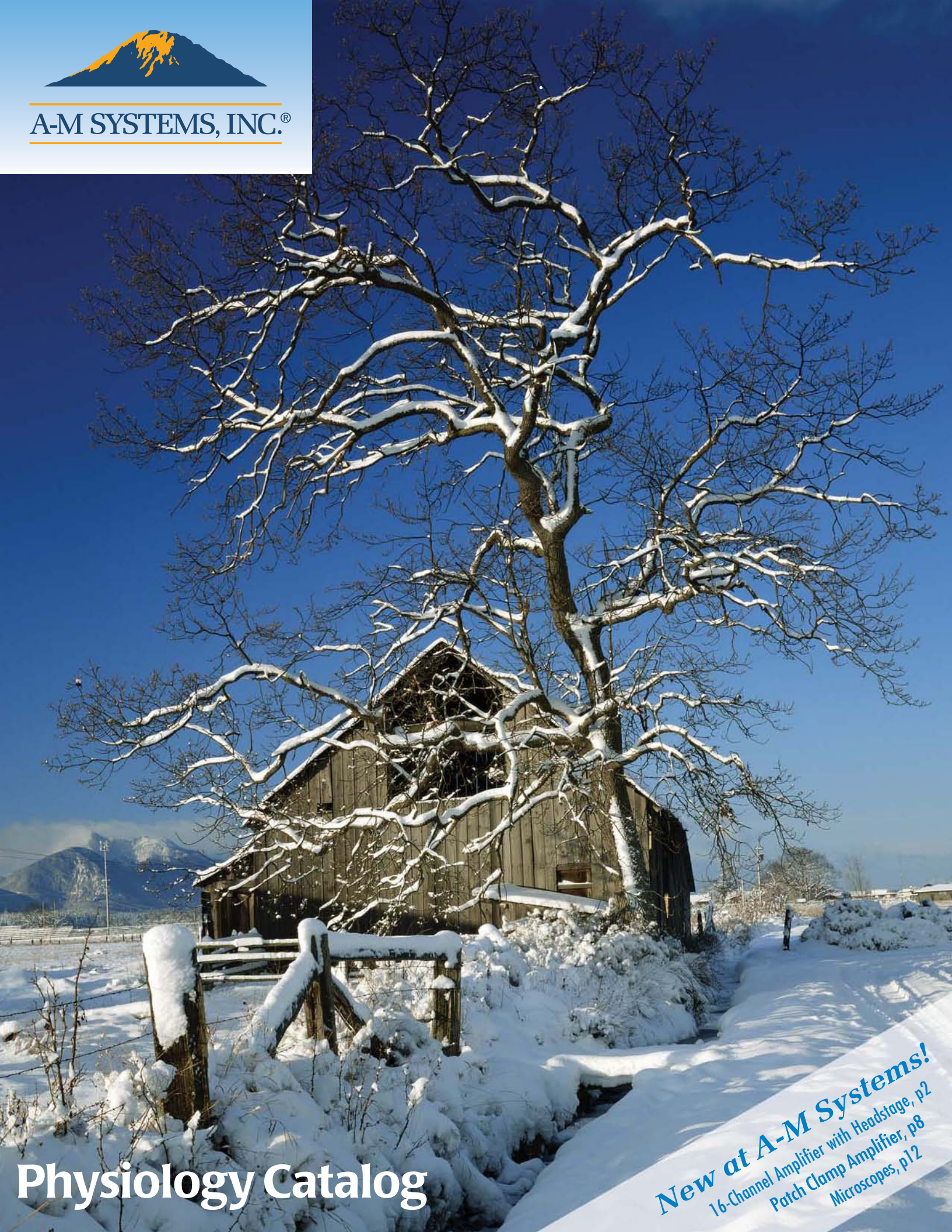




A-M SYSTEMS, INC.®



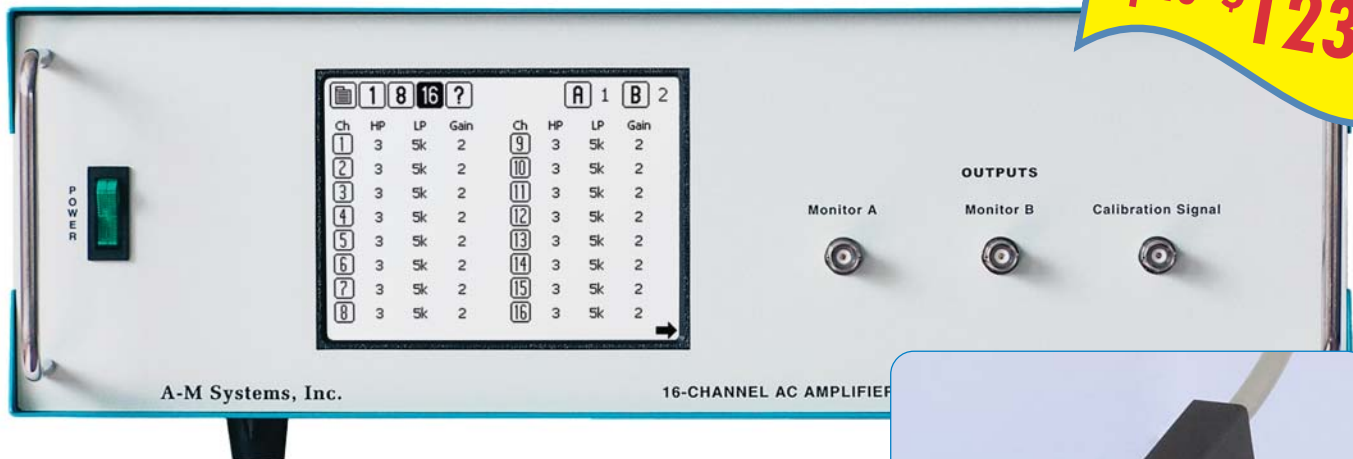
# Physiology Catalog

**New at A-M Systems!**  
16-Channel Amplifier with Headstage, p2  
Patch Clamp Amplifier, p8  
Microscopes, p12



# The Model 3500 and Model 3600 16-Channel Extracellular AC Amplifiers

Save  
up to **\$1230!**



## Featuring Complete Computer Control!

Like our Model 1700 Differential AC Amplifier and our Model 1800 Microelectrode AC Amplifier, our new 16-Channel Extracellular AC Amplifiers continue A-M System's tradition of providing excellent low-noise high-gain amplifiers at reasonable prices. By combining our analog abilities with new digital technology, we can offer these competitively priced 16-channel units with complete front panel and computer control capabilities. The Model 3500 is perfect for use with low impedance electrodes in studies such as EEG and EKG. The Model 3600, designed for use with either of our headstage options, is perfect for single-cell extracellular recording.



Stimulate & Record Headstage (left rear)  
Record-Only Headstage (right front)

### Both Instruments feature:

- 16 independent high gain, low noise channels
- Control via front panel touch screen or Windows® compatible program
- Parameter sets that are stored on-board and on-line
- Built-In Output Monitors
- Built-In Calibration Signal
- High Pass, Low Pass, and Notch Filters
- TTL Control
- Data Logging of amplifier parameters
- Rack-Mounts
- Customizable Filter and Gain Settings

### Model 3500 Features:

- Can pass two different stimulation signals directly to electrodes
- True differential, common reference or ground reference recording options
- Breakout board options for safety connectors

### Specifications

Gain — from 2 to 20,000, in 13 steps  
Noise —  $0.7\mu\text{V}$  rms noise max (10Hz – 10kHz)  
High Pass Filter — 0.3 to 500Hz, in 8 steps; 40dB / decade  
Low Pass Filter — 0.1 to 20kHz, in 8 steps; 40dB / decade  
Common Mode Rejection — >100dB

### Model 3600 Features:

- Two 16-Channel headstage options for use with high impedance electrodes:  
Stimulation and Recording Headstage  
Miniature Record-Only Headstage
- Headstage adapters for Michigan-style DIP connectors

### Specifications

Gain — from 10 to 20,000, in 12 steps  
Noise —  $0.7\mu\text{V}$  rms noise max (10Hz – 10kHz)  
High Pass Filter — 0.3 to 500Hz, in 8 steps; 40dB / decade  
Low Pass Filter — 0.1 to 20kHz, in 8 steps; 40dB / decade  
Interchannel Cross Talk — >70dB

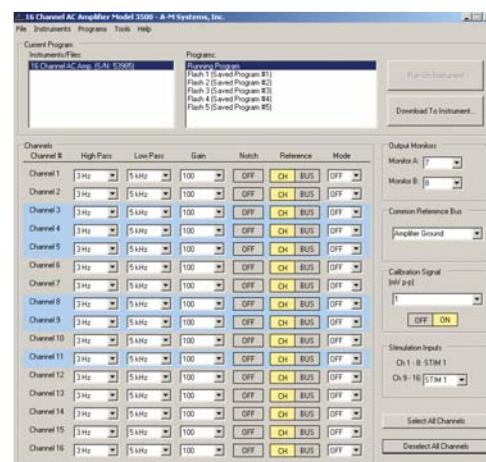
Both 16-Channel Extracellular Amplifiers can be completely controlled by their front panel touch screen displays, or by the supplied Windows® compatible software program (*Screen capture, top right*).

The major functions of the Model 3500 or Model 3600 are accessed via a convenient toolbar located at the top of each page. A Main Menu (*not pictured*) serves as the entry point to storing or recalling previously defined Channel Settings Programs, as well as enabling control of the built-in calibrator and channel monitors.

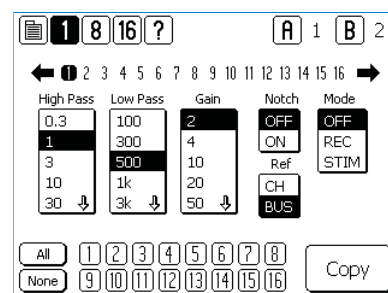
The Channel Edit screen (*lower right*) enables quick setting of all amplifier parameters on any channel in real time. Once highlighted, the amplifier immediately responds to the setting request. If desired, any channel's collection of settings can be copied to any or all of the remaining channels.

There are two additional screens used to view the current running parameters of multiple channels at once. The 16-Channel view (*depicted on the instrument photo to the left*) enables the user to ascertain the key settings of all 16 channels at once. A second page accessed by pressing the arrow on the touch screen lists the remaining settings of all 16 channels. Alternatively, one can use the 8-Channel View (*not pictured*) to look at all amplifier settings of 8 channels at once, with a second screen displaying the settings for the remaining 8 channels.

Stimulation features (not applicable with the Record-Only Headstage) include the ability to pass stimulation signals to any channel and to blank individual channels during stimulation. In addition, basic settings on the amplifiers can be controlled via rear panel TTL inputs. Contact us for more information!



Windows® Compatible Control Software Included



Channel Edit Screen

## Model 3500, without headstage

Catalog #950000 ships complete with:

- ✓ Operator's manual and rack mount hardware
- ✓ 10' USB Cable
- ✓ Windows® Compatible Computer Control Software
- ✓ Sixteen 40" Input cables

### Options

- Patch Panel with safety style connectors #951000
- Extended Input Cables, 144" long (each) #951500

## Model 3600, with headstage

Catalog #960000 ships complete with:

- ✓ Operator's manual and rack mount hardware
- ✓ 10' USB Cable
- ✓ Windows® Compatible Computer Control Software

One of the following headstages is required for proper operation:

- Stimulate & Recording Headstage #962000
- Record-Only Microminiature Headstage #961075

***Need a data acquisition and analysis system?  
Turn the page to get the complete package!***

- 16 or 32 Channel High Speed A/D boards with input patch panel
- Complete Data Acquisition software tools,  
including automated real-time control
- Sophisticated Data Analysis software package,  
enabling on- and off-line analysis of collected data



# SciWorks Data Acquisition and Analysis System

By DataWave Technologies®

The industry leader in multi-channel data acquisition and analysis systems, DataWave Technologies® SciWorks® *Experimenter* software suite, combined with their advanced A/D hardware options, is the perfect compliment to A-M System's Model 3500 and Model 3600 16-Channel Amplifiers.

*SciWorks® Experimenter* is a real-time data acquisition, analysis, and instrument control application designed for a wide variety of electrophysiology experiments, including:

Single Unit Recording	Evoked Responses	EEG	Field Potentials
Multi-Unit Recording	ECG / EKG	ERG	EMG

*SciWorks® Experimenter* provides the user with a single interface to:

- control instrumentation, including A-M System's 16 channel amplifiers,
- define acquisition parameters such as sampling rates and gain factors,
- perform real-time analysis, including multi-unit spike sorting and separation,
- generate complicated stimulation patterns
- annotate data files with messages, trial information, and timing flags, and
- write data to a multiple of common industry defined data formats

## Data Acquisition

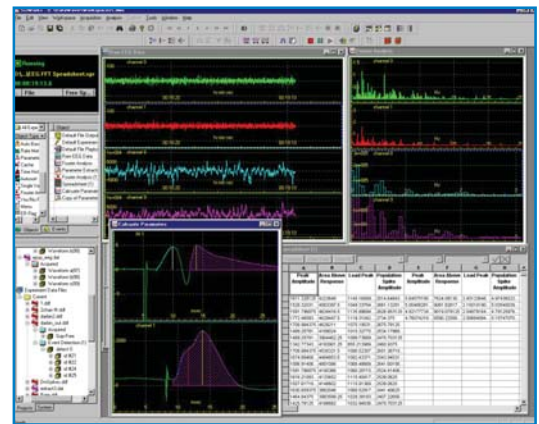
- Acquire from 1 to 128 channels of continuous or single sweep data
- Support for 12 and 16 bit A/D resolutions
- Acquire different channels using different sampling rates and gain factors simultaneously
- Record both acquired data and analyzed data to disk for subsequent off-line processing
- All data timestamped to 1microsecond resolution

## Data Analysis

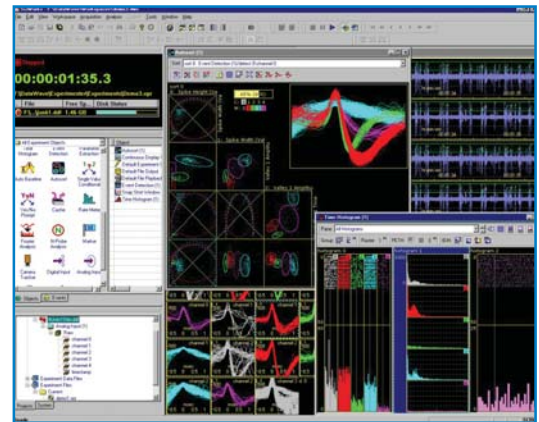
- Real time multi-unit spike sorting and separation using Autosort cluster analysis
- Extract key waveform parameters, such as peak, valley, dV/dt, and more
- Perievent time (PETH), Inter-event interval (IEIH) histograms and rasters
- Detect and extract events based on software window discriminators
- Can analyze in real-time during data acquisition
- Cross Correlation histograms
- Fast Fourier Analysis, including power calculations
- Digital filtering, auto-baseline and waveform smoothing
- Statistical calculations for waveform and single value data
- Burst analysis for detecting both event and waveform bursts
- Analysis for multichannel electrodes, such as stereotrodes, tetrodes, and high density arrays

## Other Features

- Generate stimuli and acquire data simultaneously
- Generate auditory stimuli
- Universal support for multiple D/A systems from a variety of manufacturers
- Unlimited markers and data annotations with full edit capabilities
- Data file compatibility with common industry formats
- Add on features for video monitoring and animal tracking



Field Potential Recording and Analysis



Single & Multi Unit Recording and Analysis, featuring DataWave Technologies AutoSort plug-in



32-Channel 1.25MHz A/D converter board with input/output patch panel. Also Available in 16-Channel 400kHz configuration.

## All SciWorks® Experimenter

- ✓ SciWorks® Experimenter Software
- ✓ DataWave SDK (software development kit)
- ✓ DataWave API (programming wizard)
- ✓ A/D Board (PCI Bus)
- ✓ Input/Output Patch Panel and Cabling

Catalog #955000  
16-Channel 400kHz System

Catalog #956000  
32-Channel 1.25MHz System



# Microelectrode AC Amplifier Model 1800

**Low Noise**



- Two amplifiers in one instrument
- Low cost
- Gain and filter settings can be customized
- Low noise ( $2.5\mu\text{V}$  peak-to-peak max., 10Hz – 10kHz)
- High common-mode rejection
- Notch filter for line frequency noise
- Low bias current ( $\pm 3\text{pA}$  typical;  $\pm 20\text{pA}$  maximum)
- *In situ* electrode impedance measurement

Catalog #700000 ships complete with:

- ✓ Operator's manual
- ✓ Rack mount hardware
- ✓ Two headstages with 5' input cables

Options Include:

- Extend Headstage Cable to 12' #700800
- Modify Gain or Filter Setting #695000

## Control the Model 1800 via TTL

Need to control the mode of the Model 1800 Microelectrode AC Amplifier remotely? Use a TTL signal to switch the mode of the amplifier from Recording to Stimulating. The price of the modification is \$525 per channel. Call for more information.

# AC/DC Differential Amplifier Model 3000



Catalog #910000 ships complete with:

- ✓ Operator's manual and rack mount hardware
- ✓ Remote power supply
- ✓ 3' Input cable

Optional Stim/Rec Headstage: #910500

Use this optional headstage to record with a high impedance electrode. In addition, this headstage enables stimulating of the same electrode without changing the electrical connections from the headstage. Simply connect the output of your signal source to the STIMULUS BNC on the Model 3000 front panel, and switch the MODE switch to STIM.



The Model 3000 high gain AC/DC Differential Amplifier is designed for low noise recordings from excitable tissue. Potential specific applications include EEG, EKG, and extracellular recordings.

- Differential or single-ended recordings
- Current can be passed to the electrode
- External gate can control amplifier mode
- DC and AC capabilities
- Noise:  $2.5\mu\text{V}$  rms (10Hz – 10kHz);  $0.1\text{fA}/\sqrt{\text{Hz}}$  at 1kHz
- High Pass, Low Pass, and line frequency Notch filters
- Input impedance:  $10^{15}\Omega \parallel 1\text{pF}$
- Capacity compensation: -4 to 50pF

# Four-Channel Differential AC Amplifier Model 1700



- Four amplifiers in one instrument
- Low cost
- Up to x10,000 gain — inquire about custom gain and filter settings
- 2.5 $\mu$ V rms noise max (10Hz – 10kHz)
- High common-mode rejection
- Improved Notch filter attenuates line frequency noise
- Low bias current ( $\pm$ 3pA typical;  $\pm$ 20pA maximum)
- Driven shield reduces cable capacitance

Catalog #690000 ships complete with:

- ✓ Operator's manual and rack mount hardware
- ✓ Four 3' Input cables

Options Include:

- Extend Input Cable to 12' #720800
- Modify Gain or Filter Setting #695000

## Add a Headstage to the Model 1700

Interested in using high impedance electrodes with a Model 1700 Differential AC Amplifier? The price of this modification, including the headstage, is \$270 per channel. Call for more information.

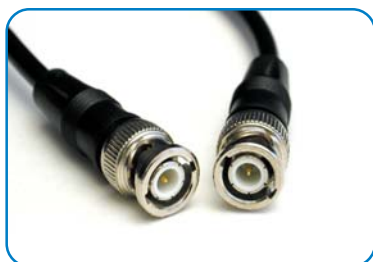
## Audio Monitor Model 3300



Catalog #940000 ships complete with:

- ✓ Operator's manual
- ✓ Rack mount hardware
- ✓ Remote power supply

- Two input channels
- 6-band frequency equalizer
- 3 gain settings
- Line Out
- Headphone jack



*Cables and Connectors*  
Page 22



*Wire and Rod*  
Page 16-17



*Meiji Techno Microscopes*  
Page 12-13

**Lowest  
Prices!**

# Isolated Pulse Stimulator Model 2100

**1 $\mu$ S  
Resolution**



- Timing range: 1  $\mu$ s to over 15 minutes
- Excellent timing accuracy! Better than 0.02% with less than 125ns jitter
- Optically-isolated, short-circuit protected mono- or bi-phasic pulse output
- Status indicators: operational state and setup/control errors
- Trigger outputs: for both individual pulses and the entire burst train
- No battery required! Dual output isolation: Transformer and optical linkage.

Catalog #720000 ships complete with:

- ✓ Operator's manual
- ✓ Rack mount hardware

Options Include:

AC Output Filter to block DC leakage current

#721000

## Analog Stimulus Isolator Model 2200

**Battery  
Powered**



## Digital Stimulus Isolator Model 2300

**Easy to  
Use!**



*Both Isolators:*

- Function as constant current or constant voltage sources
- Maximum biphasic output:  $\pm 50$ V or  $\pm 5$ mA
- Low Noise <0.03% of full scale
- Optically isolated outputs
- Wide bandwidth, DC to 40kHz, <10  $\mu$ s rise time (resistive loads)
- Use two rechargeable batteries
- Compact: 2.5"H x 6"W x 6.25"D
- Model 2200: Isolates any shape signal you provide
- Model 2300: Generates square pulses based on your timing signals

**Analog Stimulus Isolator**

Model 2200 (Catalog #850000)

**Digital Stimulus Isolator**

Model 2300 (Catalog #860000)

Both instruments ship complete with:

- ✓ Operator's manual
- ✓ Battery charger

Options Include:

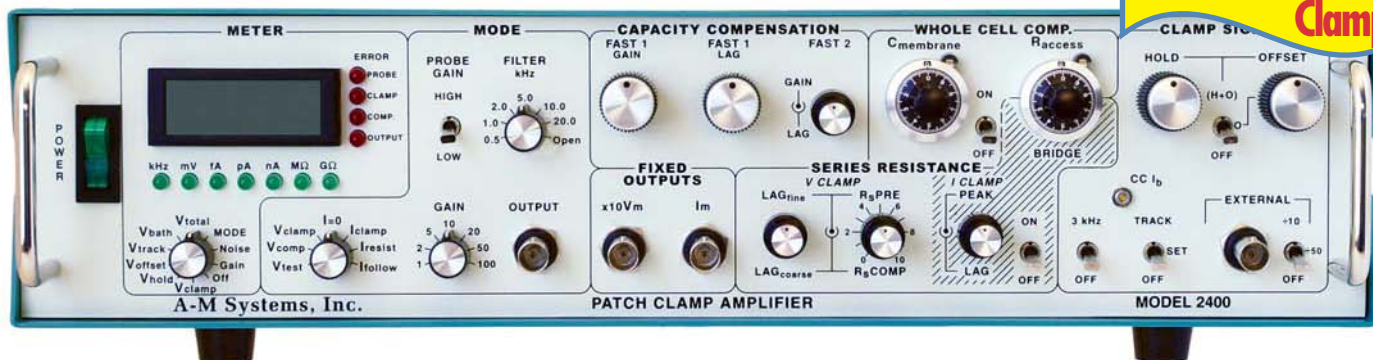
AC Output Filter to block DC leakage current

#721000



# Patch Clamp Amplifier Model 2400

**True  
Current  
Clamp**



The Model 2400 is a low noise, full featured intracellular/extracellular amplifier designed for voltage clamping using patch electrodes on single channels or whole cells. Its unique design allows fast intracellular current clamp measurements with sharp electrodes. Advanced circuit design techniques using field programmable gate arrays eliminated noisy microprocessors.

- Full-featured voltage clamp with true current clamp capabilities
- Voltage clamp mode for both whole cell and patch recordings
- Current clamp mode is 100% stable with bandwidth of 200kHz
- Current gain from 10mV/nA to 1mV/fA
- Capacity, Series Resistance, and Whole Cell compensation
- Internally generated test signals
- Telegraph outputs for all major front panel controls
- Independent hold, offset, and tracking circuitry
- Displays command potentials, cell currents, and voltages
- 4-pole low pass Bessel filter

## **Small Dual-Range Resistive Feedback Headstage.**

- Dovetail for mounting to micromanipulators
- 10' cable length



## **Data Acquisition and Analysis for under \$1000!**

The Model 2400 Patch Clamp Amplifier has complete telegraph outputs for communicating with any of the major commercially available software packages.

In addition, the unit is compatible with the Strathclyde Electrophysiology Software Suite that is available free of charge to academic users from the University of Strathclyde, Glasgow UK. This comprehensive software package, written by Dr. John Dempster, has components designed for Whole Cell Voltage and Current Clamp Experiments including data acquisition and analysis. Simply select the Model 2400 under the amplifier settings control panel in the program, and the software can immediately translate the proper gain settings available on our telegraph. Combined with any of several inexpensive A/D cards, a complete software package can be assembled for under \$1000. Contact us for details!

Single Channel and Whole Cell experiments can be performed and analyzed using QuB, a free program for academic institution based users available from The Research Foundation State University of New York ([www.qub.buffalo.edu](http://www.qub.buffalo.edu)). Compatible with a variety of A/D cards, QuB is a sophisticated investigative tool.

Catalog #880000 ships complete with:

- ✓ Operator's manual
- ✓ Model Cell
- ✓ Rack mount hardware

Catalog Number	Low Gain Resistor	High Gain Resistor
880210	10 Meg	1 Gig
880218	10 Meg	10 Gig
880222*	100 Meg	10 Gig

\* = default headstage shipped with Model 2400 unless another is requested.

**Note:** One of the headstages listed in the table to the right must be purchased for proper operation.

In addition, it is highly recommended to purchase a BNC-compatible electrode holder described in the middle of the next page.



# Cell Simulator Model 2410



The Model 2410 Cell Simulator is a simple to use, low cost instrument that simulates the activity of a cell and its major channels during intracellular recordings. Perfect in the classroom or laboratory as a teaching or troubleshooting tool.

- Accepts BNC or 2mm pin electrode holders
- Simulates major cell channels
- Gates can be controlled remotely

Catalog #880010 ships complete with:

- ✓ Operator's manual
- ✓ Rack mount hardware
- ✓ Remote power supply

Simulates the following situations:

- no connection
- patch seal
- inside-out patch
- clogged pipette
- poor whole cell seal
- outside-out patch
- pipette in bath
- good whole cell seal

## Patch Clamp Microelectrode Holders

Use these holders to couple glass microelectrodes to our patch clamp headstages. Available in Acrylic, Polycarbonate, or Teflon. Straight configuration with a suction port on the side.

Holds Glass O.D.	Acrylic	Polycarbonate	Teflon
ø 1.20mm	881120	882120	883120
ø 1.50mm	881150	882150	883150
ø 1.65mm	881165	882165	883165
ø 2.00mm	881200	882200	883200

## Patch Clamp Capillary Glass

### No Microfilament



Catalog Number	Length inches	Diameter (mm) Outside	Diameter (mm) Inside	Qty/Pkg
592400	4	1.0	0.58	250
592600	6	1.0	0.58	250
592800	4	1.2	0.68	200
593000	6	1.2	0.68	200
593100	3	1.5	0.86	150
593200	4	1.5	0.86	150
593400	6	1.5	0.86	150
593600	4	1.65	1.2	140
593800	6	1.65	1.2	140
594000	4	2.0	1.16	100
594200	6	2.0	1.16	100

### With Microfilament



596000	4	1.0	0.58	250
596200	6	1.0	0.58	250
596300	3	1.2	0.68	200
596400	4	1.2	0.68	200
596600	6	1.2	0.68	200
596700	3	1.5	0.86	150
596800	4	1.5	0.86	150
597000	6	1.5	0.86	150
597600	4	1.65	1.2	140
597200	4	2.0	1.16	100
597400	6	2.0	1.16	100

# Neuroprobe Intracellular Amplifier Model 1600

**Very Low Noise**



- Digital panel meter displays membrane potential, injected current, or electrode resistance
- Square-wave generator for electrode test and for adjustment of capacitance compensation
- Current injection system with 0.1nA resolution allows simultaneous stimulating and recording by a single electrode
- Dual-function transient and DC balance controls
- Low-Pass and line frequency Notch filters
- Optional iontophoresis adapter available

Catalog #680100 ships complete with:

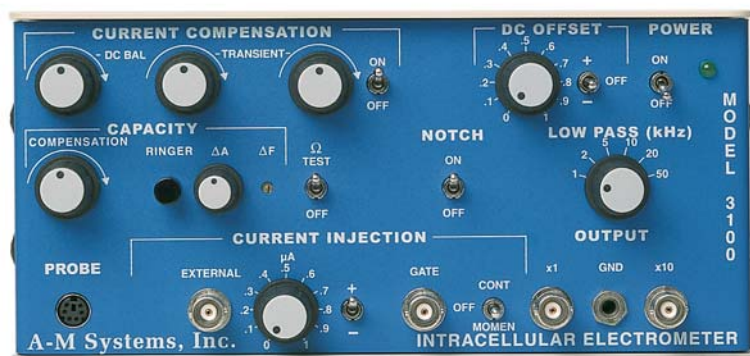
- ✓ Operator's manual and rack mount hardware
- ✓ Headstage

Options Include:

Iontophoresis Adapter

#682000

# Intracellular Electrometer Model 3100



Catalog #920000 ships complete with:

- ✓ Operator's manual and rack mount hardware
- ✓ Remote power supply
- ✓ Mini headstage with 5' cable

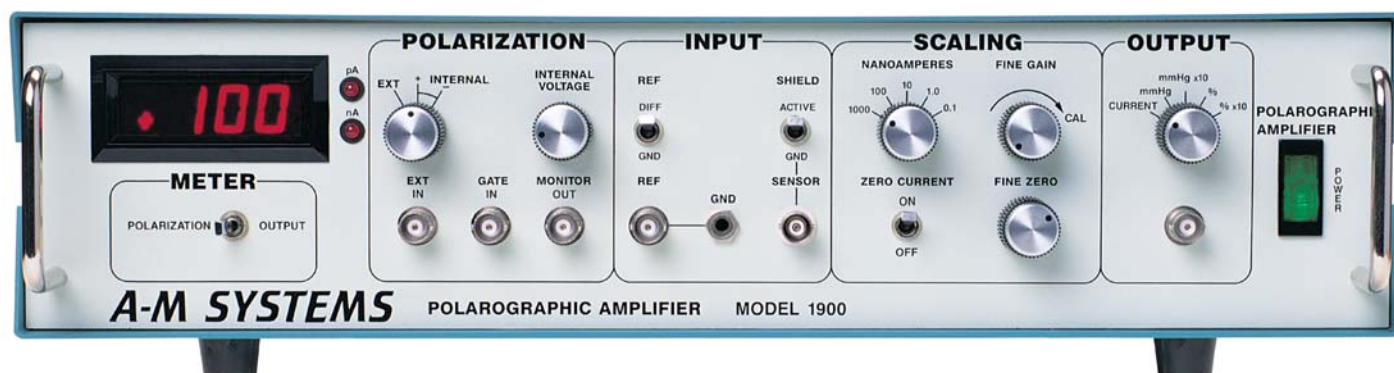


The Model 3100 Intracellular Electrometer is a simple to use, low cost intracellular amplifier with the performance and features typically found in much more expensive instruments.

- Small lightweight headstage
- Noise:  $18\mu\text{V rms}$  (10Hz – 50kHz; shorted);  $< 350\mu\text{V p-p}$  (20M $\Omega$  source)
- Input impedance:  $10^{13}\Omega$
- Bias current: Adjustable to zero
- DC balance with transient suppression circuitry
- Low-Pass and line frequency Notch filters
- Voltage gain: x1 and x10. Can customize: please inquire!
- Capacity compensation: -4pF to 35pF
- DC Offset:  $\pm 1\text{V}$
- Maximum internal current:  $1\mu\text{A}$
- External current: 100nA/V; 10V maximum
- Electrode test: 100Hz, 10nA (i.e. 10mV/M $\Omega$  electrode resistance)
- Ringer with adjustable amplitude (0 – 10V biphasic) and frequency (2 – 8kHz)



# Polarographic Amplifier Model 1900



- Low noise, precision amplifier
- Can use both oxygen and hydrogen sensors
- Wide response range: 100 pA to 1  $\mu$ A
- Excellent resolution: 0.1 pA
- Digital panel meter displays current, mm Hg, x10, %, and % x10 outputs
- Single-ended or differential measurement

Catalog #730000 ships complete with:

- ✓ Operator's manual
- ✓ Rack mount hardware

## Glass Electrode R/C Meter Model 2700

- Resistance range: 10k $\Omega$  – 999M $\Omega$
- Capacitance: 0 – 200pF
- Test Frequency: 10, 100, or 1000Hz
- Amplitude: 100mV p-p
- Input impedance: 10<sup>13</sup> $\Omega$  at 1pF
- External power supply for low noise

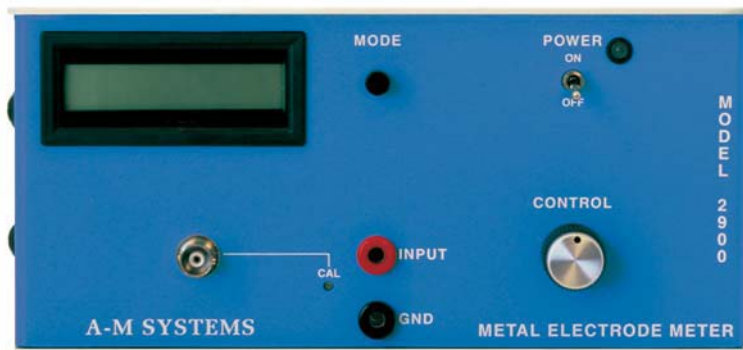


Catalog #870000 ships complete with:

- ✓ Operator's manual and rack mount hardware
- ✓ Input and Ground cables
- ✓ Remote power supply

## Metal Electrode Impedance Meter Model 2900

- Improved design is easier to use
- Wider resistance range: 1k $\Omega$  – 20M $\Omega$
- Frequency: User Adjustable From 200Hz to 10kHz
- Amplitude: User adjustable from 10nA to 100nA p-p
- Input impedance: 10<sup>13</sup> $\Omega$  at 1pF



Catalog #900000 ships complete with:

- ✓ Operator's manual and rack mount hardware
- ✓ Input cable (Dual banana plug to microclips)
- ✓ Remote power supply

# Meiji Techno Microscopes

A-M Systems is proud to announce that we carry the entire line of Meiji Techno microscopes. Stop by our website ([www.a-msystems.com](http://www.a-msystems.com)) to view the product line and the extremely low prices! These Microscopes feature superb quality optics resulting in high resolution images, rugged dependability resulting from all-metal construction, ergonomic design that facilitates long-term continuous use, and system flexibility enabling customizing your microscope to meet the specific needs of your application.



## EMZ-5 Zoom Stereo Microscope on Boom Stand

The EMZ-5 Zoom Stereo Microscope Boom System (*above*) comes complete with an EMZ-5 Zoom Stereo Microscope Body, S-4100 Boom Stand, F Holder with dual coarse vertical adjustment knobs, 10X eyepieces, eyeshields, and dust cover.

### EMZ-5 Body with 10x Eyepiece features:

- Crisp High Resolution Erect Unreversed Stereoscopic Image
- Zoom Range: 7X to 45X
- Zoom Ratio: 6.5:1
- 45 deg Binocular Eyetubes
- Standard Working Distance: 93mm
- Interpupillary distance adjustment from 54 to 75mm
- Easy to Parfocal

### S-4100 Boom Stand with F Holder features:

- Vertical adjustment knobs mounted bilaterally on holder
- Plain 265mm x 265mm Base
- Complete flexibility for horizontal and vertical adjustment
- 400mm Vertical Pole
- 530mm Horizontal Pole

### Catalog #725131 ships complete with:

- ✓ EMZ-5 Body
- ✓ S-4100 Boom Stand
- ✓ F Holder
- ✓ 10x Eyepieces

### Upgrades Available

- ✓ Change eyepieces to 12.5x, 15x, or 20x for increased magnification
- ✓ Upgrade to FC Holder with Dual Fine and Coarse Vertical Adjustment Knobs
- ✓ Upgrade to Binocular EMZ-13 Body (*Increased Magnification Range: 10x to 70x*)
- ✓ Upgrade to Trinocular EMZ-5TR Body (*Left Eyetube Optical Path Light can be Diverted to Vertical Phototube*)
- ✓ Upgrade to Trinocular EMZ-8TR Body (*Direct Light to all 3 Viewing Ports Simultaneously*)
- ✓ Add DK-Light CMOS USB 1.5MP 1280 x 1024 8 bit Digital Video Camera (*Requires Trinocular Microscope Body*)
- ✓ Add DK1000 CMOS USB 1.3MP 1280 x 1024 24 bit Digital Video Camera and Analysis Software (*Requires Trinocular Microscope Body*)

Add a  
Digital Video Camera for  
photomicrography and  
video analysis

Contact A-M Systems for actual products numbers for any of the above upgrades!



## Need a Pole Stand, instead of a Boom Stand?

A variety of Pole stands are available for use with EMZ Zoom Stereo Microscope Bodies:

- P Standard stand with Coarse Adjustment Control Focusing Block
- PC Standard stand with Fine and Coarse Adjustment Control Focusing Block
- PK Large ergonomic base stand with Coarse Control Focusing Block
- PBH Stand with Built-in Transmitted and Incident Halogen Illumination and Coarse Control Focusing Block
- PKL Large Ergonomic Base stand with Built-in Transmitted and Incident LED Illumination and Coarse Control Focusing Block



## A-M Systems also offers Biological Microscopes

We offer a variety of biological microscopes to meet your specific application. Available Features include

- On the ML 2000 series,  
Brightfield, Phase Contrast or Darkfield configurations  
Smooth-operating, ball bearing mounted, quadruple nosepiece  
Koehler illumination
- On the ML 5000 series,  
Brightfield, Phase Contrast or Darkfield configurations  
Binocular or Trinocular Heads  
Ergonomic reverse mounted quintuple nosepiece



## Fiber Optic Illuminators



150W Dual Gooseneck



30W Fiberlite



150W Ringlight

### Catalog Number

### Description

725900	150 Watt Fiber Optic Illuminator, with Single Ringlight
725910	150 Watt Fiber Optic Illuminator, with 23" Dual Gooseneck
725942	150 Watt Fiber Optic Illuminator, with 36" Dual Gooseneck
725915	150 Watt Fiber Optic Illuminator, 23" Dual Gooseneck, Color Filter Adapter
725949	150 Watt Fiber Optic Illuminator, 36" Dual Gooseneck, Color Filter Adapter
725940	Set of Infrared and Color Filters
725920	30 Watt Fiberlite Convection Cooled Fiber Optic Illuminator
725925	Replacement Lamp, EKE, Low Output, for 150W Illuminators
725930	Replacement Lamp, EJY, High Output, for 150W Illuminators

# Standard Capillary Glass

Single, Double, Multi-Barreled, and Thin-Walled capillaries are made from standard Borosilicate glass and have a softening temperature of 820°C.

		Catalog Number	Length inches	Diameter (mm)		Qty/ Pkg
				Outside	Inside	
<b>Single Barrel</b> With Microfilament		601000	4	1.00	0.58	250
		601500	6	1.00	0.58	250
		602000	4	1.20	0.68	200
		602500	6	1.20	0.68	200
		603000	4	1.50	0.86	150
		603500	6	1.50	0.86	150
		604000	4	2.00	1.16	100
		604500	6	2.00	1.16	100
<b>Multi-Barrel</b> With Microfilaments	2 Barrel	607000	4	1.20	0.60	100
		607500	6	1.20	0.60	100
		608000	4	1.50	0.86	100
		608500	6	1.50	0.86	100
	3 Barrel	609000	4	1.20	0.60	75
		609500	6	1.20	0.60	75
	4 Barrel	610500	4	1.20	0.60	50
		611500	6	1.20	0.60	50
	5 Barrel	612000	4	1.20	0.60	50
		612500	6	1.20	0.60	50
	7 Barrel	613000	4	1.00	0.60	50
<b>Thin-Walled</b> With Microfilament		615000	4	1.00	0.75	250
		615500	6	1.00	0.75	250
		616000	4	1.20	0.90	200
		616500	6	1.20	0.90	200
		617000	4	1.50	1.12	150
		617500	6	1.50	1.12	150
		618000	4	2.00	1.50	100
		618500	6	2.00	1.50	100
<b>Double Barrel</b> One Barrel With Microfilament		631000	4	1.20	0.68	100
		631500	6	1.20	0.68	100
		632000	4	1.50	0.86	100
		632500	6	1.50	0.86	100

		Catalog Number	Length inches	Diameter (mm)		Qty/ Pkg
				Outside	Inside	
<b>Single Barrel</b> Without Microfilament		625000	4	0.75	0.40	250
		625500	6	0.75	0.40	250
		626000	4	1.00	0.50	250
		626500	6	1.00	0.50	250
		626800	4	1.00	0.25	250
		627000	4	1.20	0.68	200
		627500	6	1.20	0.68	200
		628500	6	1.50	0.86	150
		629000	4	2.00	1.00	100
		629500	6	2.00	1.00	100
		635000	4	1.20	0.68	100
<b>Double Barrel</b> Without Microfilament		635500	6	1.20	0.68	100
		636000	4	1.50	0.86	100
		636500	6	1.50	0.86	100



# Glass Microelectrode Holders

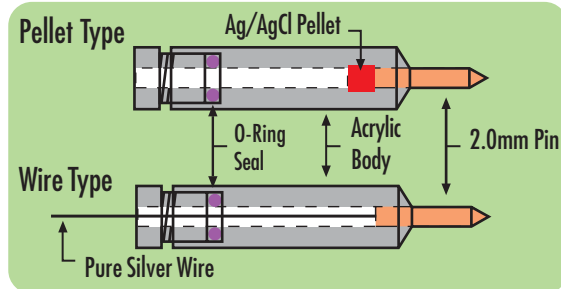
Glass Microelectrode holders are a convenient way to couple fluid-filled glass microelectrodes to amplifier headstages. Each holder features a precision machined plastic body, and a 2mm pin.

Designed to work with industry standard 2mm jack headstages (pre-amplifier probes), including the :

Model 1600 Neuroprobe Amplifier (page 10)

Model 3100 Intracellular Electrometer (page 10)

Pellet type holders have a 2 mm x 2 mm silver / silver chloride pellet encased within their body.



Wire type holders have a 0.10" pure silver wire extending from their pin.

Catalog Number	Type	Shape	Fits Glass
647010	Pellet	Right Angle	1.00
647012	Pellet	Right Angle	1.20
647015	Pellet	Right Angle	1.50
647017	Pellet	Right Angle	1.65
647020	Pellet	Right Angle	2.00
647510	Pellet	Straight	1.00
647512	Pellet	Straight	1.20
647515	Pellet	Straight	1.50
647517	Pellet	Straight	1.65
647520	Pellet	Straight	2.00

Catalog Number	Type	Shape	Fits Glass
648010	Wire	Right Angle	1.00
648012	Wire	Right Angle	1.20
648015	Wire	Right Angle	1.50
648017	Wire	Right Angle	1.65
648020	Wire	Right Angle	2.00
648510	Wire	Straight	1.00
648512	Wire	Straight	1.20
648515	Wire	Straight	1.50
648517	Wire	Straight	1.65
648520	Wire	Straight	2.00

## Rod

### Platinum Stainless Steel

Annealed: 90-140 kPSI  
Spring: 245-275 kPSI  
Double Spring: 325-355 kPSI

### Tungsten

All of our pre-cut rod is cleaned and stress-relieved to prevent tip curl, providing a convenient supply of pre-cut lengths for electrode fabrication. Don't see what you need? Contact us for a quotation for your custom rod needs!

Catalog Number	Tensile Strength	Diameter inches	Diameter $\mu$ m	AWG	Length inches	Qty/ Pkg
711000		0.01	250	30	3	4
712500	Spring	0.01	250	30	3	250
712600	Spring	0.01	250	30	4	250
712700	Double Spring	0.01	250	30	3	100
712800	Double Spring	0.01	250	30	4	100
713000	Annealed	0.02	510	24	3	250
715000		0.002	51	44	3	100
715500		0.002	51	44	4	100
715550		0.002	51	44	6	100
719000		0.004	100	38	3	100
719200		0.004	100	38	4	100
719500		0.004	100	38	6	100
716000		0.005	130	36	3	100
716100		0.005	130	36	4	100
716200		0.005	130	36	6	100
716500		0.008	200	32	3	100
716600		0.008	200	32	4	100
716700		0.008	200	32	6	100
718500	Teflon®	0.008	200	32	4	35
717000		0.01	250	30	3	100
717100		0.01	250	30	4	100
717200		0.01	250	30	6	100
717500		0.02	510	24	3	100
717700		0.02	510	24	4	100
718000		0.02	510	24	6	100

# Wire

Gold, Silver and Platinum wires are 99.99% pure. Platinum-Iridium wire features a 90% Platinum, 10% Iridium composition. Stainless Steel wire has a Type 316 composition. Tungsten wire is electrochemically cleaned and annealed.

Our Teflon® insulation is non-toxic, corrosion-resistant, flexible, has a high dielectric constant, and has a low coefficient of friction.



## Teflon® Coated Wire

	Catalog Number	Tensile Strength	Bare Diameter inches	μm	AWG	Coated Diameter inches	μm	Length feet
<b>Gold</b>	751000		0.003	76	40	0.0055	140	10
<b>Platinum</b>	771000		0.002	51	44	0.0040	102	10
	772000		0.003	76	40	0.0055	140	10
	773000		0.005	130	36	0.0080	203	10
	775010		0.001	25	50	0.0015	38	10
<b>Platinum-Iridium</b>	776000		0.002	51	44	0.0045	114	10
	777000		0.003	76	40	0.0055	140	10
	778000		0.005	130	36	0.0080	203	10
	785500		0.003	76	40	0.0055	140	25
<b>Silver</b>	786000		0.005	125	36	0.007	178	25
	786500		0.008	200	32	0.011	280	25
	787000		0.010	250	30	0.013	330	25
	787500		0.015	380	26	0.019	480	25
	788000		0.025	640	22	0.030	760	25
	790500	Annealed						
<b>Stainless Steel</b>	790600	Half-Hard	0.002	51	44	0.0045	112	100
	790700	Full-Hard						
	790900	Annealed						
	791000	Half-Hard	0.003	76	40	0.0055	140	100
	791100	Full-Hard						
	791400	Annealed						
	791500	Half-Hard	0.005	125	36	0.008	200	100
	791600	Full-Hard						
	791900	Annealed						
	792000	Half-Hard	0.008	200	32	0.011	280	100
	792100	Full-Hard						
	792400	Annealed						
	792500	Half-Hard	0.010	250	30	0.013	330	100
	792300	Full-Hard						
	793200	7 Strand	0.001	25	50	0.0055	140	25
	793400	3 Strand	0.002	51	44	0.006	152	25
	793500	7 Strand	0.002	51	44	0.009	230	25
	795500		0.002	51	44	0.004	102	25
<b>Tungsten</b>	796000		0.003	76	40	0.0045	112	25
	796500		0.005	125	36	0.008	200	25
	797000		0.008	200	32	0.011	280	25

Annealed, Full, and Half Hard describe the tensile strength of the wire (given in thousands of pounds per square inch, kPSI). High kPSI wire is more brittle but it retains its shape well. Low kPSI wire is softer and more flexible, and it is less likely to break if you repetitively bend the wire.

Annealed: 90-140 kPSI  
Half-Hard: 155-185 kPSI  
Full-Hard: 215-245 kPSI

## Bare Wire

### Platinum

Catalog Number	Tensile Strength	Diameter			Quantity Feet
		Inches	μm	AWG	

764500		0.001	25	50	10
765000		0.002	51	44	10
766000		0.003	76	40	10
767000		0.005	125	36	10

### Platinum-Iridium

767400		0.001	25	50	10
767500		0.002	51	44	10
767600		0.003	76	40	10
767700		0.005	125	36	10

### Silver

781000		0.003	76	40	25
781500		0.005	125	36	25
782000		0.008	200	32	25
782500		0.010	250	30	25
783000		0.015	380	26	25
783500		0.025	640	22	25

### Stainless Steel

Annealed: 90-140 kPSI  
 Half-Hard: 155-185 kPSI  
 Full-Hard: 215-245 kPSI

793600	Annealed				
792600	Half-Hard	0.002	51	44	100
794600	Full-Hard				
793700	Annealed				
792700	Half-Hard	0.003	76	40	100
794700	Full-Hard				
792800	Annealed				
793800	Half-Hard	0.005	125	36	100
794800	Full-Hard				
792900	Annealed				
793900	Half-Hard	0.008	200	32	100
794900	Full-Hard				
793000	Annealed				
794000	Half-Hard	0.010	250	30	100
795000	Full-Hard				
794100	Annealed				
793100	Half-Hard	0.020	500	24	100
795100	Full-Hard				

### Tungsten

797500		0.002	51	44	25
797550		0.003	76	40	25
797600		0.005	125	36	25
797650		0.008	200	32	25

## Formvar Coated Nichrome Wire

Catalog Number	Bare Diameter inches	μm	Coated Diameter			Quantity feet
			inches	μm	AWG	

761000	0.0007	18	0.0010	25	50	500
761500	0.0010	25	0.0015	38	46	500
762000	0.0020	51	0.0026	66	41	500

### *Need longer lengths? Need special sizes?*

We can custom spool just about any of our offered wires in longer lengths, for a nominal surcharge. If you need a custom size, let us know, and we'll work hard to get it for you. Custom size orders often require minimum purchases.



# Epoxy-Insulated Electrodes

- Gold-plated 0.032" pin connector  
(Mates with #520100, page 21)
- 3 inches long
- Packaged 12/box



	Catalog Number	Diameter		Impedance (MΩ)
		Inches	μm	
Stainless Steel 8° tapered tip	571000	0.01	250	5
	571500	0.01	250	12
	572000	0.02	500	5
	572500	0.02	500	12
Stainless Steel 12° tapered tip	572600	0.01	250	5
	572700	0.01	250	12
	572800	0.02	500	5
	572900	0.02	500	12
Tungsten 8° tapered tip	575300	0.005	125	5
	575400	0.005	125	12
	575500	0.01	250	5
	576000	0.01	250	12
	576500	0.02	500	5
	577000	0.02	500	12
Tungsten 12° tapered tip	577100	0.005	125	5
	577200	0.005	125	12
	577300	0.01	250	5
	577400	0.01	250	12
	577500	0.02	500	5
	577600	0.02	500	12

# Parylene-C® Insulated Tungsten Electrodes

- Gold-plated 0.032" pin connector  
(Mates with #520100, page 21)
- Small tip exposure
- Bio-compatible insulation
- Perfect for chronic recording
- Excellent durability
- Length: 3 inches (76 mm)
- Packaged 6/box

Catalog Number	Diameter		Impedance (MΩ)
	Inches	μm	
573210	0.005	125	0.5
573220	0.005	125	1
573200	0.005	125	2
573400	0.005	125	5
573510	0.01	250	0.5
573520	0.01	250	1
573500	0.01	250	2
574000	0.01	250	5
574510	0.02	500	0.5
574520	0.02	500	1
574500	0.02	500	2
575000	0.02	500	5

# Stimulating Electrodes

- Gold-plated 0.032" pin connector  
(Mates with #520100, page 21)
- Great for long duration stimulation
- Polyimide insulation
- 3" long, Packaged 8/box



Catalog Number	Substrate	Diameter		Tip Exposure
		inches	μm	
563410	Tungsten	0.010	250	1 mm
563420	Tungsten	0.010	250	2 mm
564410	Stainless Steel	0.010	250	1 mm
564420	Stainless Steel	0.010	250	2 mm

# Suction Electrode and Threaded Syringe

- Record from tissue while it is submerged in saline
- Convenient BNC connector for interfacing with any amplifier
- Make recordings during local drug applications
- Apply negative pressure via Luer-type connection to draw the tissue to the capillary tube
- Threaded Syringe provides a controlled pressure source and is ideal for use with the Suction Electrode

Catalog Number	Description
573000	Suction Electrode
728000	Threaded Syringe



Suction Electrode



Threaded Syringe

## Miniature Electrode Holder

- Connects easily to many different instruments via BNC connector
- Fits electrodes with standard 0.032" pin connectors
- Length: 4 inches
- Diameter: 0.25 inches
- Cable Length: 3 feet

Catalog #651000



## Ag/AgCl Wire Electrodes

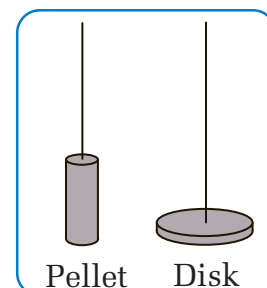
High purity silver wires are used to fabricate these electrodes. Chloridized Ag/AgCl Electrodes are made by an electrochloridizing process, and are optimized for intracellular DC recordings. Sintering Ag/AgCl causes the AgCl to adhere better to the wire than chloridizing, making these electrodes ideal for use in longer term AC recordings.

Catalog Number	Type	Diameter	
		Inches	$\mu\text{m}$
530800	Chloridized	0.008	200
531500	Chloridized	0.015	380
540800	Sintered	0.008	200
541500	Sintered	0.015	380

## Ag/AgCl Pellet and Disk Electrodes

Disk and pellet electrodes have a pure silver wire embedded in an Ag/AgCl matrix. They are reusable, resurfacable, and never need chloriding. Essentially non-polarizable, they are commonly used as reference electrodes. Silver Wire leads are 70mm long.

Catalog Number	Type	Diameter (mm)	Length (mm)
550008	Pellet	0.8	3.0
550010	Pellet	1.0	2.5
550015	Pellet	2.0	4.0
550020	Disk	4.0	1.0
550025	Disk	8.0	1.0



# Polyethylene Tubing

- Translucent
- Non-reactive to tissue
- No Additives
- No Plasticizers
- Holds form to 104°C
- Inelastic at -60°C
- 20 Feet per package

Catalog Number	PE Size	Outside Diameter		Inside Diameter	
		inches	mm	inches	mm
800000	10 - 280	10 feet of each size listed below			
800700	10	0.024	0.610	0.011	0.279
801000	20	0.043	1.092	0.015	0.381
801300	50	0.038	0.965	0.023	0.584
801600	60	0.048	1.219	0.030	0.762
801900	--	0.050	1.270	0.034	0.864
802200	90	0.060	1.524	0.034	0.864
802500	160	0.062	1.575	0.045	1.143
802800	190	0.067	1.702	0.047	1.194
803100	200	0.075	1.905	0.055	1.397
803400	205	0.082	2.083	0.062	1.575
803700	240	0.095	2.413	0.066	1.676
804000	--	0.110	2.794	0.070	1.778
804300	280	0.128	3.251	0.085	2.159
804600	--	0.138	3.505	0.106	2.692

# Silicone Tubing

- Flexible
- Non-reactive to tissue
- No Additives
- No Plasticizers
- Non wetting surface insures smooth flow
- 20 Feet per package

Catalog Number	Outside Diameter		Inside Diameter	
	inches	mm	inches	mm
800100	10 feet of each size listed below			
806100	0.025	0.635	0.012	0.305
806400	0.037	0.940	0.020	0.508
806700	0.047	1.194	0.025	0.635
807000	0.065	1.651	0.030	0.762
807300	0.085	2.159	0.040	1.016
807600	0.077	1.956	0.058	1.473
807900	0.095	2.413	0.062	1.575
808200	0.125	3.175	0.062	1.575
808500	0.125	3.175	0.078	1.981
808800	0.192	4.877	0.104	2.642
809100	0.183	4.648	0.132	3.353
809400	0.250	6.350	0.125	3.175

# Stainless Steel Tubing

- Four 12" pieces per package

Catalog Number	AWG	Outside Diameter		Inside Diameter	
		inches	μm	inches	μm
832000	30	0.0120	0.305	0.0055	0.140
832400	29	0.0130	0.330	0.0065	0.165
832800	28	0.0140	0.356	0.0065	0.165
833200	27	0.0160	0.404	0.0075	0.191
833600	26	0.0180	0.457	0.0095	0.241
842000	25	0.0200	0.508	0.0115	0.292
842400	24	0.0220	0.559	0.0135	0.343
842800	23	0.0250	0.635	0.0165	0.419
843200	22	0.0280	0.711	0.0190	0.483
843600	21	0.0320	0.813	0.0225	0.527
844000	19	0.0355	0.902	0.0255	0.648

# Polyimide Tubing

- Five 12" pieces per package

Catalog Number	Inside Diameter		Wall Thickness	
	inches	μm	inches	μm
822000	0.0100	250	0.00100	25
822200	0.0089	225	0.00075	19
822400	0.0080	200	0.00075	19
822600	0.0071	180	0.00075	19
822800	0.0063	160	0.00075	19
823000	0.0056	142	0.00075	19
823200	0.0050	127	0.00075	19
823400	0.0045	114	0.00050	13



# Dental Cement: Solvent and Powder

Teets Cold Curing Dental Cement is an excellent bonding material that can be used to affix stainless steel screws or cannula to exposed skull or bone, or as a general laboratory adhesive. Sets rapidly after mixing with the solvent.

*Note: Dental Cement Liquid is sold to the domestic US market and Canada only, and ships by ground service only. Not licensed for use with Human subjects.*

**Sets  
Fast!**




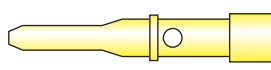


Catalog Number	Description	Qty
525000	Dental Cement, Powder	1 lb.
526000	Dental Cement, Solvent	16 oz.

## Gold Pin Connectors

- Gold plated
- 521000 fits Model 1600 & Model 3100 Amplifier Headstages
- 521200 fits Model 1800 & Model 3000 Amplifier Headstages

Catalog Number	Description	Qty
520100	Female connector pin (Fits #520200)	100
520200	Male connector pin	100
521000	Male connector pin (Model 1600, 3100)	20
521100	Female connector pin (Fits #521000)	10
521200	Male connector pin (Model 1800, 3000)	20
521300	Female connector pin (Fits #521200)	20

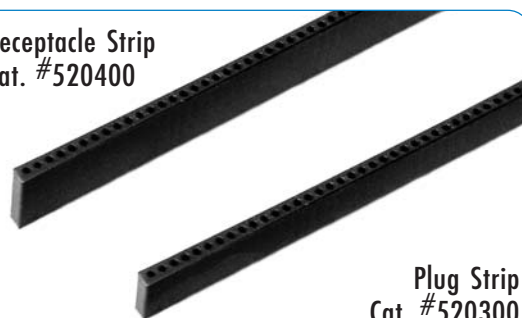
 <p>Cat. No.: 520100 Opening Length: 0.277" Overall Connector Length 0.404" Opening Diameter: 0.051"</p>	 <p>Cat. No.: 520200 Pin Length: 0.212" Overall Connector Length 0.389" Pin Diameter: 0.032"</p>
 <p>Cat. No.: 521000 Pin Length: 0.375" Overall Connector Length 0.676" Pin Diameter: 0.080"</p>	 <p>Cat. No.: 521200 Pin Length: 0.282" Overall Connector Length 0.591" Pin Diameter: 0.062"</p>

## Gold Pin Connector Strips

These connector strips are designed to hold our smallest gold miniature pins (Catalog #520100 and #520200) snugly. Perfect for manufacturing chronic electrodes for use in behaving animals. Pin spacing is 0.075". Pin endings are exposed in the plug strip, and covered in the receptacle strip.

Catalog Number	Description	Qty
520300	4" Plug Strip for Miniature Pins	10
520400	4" Receptacle Strip for Miniature Pins	10

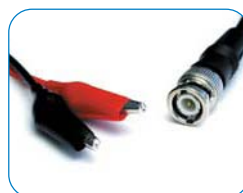
Receptacle Strip  
Cat. #520400



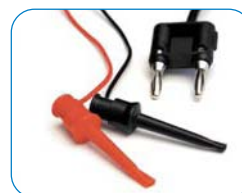
Plug Strip  
Cat. #520300

## Test Leads

Catalog Number	Description	Qty	Price
726042	BNC to Mini-Alligator Clips, 1M	1	4.00
726044	Double Banana Plug to Micro-Clips, 1M	1	4.00
726046	BNC to Micro-Clips, 1M	1	4.00



#726042



#726044



#726046

# Cables, Patch Cords, Adapters, and Connectors



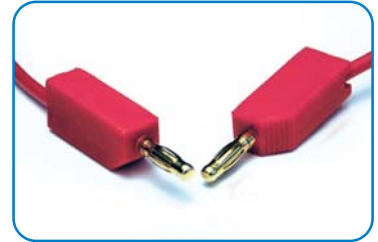
BNC - BNC



Double Banana



BNC - Double Banana



Banana

Length (m)	BNC to BNC Catalog #	Double Banana Catalog #	BNC to Double Banana Catalog #
0.5	726092	726048	726060
1.0	726094	726050	726062
1.5	726096	726052	726064
2.0	726098	726054	726066
3.0	726100	726056	726068
5.0	726102	726058	726070

Length (m)	Banana Plug to Banana Plug			
	Black Catalog #	Red Catalog #	Blue Catalog #	Green Catalog #
0.5	726079	726080	726110	726111
1.0	726081	726082	726112	726113
1.5	726083	726084	726114	726115
2.0	726085	726086	726116	726117
3.0	726087	726088	726118	726119
5.0	726089	726090	726120	726121



#726032



#726034



#726036



#726038



BLACK: #726040  
RED: #726041



#726026



#726028



#726030

Catalog Number	Description	Qty/ Pkg
726032	BNC-Male to Double Binding Posts Adapter	3
726034	BNC-Female to Double Binding Posts Adapter	3
726036	BNC-Male to Double Banana Plug Adapter	3
726038	BNC-Female to Double Banana Plug Adapter	3
726040	BNC-Male to Single Binding Post Adapter, Black	3
726041	BNC-Male to Single Binding Post Adapter, Red	3
726108	Banana Female to Banana Female Connector <i>(not pictured)</i>	3
726026	BNC-Male to 2 BNC-Female "T" Connectors	3
726031	BNC-Female to 2 BNC-Female "T" Connectors <i>(not pictured)</i>	3
726028	BNC-Male to BNC-Male Connector	3
726030	BNC-Female to BNC-Female Connector	3

## Soldering Station

- Color digital display
- Temperature range  
160°C – 480°C  
(320°F – 900°F)



Catalog Number	Description	Qty
----------------	-------------	-----

726000	Soldering Station	99.00
726005	10 Extra Tips	21.00
726200	Helping Hands Clamp	9.00

## Helping Hands Clamp



This handy little bench-top vise comes equipped with a magnifying lens and two alligator clips. Buy a Soldering Station, get a vise for only \$1.

## Alligator Clips



Catalog Number	Description
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726072	Alligator Clip with Screw
726074	Alligator Clip without Screw

## Digital Multimeter

- Auto ranging
- DC/AC voltage and current measurement
- Auto power off
- Large display with 3 3/4 digits
- Overload Protection
- Resistance measurement
- Audible continuity test
- Low battery indicator



Catalog Number	Description
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726024	Auto Ranging Digital Multimeter
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## Powered Breadboard Workstation

The AT-700 Powered Breadboard Workstation features a centrally located solderless breadboard with 2290 tie points surrounded by a variety of the most commonly required support elements used in the development and testing of a circuit.

- DC power supplies : +5V/1A , -5V/1A, Variable  $\pm 1.25V$  to  $\pm 18V$  /0.3A
- 2 single shot 80 $\mu$ S pulse generators
- 8-bit LED indicators with buffer
- 3 1/2 digit digital voltmeter
- Function generator: Sine Wave, Square, Triangle: 1Hz to 100kHz
- Eight data switches, 2 logical flip-flop gates, & 2 logical switches
- Loudspeaker
- 3 input/output BNC/Banana connectors

Catalog Number	Description
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726078	Powered Breadboard Workstation
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### Cover Photo

Home to forests, mountains, and lakes of the Olympic National Park in western Washington State, the Olympic Peninsula is also the location of A-M Systems. This photograph was taken by Ross Hamilton, a resident of Sequim, Washington, who has dedicated over 25 years to capturing on film the beauty of the Olympic Peninsula region of Washington State.

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