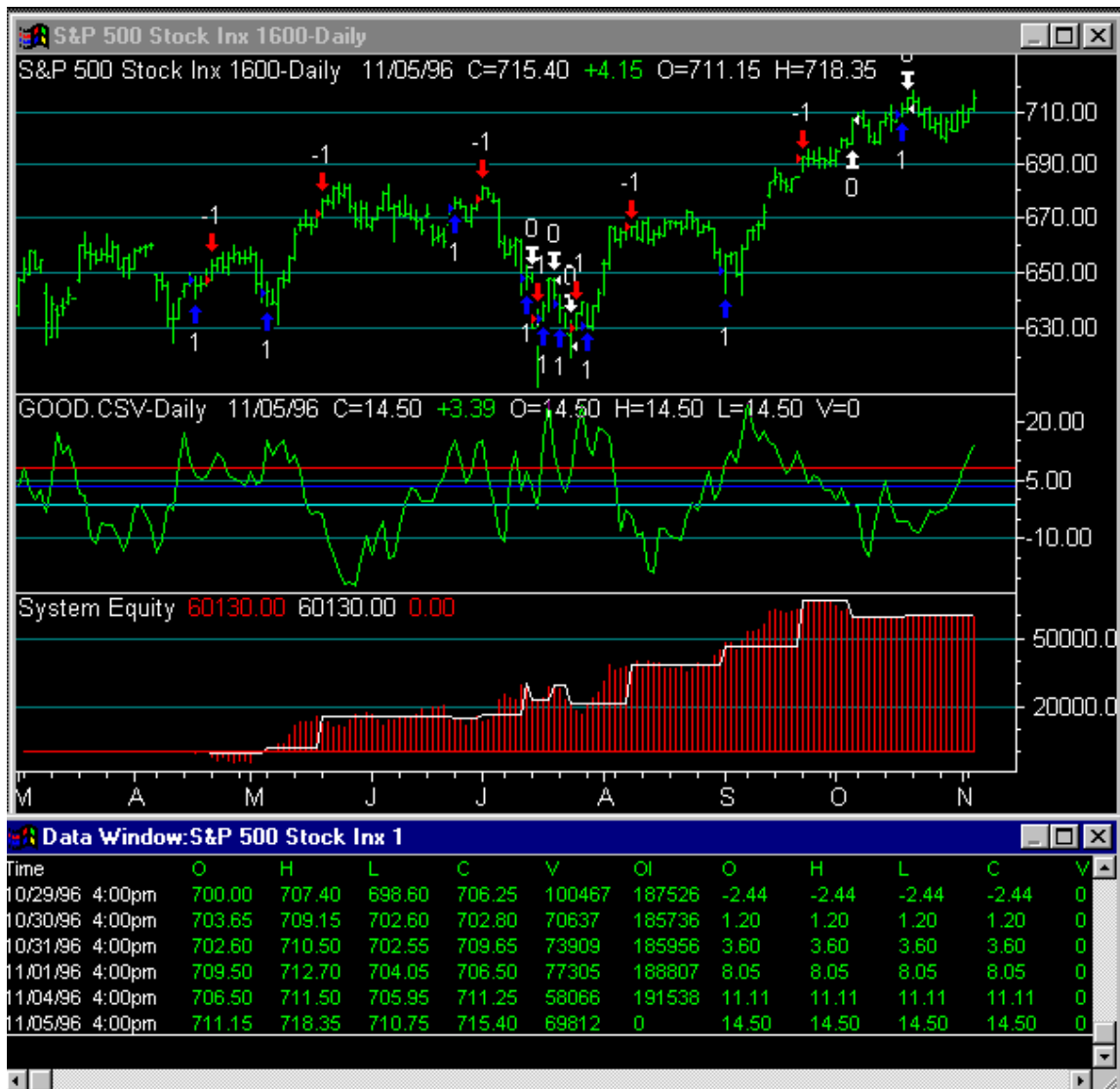


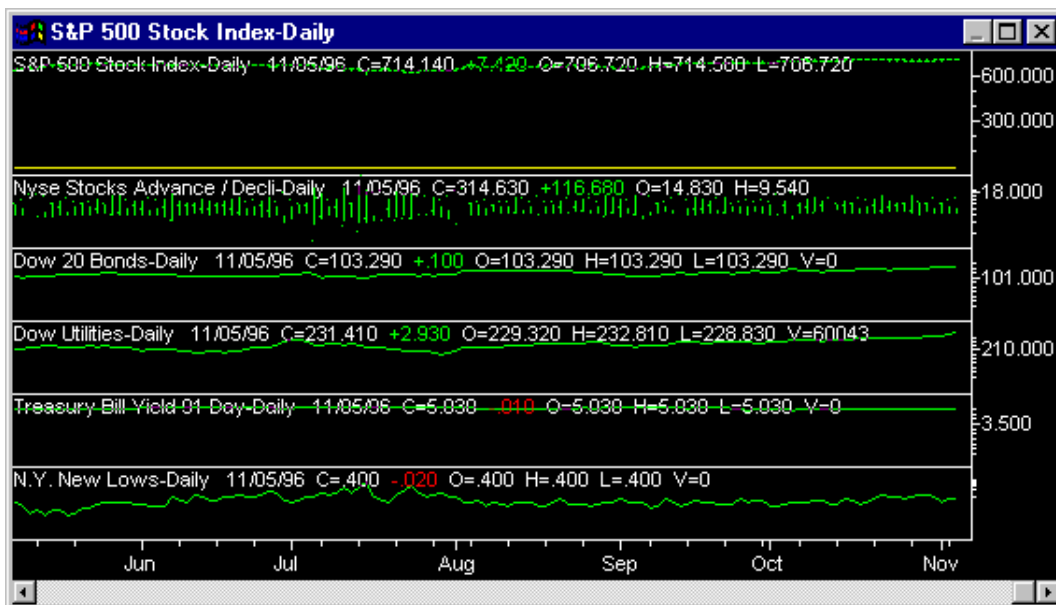
## TradeStation and BioComp's NeuroGenetic Optimizer (NGO) A Tutorial for Integration

Several of our customers have expressed an interest in using the charting, data, and technical analysis features of TradeStation with the model building ability of the NGO. The following tutorial will take you step by step through the process of integrating these powerful tools. The results are charts like the one below that use a neural indicator generated by the NGO as a trading signal for the S&P 500 futures.



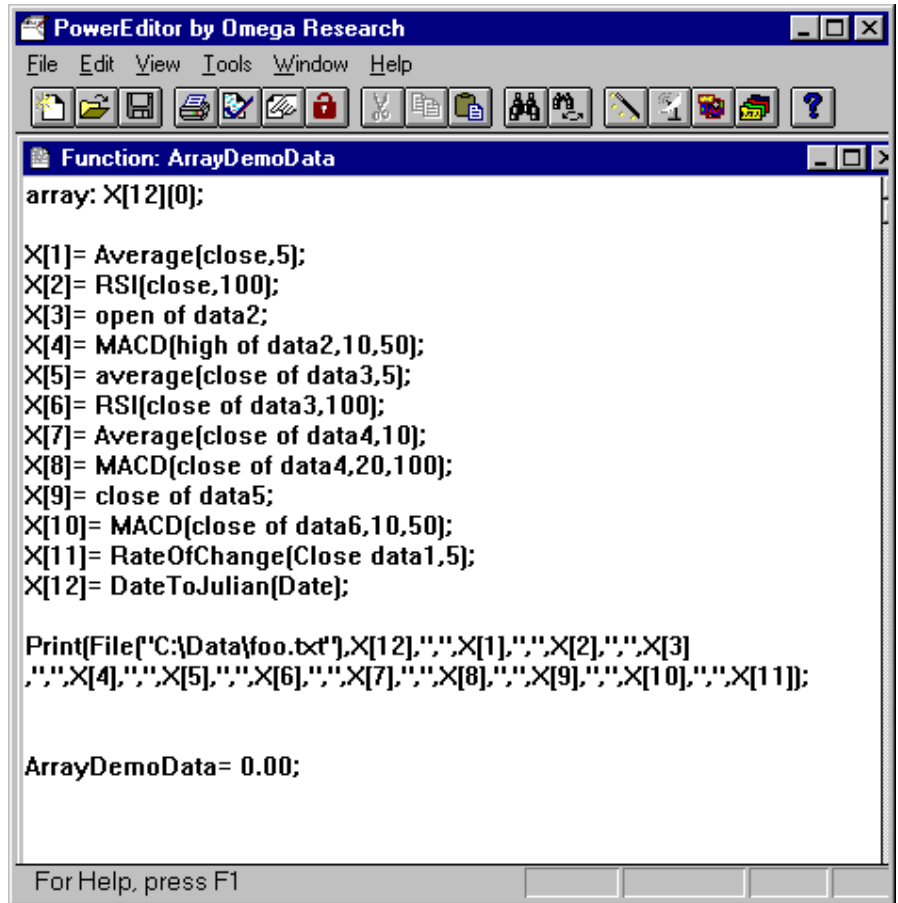
### Step 1 Data Selection:

The first step is to identify the data that drives the variations in the trading instrument of interest. Add the variable that you want to predict (output) and all of probable inputs to a chart. TradeStation supports a large number of symbols on a single chart. The following image is an example of chart with five symbols. This whole process may seem a bit intricate to setup, but once complete all the data is updated automatically very time you down load.



### Step 2 Use PowerEditor to create a data array.

The following image shows an example of a “Function” written in PowerEditor using data1 through data5. The purpose of this function is to create array based on the data in your study that will print to a text file. Using only five data sources you can create almost an unlimited variety of array elements using the various technical analysis functions available in TradeStation. I have used the “DatetoJulian” function to create a date format that can be read by Excel and Access. It would be nice if TradeStation could output a comma delimited file, however, you can create the same effect in the “Print(File” statement by adding > “,” < between the printed elements. The last printed element in the “Print(File” statement is the output variable. After you have “verified” the function you can now use this functions in an “indicator”.



### Step 3 Create an Indicator

Using QuickEditor you can create an “Indicator” using the array that you just created as the plot element. Once you have created the indicators, it then needs to be added to the

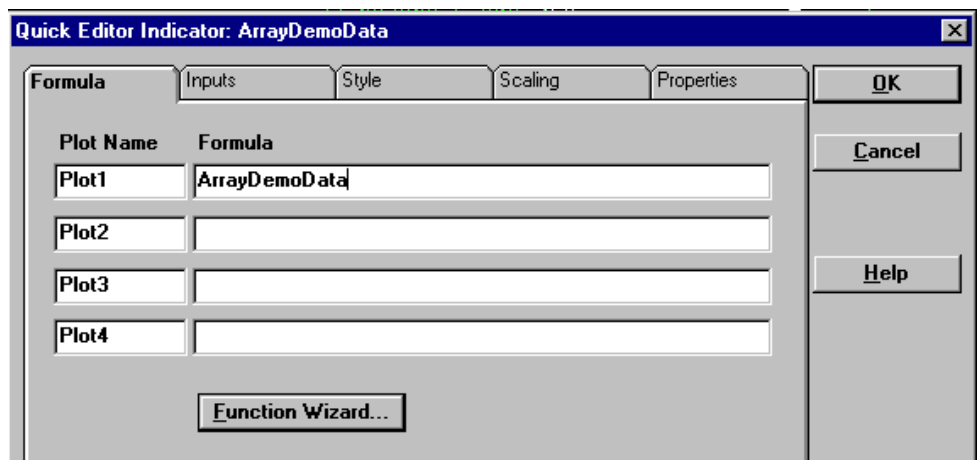
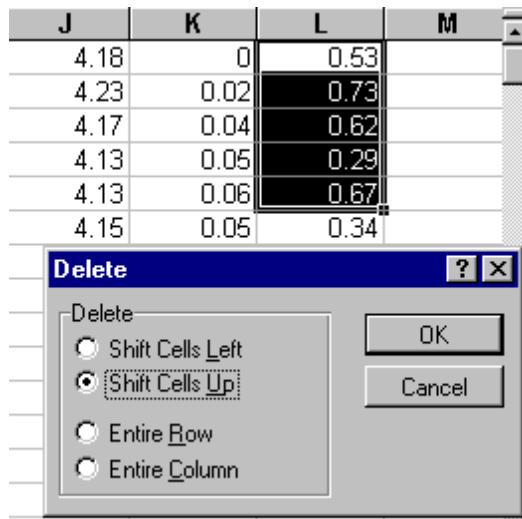


chart. It will show up as a flat line on the chart. The act of adding the indicator to your chart activates the “Print(File” statement.

#### Step 4 Prepare Data for NGO in Excel

The file that you have created with TradeStation can now be open in Excel. Once the worksheet is open in Excel then we need to prepare it for NGO training. First we want to convert the date format to dd/mm/yy. Then we want to add column labels. I generally label the columns X1 through X? so that they match the label used in TradeStation. The final step is to time shift the outputs. If you want to forecast 5 ticks ahead, then we need to shift the out put back or up five ticks. The NGO is learning what the relationship between data in time period 0 and time period 5. Mechanically the steps are as follows. Go to the top of the output column, delete the number of cells that you want to forecast and accept the “Shift Cells Up” option. The last step is put zeros in the now blank cells at the bottom of the output column. NGO will not accept blank cells or missing data. The records with zeros should not be included in the training or testing data. I usually avoid this by using the Walk Forward data splitting and insuring the that the validation set is larger than my forecast period. Alternatively these rows can be deleted before the data is transfer to NGO.



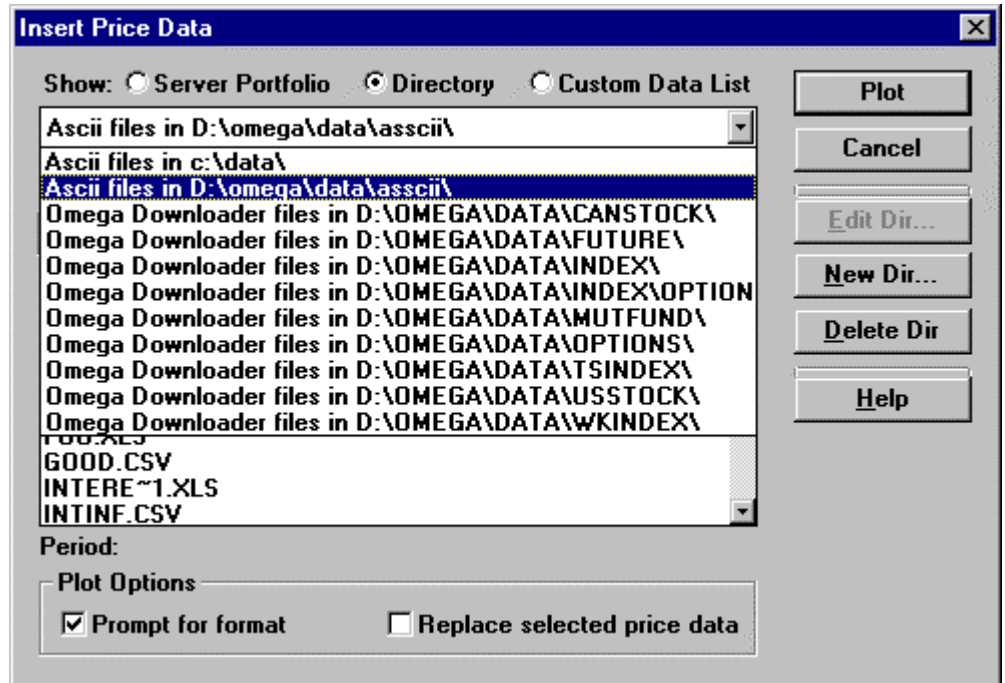
#### Step 5 Send Sheet to NGO

Open the Penney menu and choose “Send Sheet to NGO”. I will not go through the NGO set up issues. Those setup issues are already cover in the NGO online help and in the NGO manual.

#### Step 6 Import Neural Signal into TradeStation

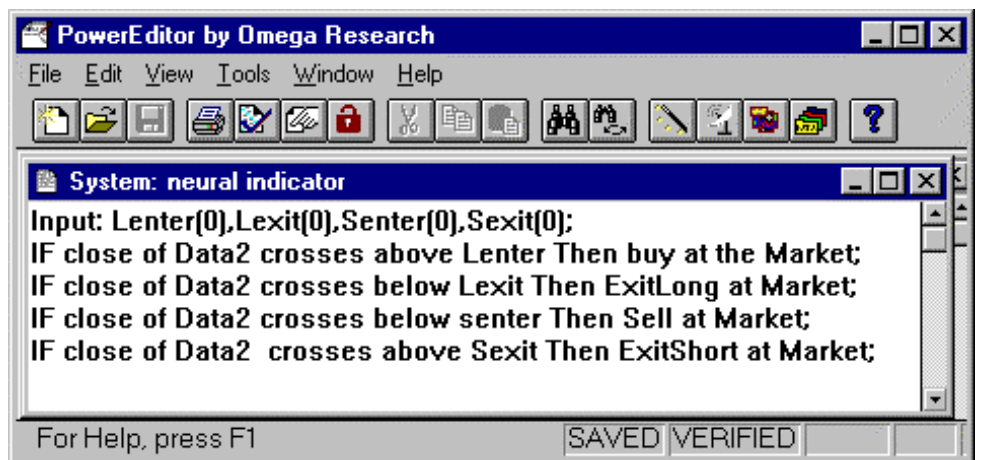
After you have completed training of an acceptable network and you have transferred the network to Excel (I like using “View|Best Networks|File|Send to Excel” menu item in NGO) you can now import that signal in to TradeStation. See TradeStation help for more complete information, but the following steps should get you started. Insert a new sheet and copy just the date and predicted columns from the Results sheet. Save that sheet as a CSV file in a directory with a path like “C:\Omega\Data\Ascii”.

Then go to TradeStations insert price data you and should see a window like the one on this page. Open the file you just saved and accept the "Date-Close" option. Click OK on the next window and you should see the neural indicator loaded in your chart.



#### Step 7 Build a Trading System

The following is a simple trading system you can build to trade and optimize in TradeStation.



**With the NGO you can build trading systems that are much more successful than traditional technical analysis.**