
# Axon Digidata 1550A *plus* HumSilencer

## A high-resolution, low-noise digitizer with single-click 50 or 60 Hz line-frequency noise elimination

### Key Features

- Eliminates 50/60 Hz line-frequency noise in less than one second
- Built-in HumSilencer enabled by a single click
- Supports analysis of very small signals
- Eight analog outputs
- Includes Axon AxoScope 10.5 Data Acquisition Software for Windows

The Axon™ Digidata® 1550A Low Noise Data Acquisition System *plus* HumSilencer™ Adaptive Noise Cancellation is the next generation of low-noise digitizers from Molecular Devices (patent pending). It offers the same high-resolution, low-noise signal digitization capabilities as the Axon™ Digidata 1550 digitizer, with the added benefit of single-click elimination of 50 or 60 Hz line-frequency noise. Intended for precision scientific applications, it is particularly designed for electrophysiology experiments, to send and receive signals from microelectrode amplifiers, and to interact with peripheral instruments such as solution exchangers.

### Built-in HumSilencer

The HumSilencer feature is built-in, software-controlled technology that learns the local line-frequency noise patterns and associated high-frequency harmonics and removes them from the incoming signal in less than one second. With a single click, line-frequency noise is subtracted from the incoming signal during data acquisition. The HumSilencer feature provides a fast adaptive rate (within 1 s) for changing noise patterns, digitizes a large range of input signals from -10 to +10 V, and eliminates noise amplitudes at the digitizer's analog input of up to 20 V peak-to-peak. The HumSilencer feature is not a filter and does not have a filtering effect on acquired signals; nor does the HumSilencer system cause signal distortion, such as frequency change, amplitude attenuation, phase shift, or DC voltage change. It is an adaptive, built-in solution to the problem of line-frequency noise.

### Lower noise

The low digitization noise is maintained in this digitizer. Analog input channel crosstalk is prevented by the use of separate analog-to-digital converters (ADCs) for each of the analog input channels. Additionally, the use of the latest manufacturing processes and precision components contribute to an extremely low-noise 16-bit signal.

## Superior features

Eight independent analog output channels can stimulate eight cells at once for higher throughput or synaptic network experiments. All of the eight analog input channels can be simultaneously digitized at the highest sampling rate of 500 kHz for maximum throughput. Multiple triggering options are available via hardware and software.

## Easy setup

Simply load the software and plug into a USB 2.0 port to connect to desktop or laptop computers. Connect the power cord to the wall socket and then to the rear panel AC power input connector. All signal connections are conveniently accessible on the front panel.

### Elimination of 60 Hz noise

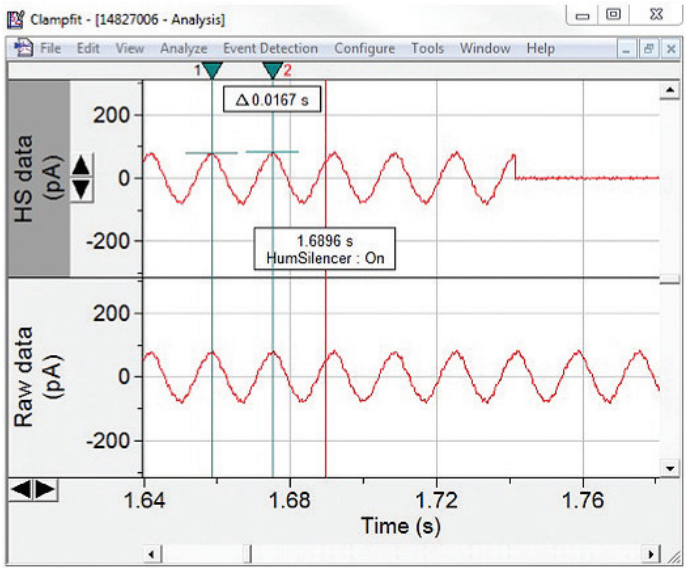


Figure 1. HumSilencer elimination of 60 Hz line-frequency noise 50 ms after HumSilencer is turned on. Recordings made from a model cell attached to an Axon™ Axopatch™ 200B amplifier, with 60 Hz line-frequency noise introduced by a noise generator placed next to the model cell. Signals were digitized by a Digidata 1550A *plus* HumSilencer. Bottom trace: raw data; Top trace: same data with HumSilencer enabled at 1.6896 s (red line). The two vertical green lines indicate peak-to-peak time (0.0167 s).

### Elimination of 50 Hz noise

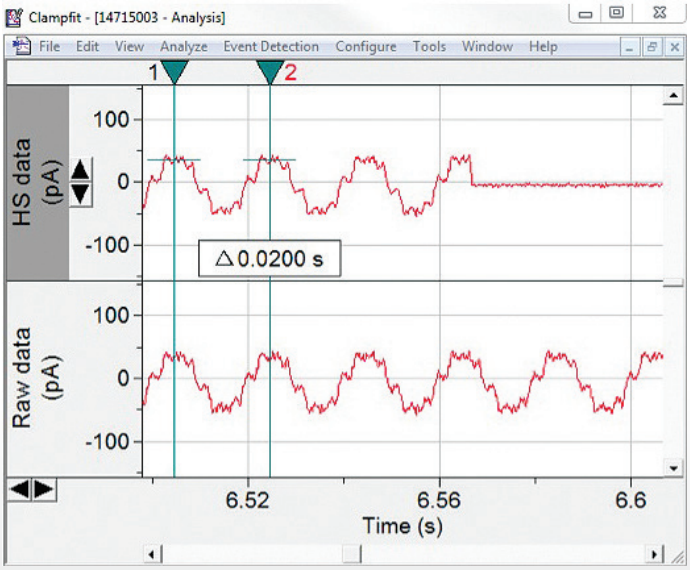


Figure 2. HumSilencer elimination of 50 Hz line frequency noise. Recordings made from a model cell attached to an Axopatch 200B amplifier, with 50 Hz line-frequency noise introduced by a noise generator placed next to the model cell. Signals were digitized by a Digidata 1550A *plus* HumSilencer. Bottom trace: raw data; Top trace: same data with HumSilencer enabled. The two vertical green lines indicate peak-to-peak time (0.0200 s).

### Fast noise learning

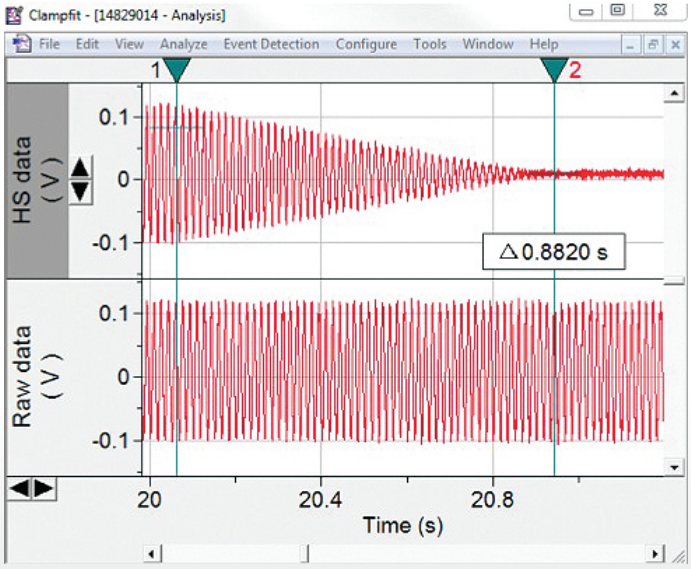


Figure 3. The HumSilencer quickly learns the noise pattern. Recordings made from a model cell attached to an Axopatch 200B amplifier, with 60 Hz line-frequency noise introduced by a noise generator placed next to the model cell. Signals were digitized by a Digidata 1550A plus HumSilencer. Bottom trace: raw data; top trace: same data with HumSilencer enabled. Vertical green lines indicate the time it takes HumSilencer to learn and eliminate noise (0.8820 s). Even if HumSilencer is only enabled after noise appears, it quickly learns and eliminates the noise once it's turned on.

## Fast noise adaptive rate

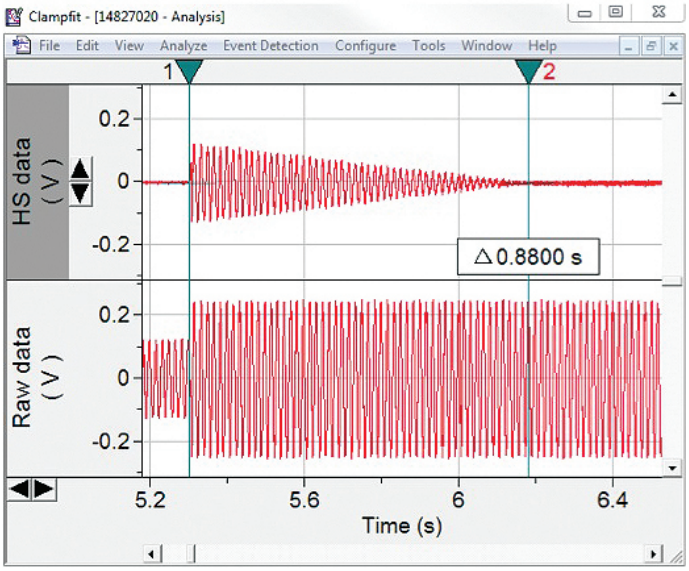


Figure 4. HumSilencer quickly adapts to changing noise conditions. Recordings made from a model cell attached to an Axopatch 200B amplifier, with 60 Hz line-frequency noise introduced by a noise generator placed next to the model cell. Signals were digitized by a Digidata 1550A *plus* HumSilencer. Bottom trace: raw data; top trace: same data with HumSilencer already enabled. At 5.3 s, the amplitude of the noise increases. In less than one second (time indicated by two vertical green lines, 0.8800 s), HumSilencer learns, adapts, and eliminates the increased noise.

## Eliminate a large range of noise amplitude

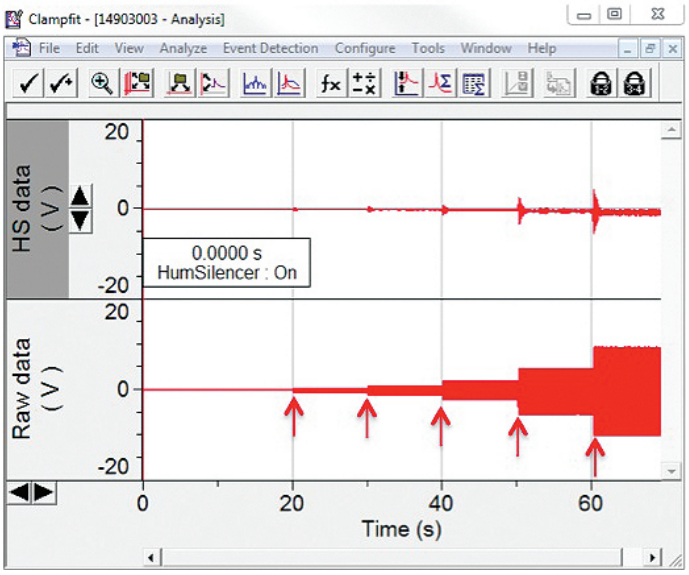


Figure 5. HumSilencer eliminates a wide range of input noise. Recordings made from a model cell attached to an Axopatch 200B amplifier, with 60 Hz line-frequency noise introduced by a noise generator placed next to the model cell. Noise amplitude is increased by changing the amplifier's output gain (x2, x5, x10, x50, and x100) of the signal at the times indicated by the red arrows. Signals were digitized by a Digidata 1550A *plus* HumSilencer. Bottom trace: raw data; top trace: same data with HumSilencer already enabled (at 0 s). HumSilencer is able to eliminate noise amplitudes at the digitizer's analog input of up to 20 V, peak-to-peak.

## Single-channel recording

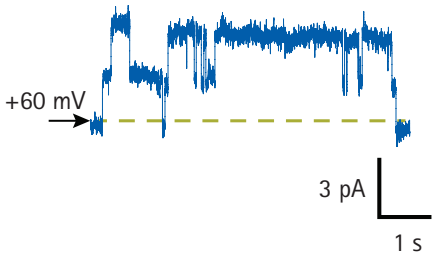


Figure 6. Single-channel recordings from a membrane patch excised from an HEK293 cell transfected with the α-subunit of an olfactory cyclic nucleotide-gated channel. Membrane was clamped at +60 mV in the presence of 2 µM cGMP.

## Whole-cell current recording

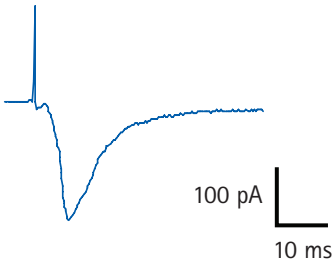


Figure 7. An evoked excitatory postsynaptic current recording from a corticostriatal neuron in a brain slice preparation. The stimulation electrode was placed in the layer V/VI region of the cortex. Membrane was clamped at -70 mV.

## Action potential recording

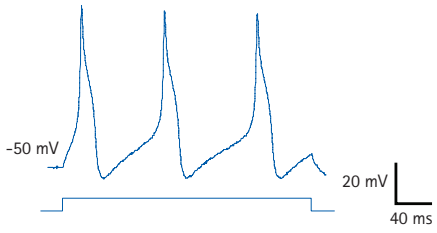


Figure 8. Action potential recordings from a neuron in an isolated dorsal root ganglia of a rat brain. Action potentials were evoked by injecting a current step of 110 µA. The resting membrane potential was at -50 mV.

### Waveform preview

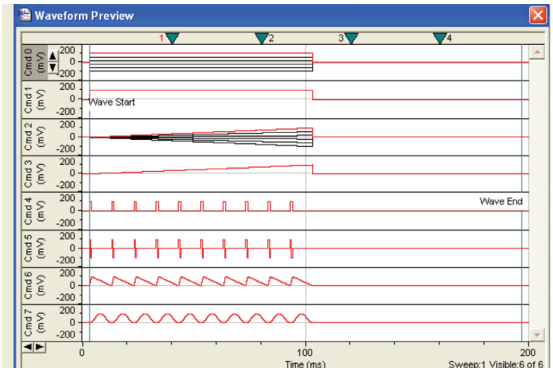


Figure 9. Eight analog waveforms can be generated simultaneously in Axon™ pCLAMP™ 10.5 Software.

### Real-time control panel

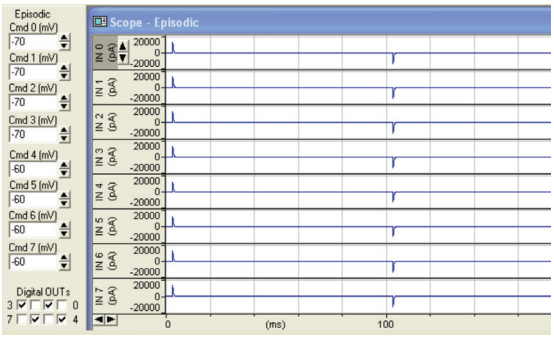


Figure 10. The included Axon™ AxoScope™ 10.5 Software offers optional real-time control of analog and digital outputs.

## Ordering information

Axon Digidata 1550A Data Acquisition System
*plus* HumSilencer
Part Number: Digidata 1550A1 (one HumSilencer channel)
Part Number: Digidata 1550A0 (without HumSilencer)*

- Axon Digidata 1550A Digitizer *plus* HumSilencer
- Power cord
- USB 2.0 cable
- Axon AxoScope 10.5 Software CD
- User Guide (electronic)
- Quick Start Guide (printed)

* Digidata 1550A0 digitizer replaces the Digidata 1550 and provides the same functionality and specifications.

## Technical Specifications

| Performance Specifications | |
|---|---|
| Analog outputs | 8 channels, 8 DACs, ±10 V range, 16-bit resolution, 1 Hz–500 kHz sampling rates. |
| Analog inputs | 8 channels, 8 ADCs, ±10 V range, 16-bit resolution, 1 Hz–500 kHz sampling rates. |
| Digital outputs | 8 bits, BNC and DB-25F connections |
| Digital triggers | Start input, tag input, scope output |
| Telegraphs | 4 BNC input channels or via internal Windows messaging for supported software |
| Analog output impedance | < 0.5 Ω |
| Analog input resistance | > 1 M Ω |
| Digital output current | ± 4 mA source |
| Analog crosstalk | < 1 mV Avg peak-to-peak |
| Digitization noise | < 1 mV Avg peak-to-peak |
| **HumSilencer Specifications** | |
| Maximum input signal (total of noise + signal) | ±10 V |
| Maximum noise amplitude | 20 V peak-to-peak (on a 0 V signal) |
| Noise cancellation | Line-frequency (50 Hz / 60 Hz) and harmonics to 10 kHz |
| Cancellation response time | < 1 second |
| **General Specifications** | |
| Dimensions (in.) | 4.3 (H) x 19 (W) x 14.3 (D) |
| Dimensions (cm) | 10.9 (H) x 48.3 (W) x 36.3 (D) |
| Weight | 8 lbs. (3.6 kg) |
| Communications | USB 2.0 |
| Rack use | Standard 19" rack mount (2U) with handles |
| Power | 100–240 Vac 50–60 Hz, 115 watts (max.) |
| Safety | CE marking (Conformité Européenne) |
| Computer | PC with 2 GHz CPU (or faster), Windows 7 (32-bit or 64-bit), 2 GB RAM (or more), 1024 x 768 display, CD-ROM drive, 3 high-speed built-in USB 2.0 ports |
| Software | Axon AxoScope 10.5 Software (included) Axon pCLAMP 10.5 Software (optional) |


Contact Us
Phone: +1-800-635-5577
Web: www.moleculardevices.com
Email: info@moldev.com
Check our website for a current listing of worldwide distributors.

Regional Offices
USA and Canada +1-800-635-5577
Brazil +55-11-3616-6607
China (Beijing) +86-10-6410-8669
China (Shanghai) +86-21-3372-1088
Germany 00800-665-32860
Japan (Osaka) +81-6-7174-8831
Japan (Tokyo) +81-3-6362-5260
South Korea +82-2-3471-9531
United Kingdom +44-118-944-8000


Molecular Devices