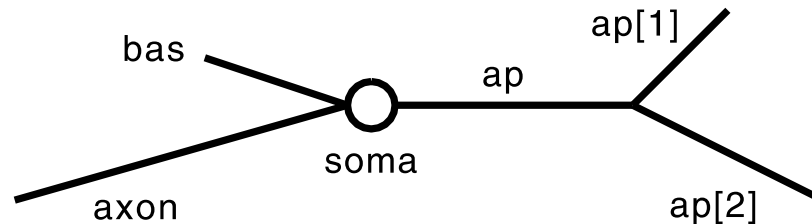


## Step 2: creating and using an interface for running simulations



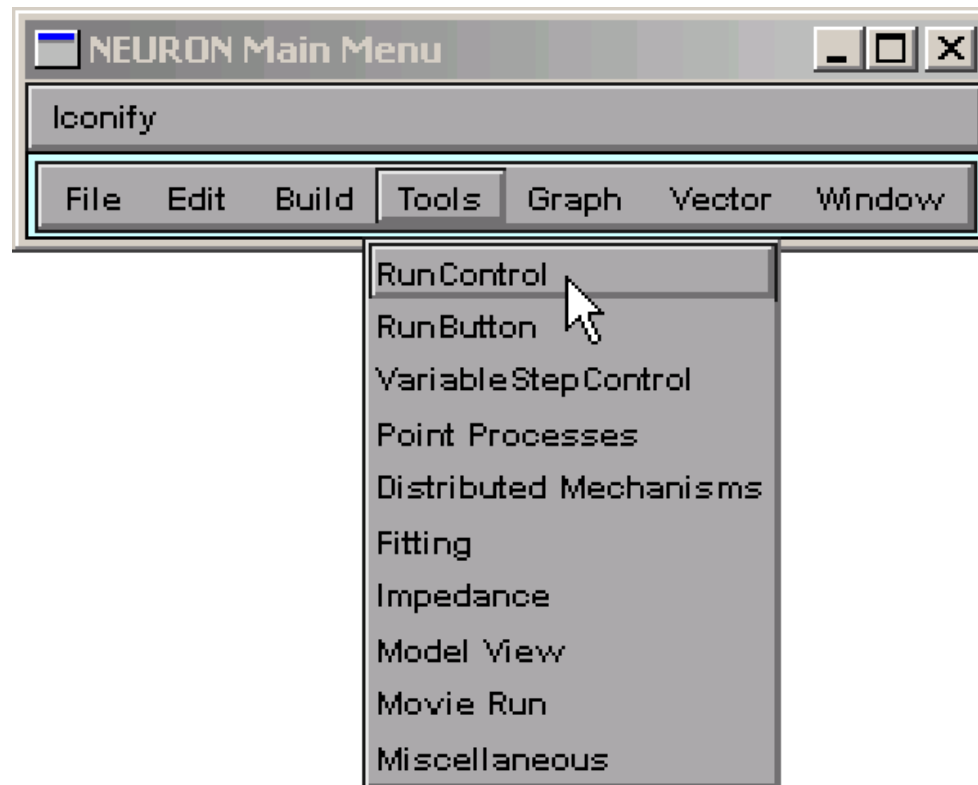
We want to

- attach a stimulating electrode
- evoke an action potential
- show time course of  $V_m$  at soma
- show  $V_m$  along a path from one end of the cell to the other

We need

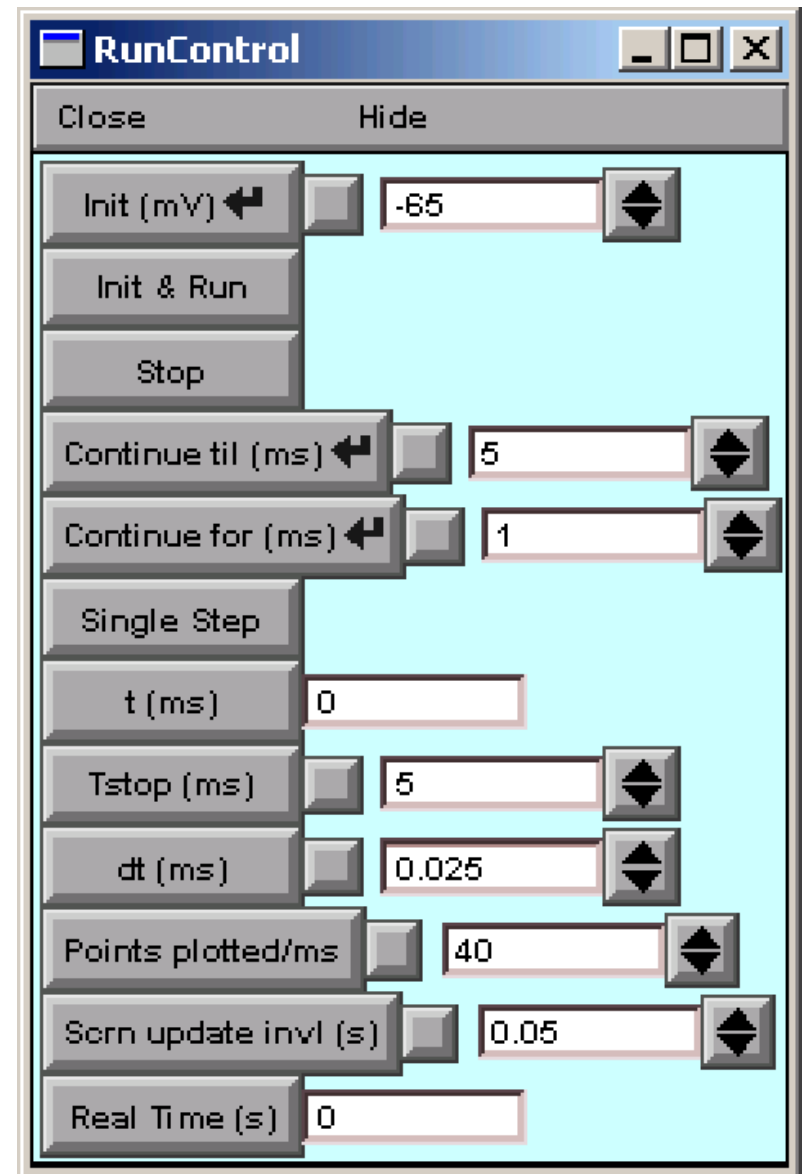
- a "Run" button
- graphs to plot results
- a stimulator

# Get a "Run" button



NEURON Main Menu / Tools / RunControl

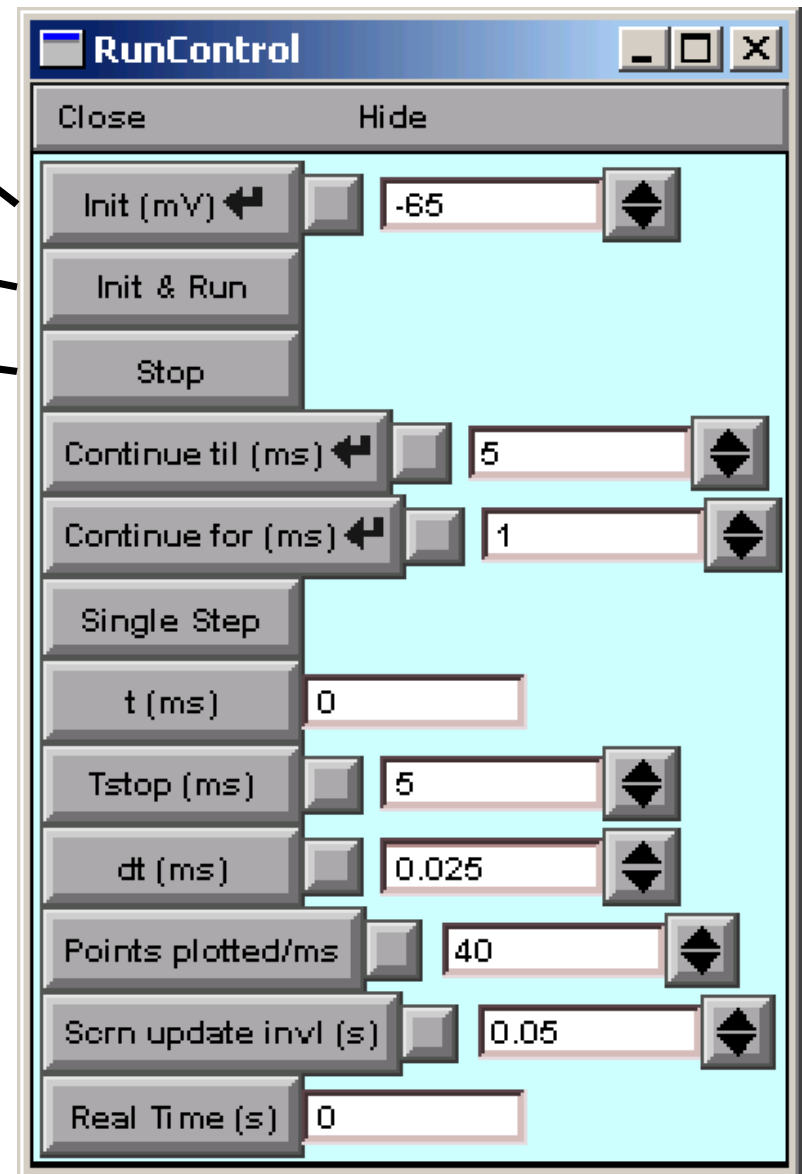
# RunControl panel



**Init** sets time to 0,  
Vm to displayed value, and  
conductances to steady-state

**Init & Run** does an Init,  
then starts a simulation

**Stop** interrupts the simulation



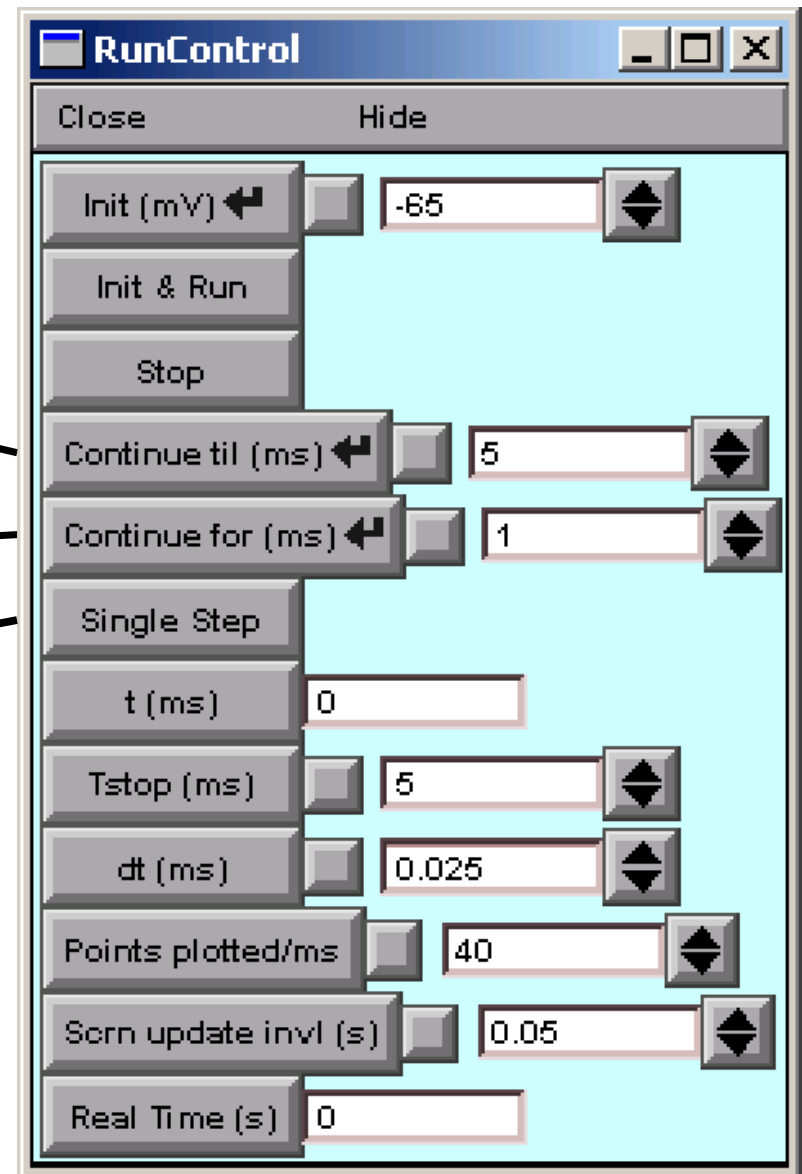
The RunControl window is a graphical user interface for controlling a simulation. It features a title bar with 'RunControl' and standard window controls. Below the title bar are 'Close' and 'Hide' buttons. The main area contains several controls:

- Init (mV)**: A button with a left arrow and a text field showing '-65' with a vertical slider.
- Init & Run**: A button.
- Stop**: A button.
- Continue til (ms)**: A button with a left arrow and a text field showing '5' with a vertical slider.
- Continue for (ms)**: A button with a left arrow and a text field showing '1' with a vertical slider.
- Single Step**: A button.
- t (ms)**: A text field showing '0'.
- Tstop (ms)**: A button and a text field showing '5' with a vertical slider.
- dt (ms)**: A button and a text field showing '0.025' with a vertical slider.
- Points plotted/ms**: A button and a text field showing '40' with a vertical slider.
- Scrn update invl (s)**: A button and a text field showing '0.05' with a vertical slider.
- Real Time (s)**: A button and a text field showing '0'.

**Continue til** runs until displayed time

**Continue for** runs for displayed interval

**Single step** advances by  $1/(\text{Points plotted/ms})$

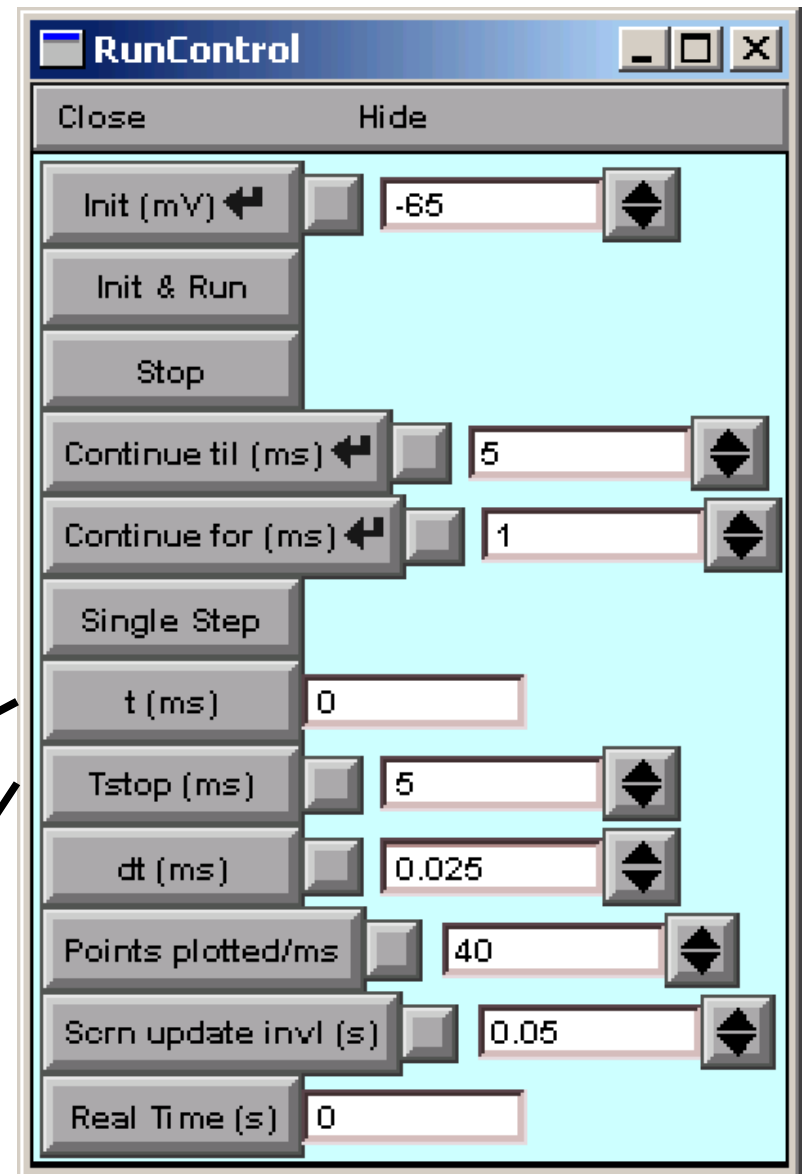


The RunControl dialog box contains the following controls:

- Close** and **Hide** buttons at the top.
- Init (mV)** button and a text field with the value **-65**.
- Init & Run** button.
- Stop** button.
- Continue til (ms)** button and a text field with the value **5**.
- Continue for (ms)** button and a text field with the value **1**.
- Single Step** button.
- t (ms)** button and a text field with the value **0**.
- Tstop (ms)** button and a text field with the value **5**.
- dt (ms)** button and a text field with the value **0.025**.
- Points plotted/ms** button and a text field with the value **40**.
- Scrn update invl (s)** button and a text field with the value **0.05**.
- Real Time (s)** button and a text field with the value **0**.

**t** numeric field shows model time

**Tstop** specifies when simulation ends



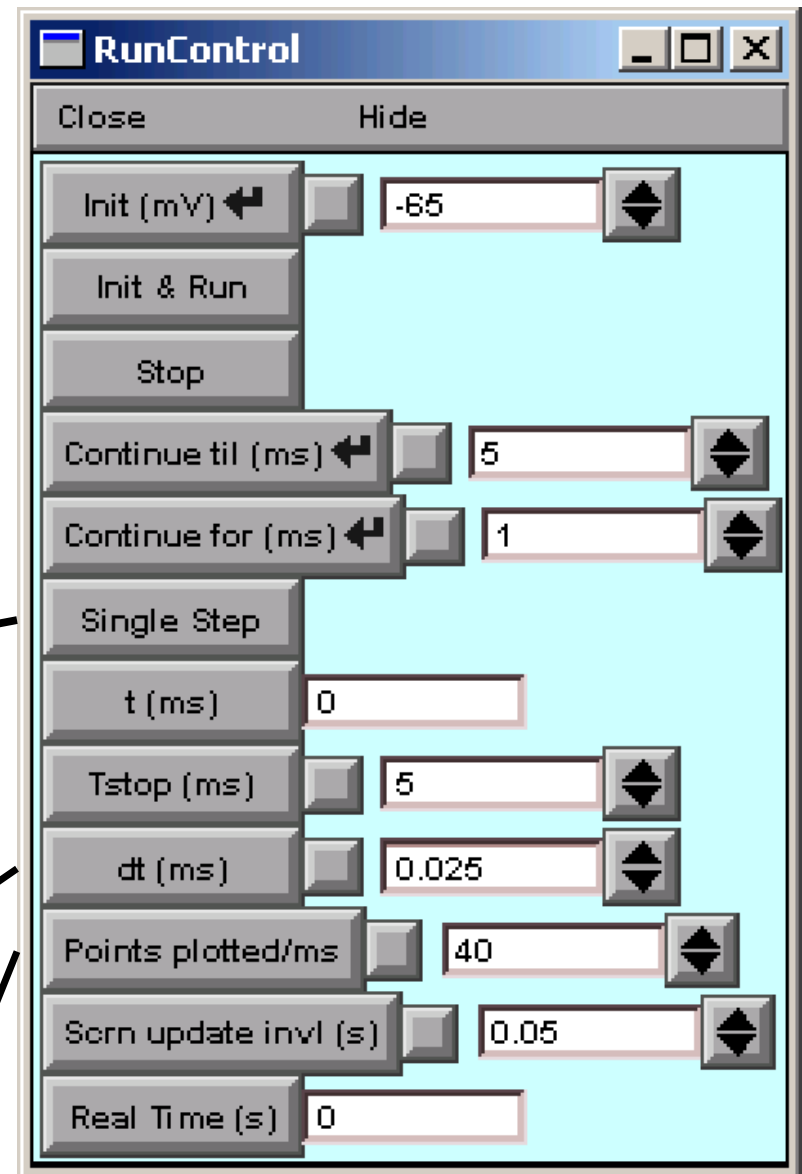
The RunControl dialog box is a window with a title bar containing a close button and the text 'RunControl'. Below the title bar is a menu bar with 'Close' and 'Hide' options. The main area of the dialog is light blue and contains several controls:

- Init (mV)**: A button with a left arrow and a numeric field showing '-65' with a double-headed arrow.
- Init & Run**: A button.
- Stop**: A button.
- Continue til (ms)**: A button with a left arrow and a numeric field showing '5' with a double-headed arrow.
- Continue for (ms)**: A button with a left arrow and a numeric field showing '1' with a double-headed arrow.
- Single Step**: A button.
- t (ms)**: A button and a numeric field showing '0'.
- Tstop (ms)**: A button and a numeric field showing '5' with a double-headed arrow.
- dt (ms)**: A button and a numeric field showing '0.025' with a double-headed arrow.
- Points plotted/ms**: A button and a numeric field showing '40' with a double-headed arrow.
- Scrn update invl (s)**: A button and a numeric field showing '0.05' with a double-headed arrow.
- Real Time (s)**: A button and a numeric field showing '0'.

**Single step** advances by  
 $1/(\text{Points plotted/ms})$

**dt** is integration time step;  
must be integer fraction of  
 $1/(\text{Points plotted/ms})$

**Points plotted/ms** is plotting interval



The RunControl dialog box contains the following controls:

- Buttons: Close, Hide
- Init (mV): -65
- Init & Run
- Stop
- Continue til (ms): 5
- Continue for (ms): 1
- Single Step
- t (ms): 0
- Tstop (ms): 5
- dt (ms): 0.025
- Points plotted/ms: 40
- Scrn update invl (s): 0.05
- Real Time (s): 0

# RunControl panel

**Init** sets time to 0,  
Vm to displayed value, and  
conductances to steady-state

**Init & Run** does an Init,  
then starts a simulation

**Stop** interrupts the simulation

**Continue til** runs until displayed time

**Continue for** runs for displayed  
interval

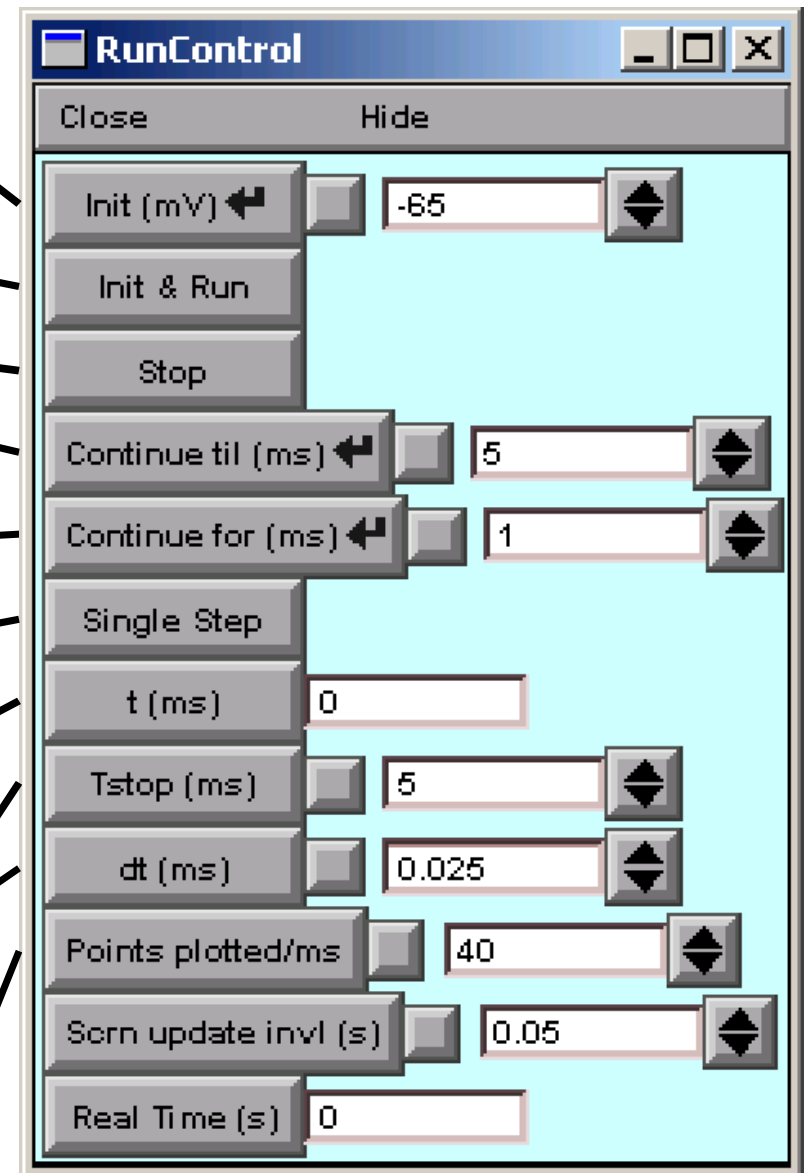
**Single step** advances by  
 $1/(\text{Points plotted/ms})$

**t** numeric field shows model time

**Tstop** specifies when simulation ends

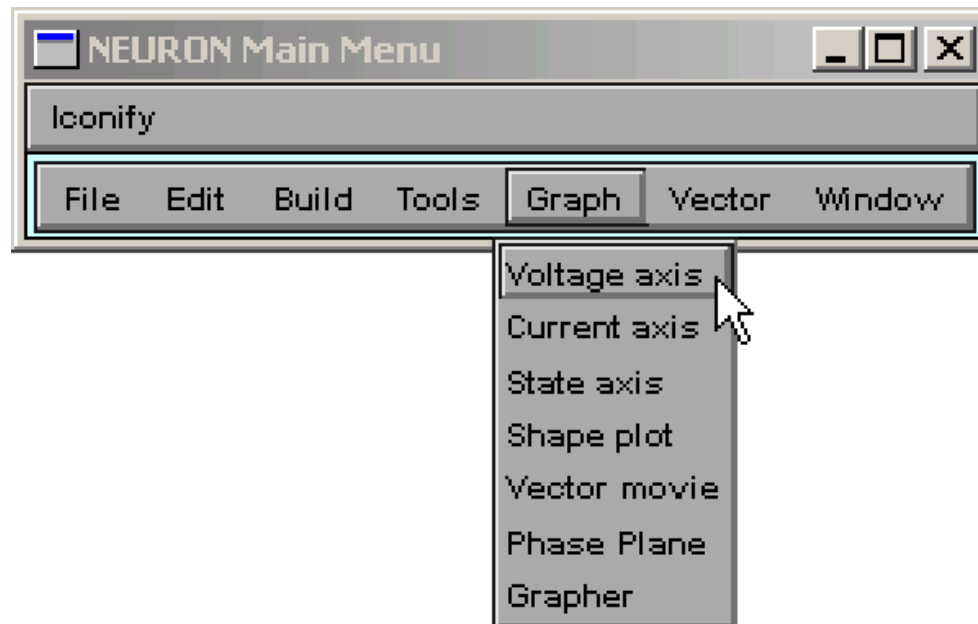
**dt** is integration time step;  
must be integer fraction of  
 $1/(\text{Points plotted/ms})$

**Points plotted/ms** is plotting interval



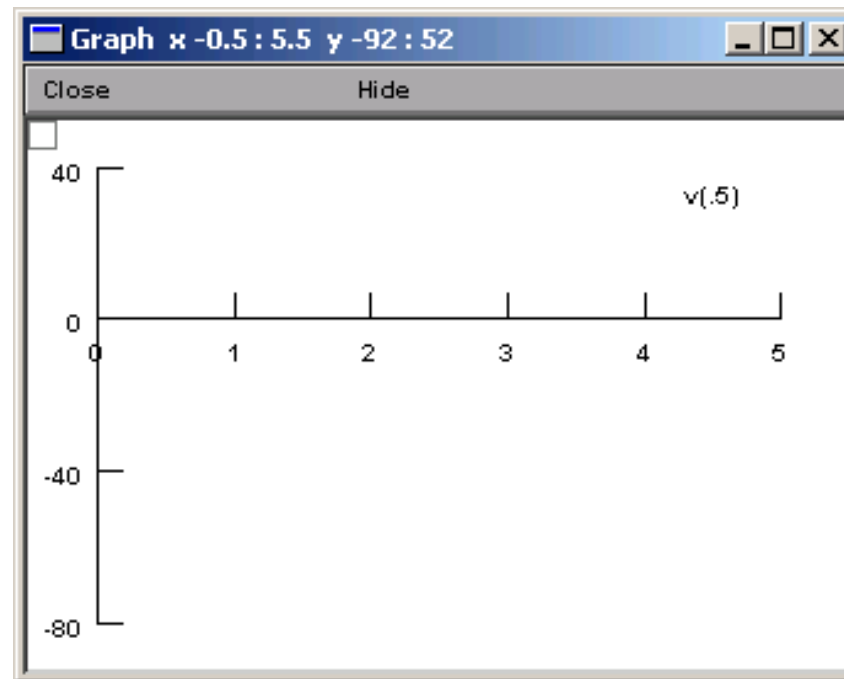


# We need to plot $V_m(t)$ at soma



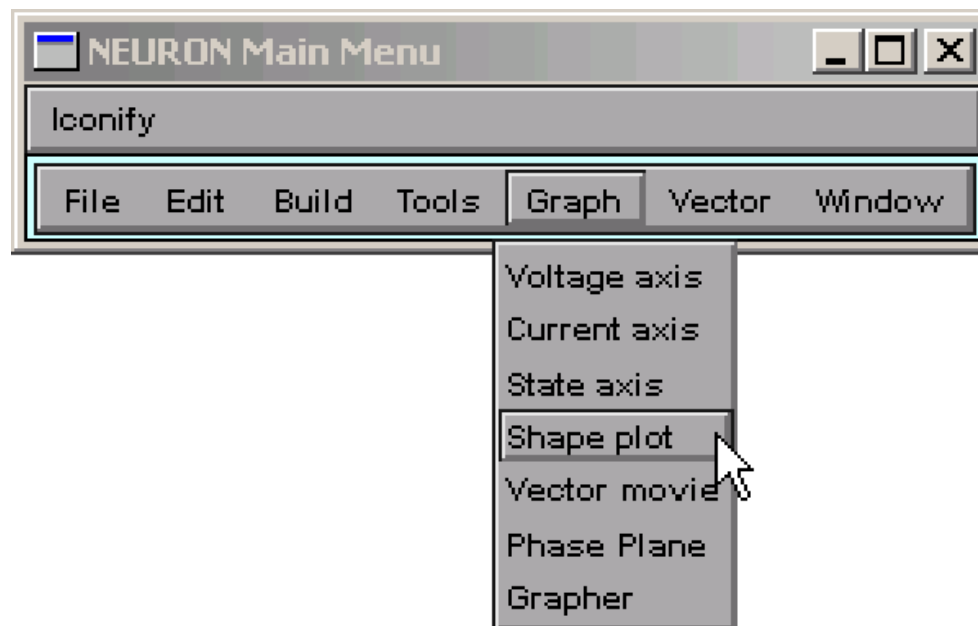
NEURON Main Menu / Graph / Voltage axis

# Graph window



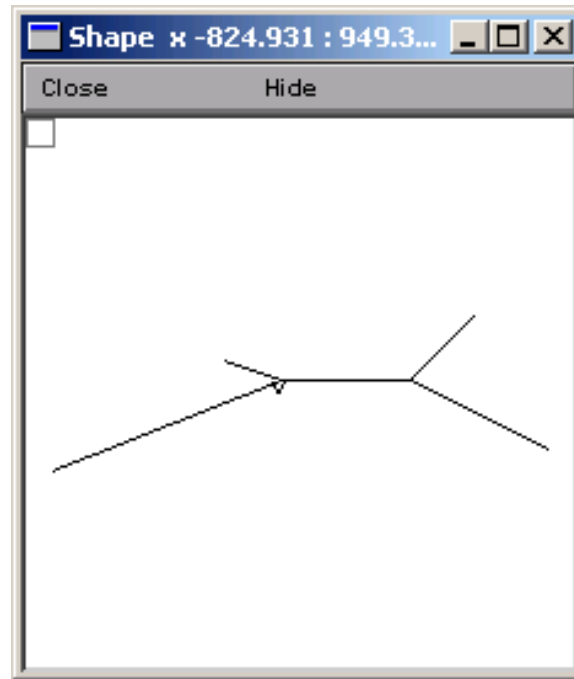
$v(.5)$  is  $V_m$  at middle of default section  
(soma in this example)

# We need to plot $V_m$ along a path



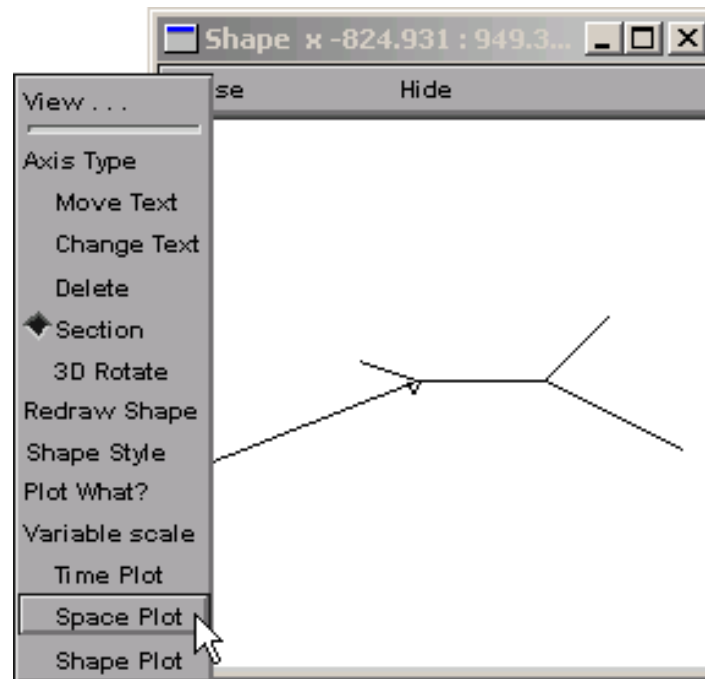
NEURON Main Menu / Graph / Shape plot

# Bringing up a space plot



Use this "shape plot" to create a "space plot".  
Click on its "menu box" . . .

# Bringing up a space plot *continued*



. . . and scroll down to "Space Plot".

# Bringing up a space plot *continued*

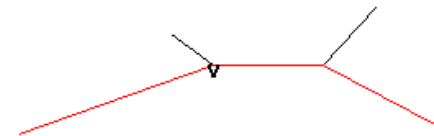
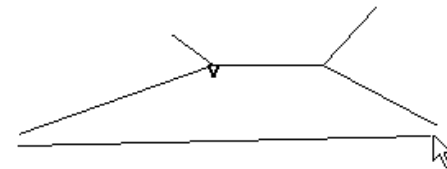
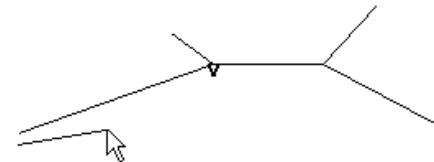
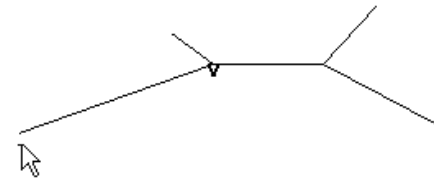
Click just left of the shape

Hold button down while dragging  
from left . . .

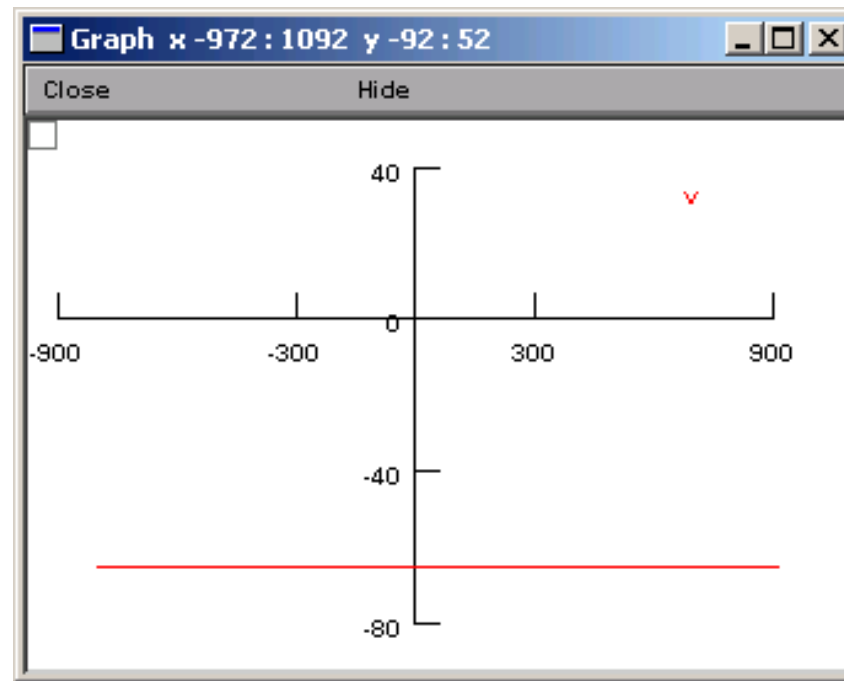
. . . to right . . .

. . . then release button.

This pops up a . . .



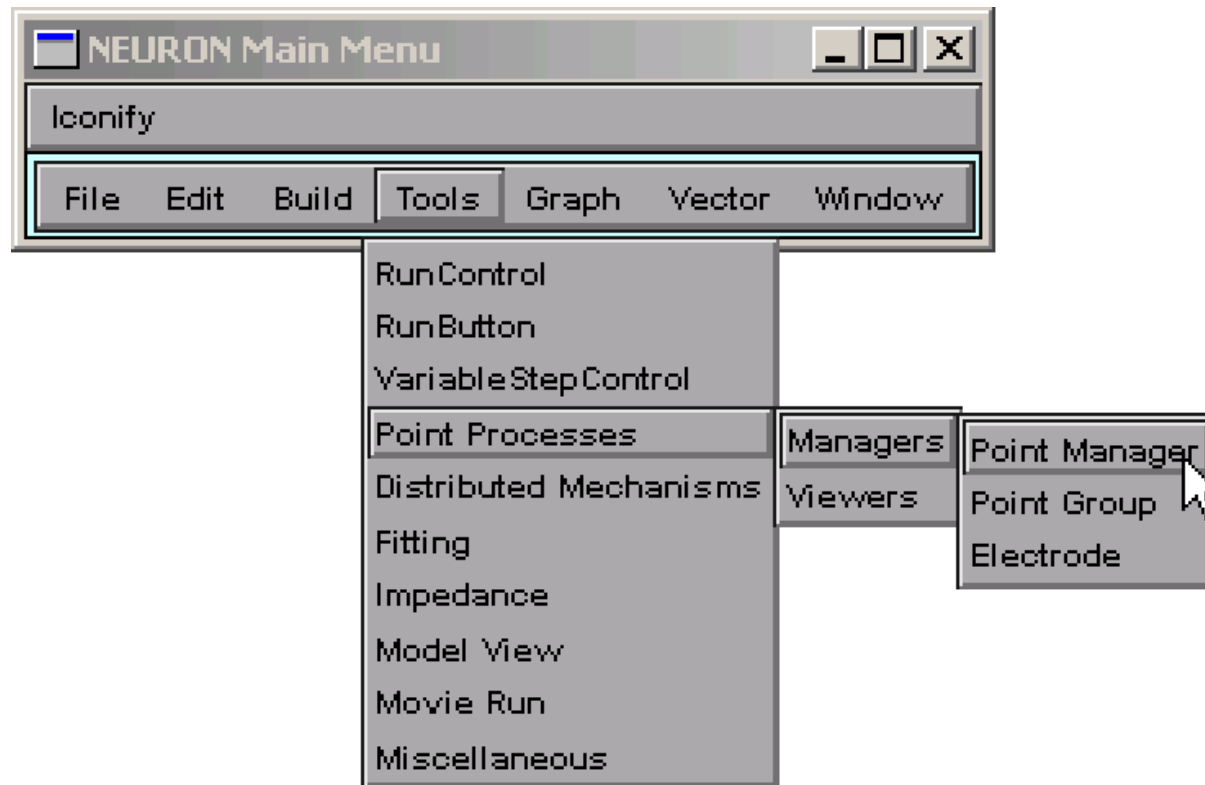
# Space plot



A plot of  $V_m$  vs. distance along a path.

*Better save a session file.*

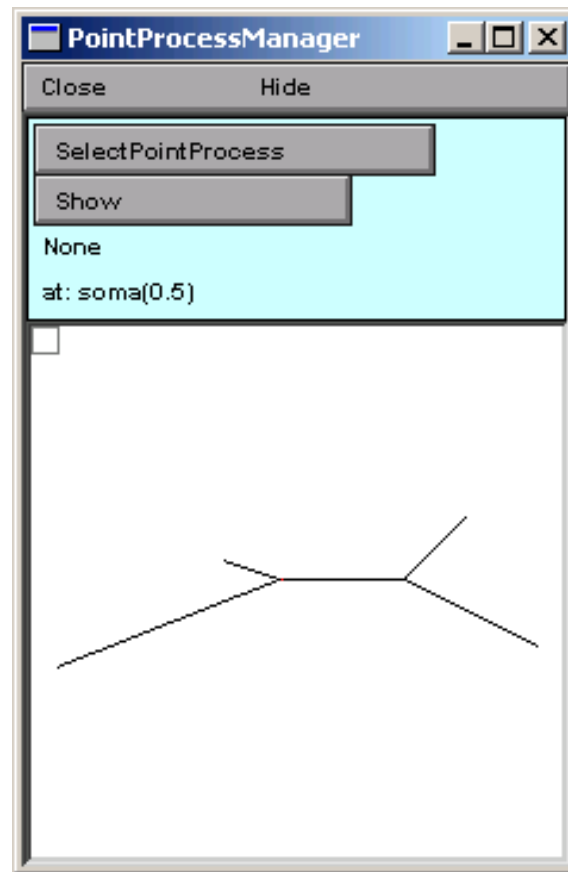
# We need a stimulator



NEURON Main Menu / Tools / Point Processes  
/ Managers / Point Manager

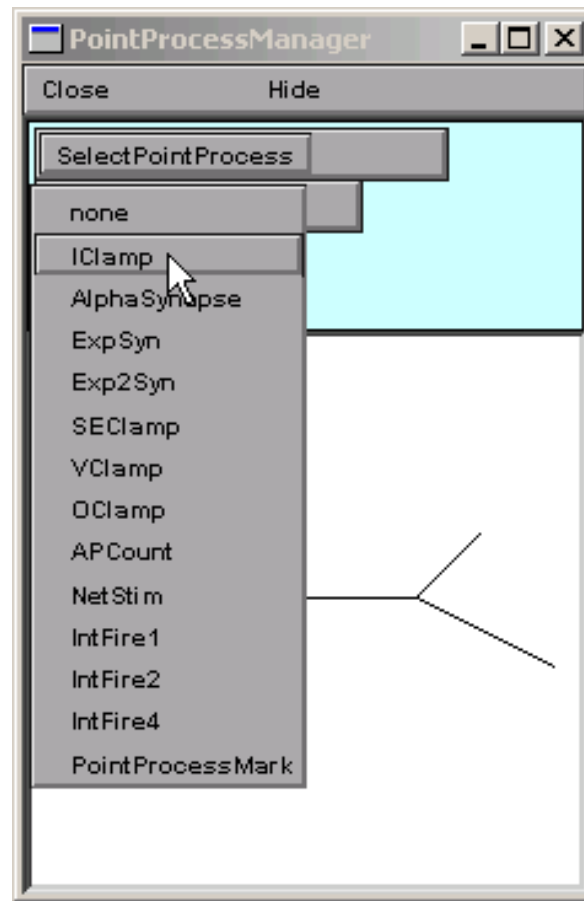


# PointProcessManager window



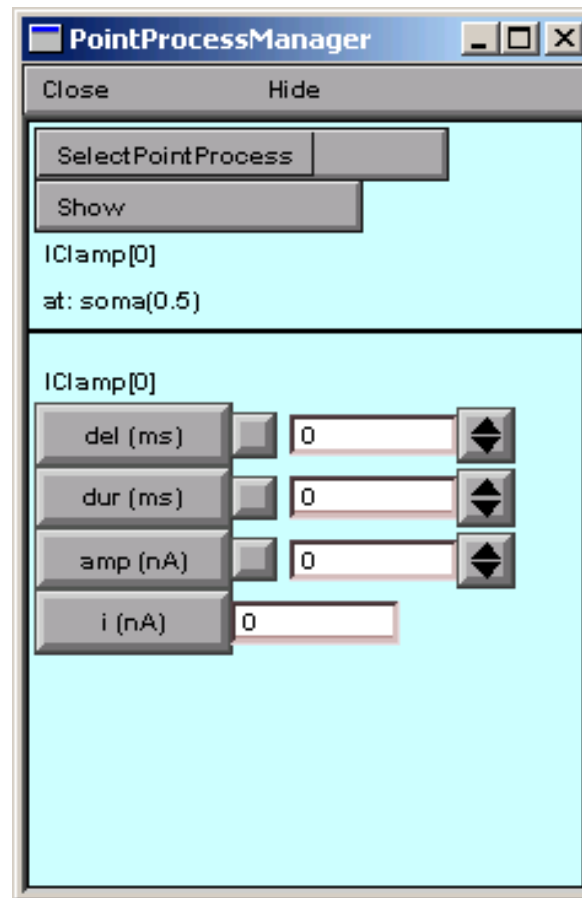
To make this an IClamp . . .

# Creating an IClamp



. . . click on SelectPointProcess  
and scroll down to IClamp.

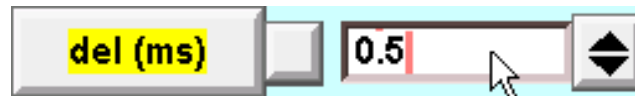
# I Clamp parameter panel



Next: set parameter values.

# Entering values into numeric fields

## Direct entry



Note yellow highlight on button

## Spinner



Red check means value has been changed from default

## Mathematical expression

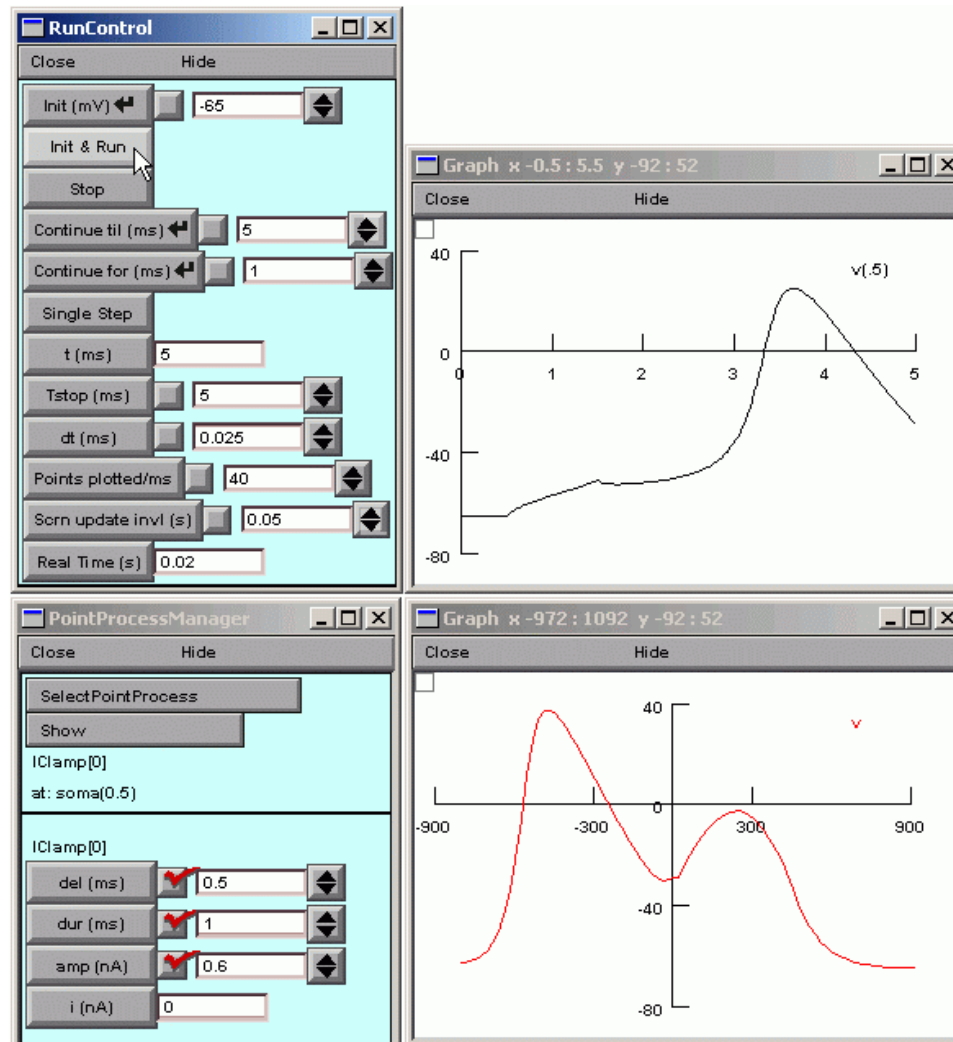


# Our user interface

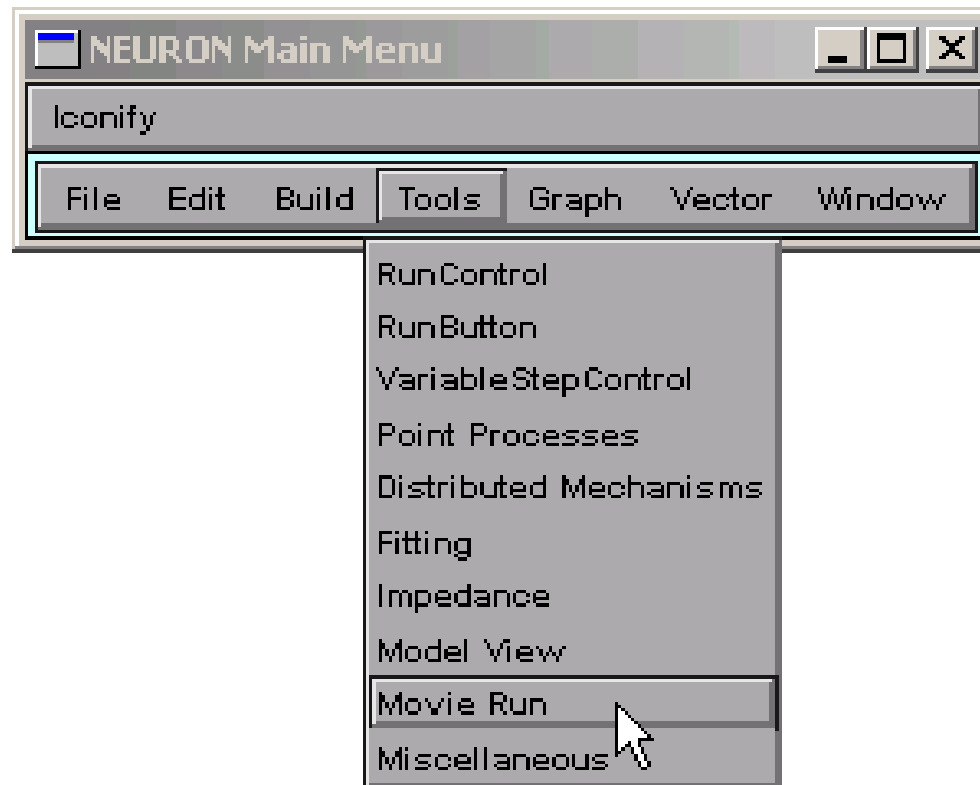


*Time to save to a new session file!*

# It works!



# How to get nice space plot "movies"



NEURON Main Menu / Tools / Movie Run

# Space plot "movies" *continued*



Movie Run / Init & Run



