882 1155
Fax +1 516 467 3125
Web Site <http://www.heka.com>
Email ussales@heka.com
support@heka.com

General notice:

Product names used herein are for identification purposes only and may be trademarks of their respective owners. HEKA disclaims any and all rights in those marks.

We reserve the right to effect technical changes as development progresses. Special versions are available on request. Further technical data are provided by a detailed description, which is available on request. A warranty of one year applies on all instruments.