

# Using MultiCharts To Update Tables from Toby Crabel's book "Day Trading With Short Term Price Patterns & Opening Range Breakout"

Prepared by Mike S. • October 1<sup>st</sup>, 2010

## Introduction

In this discussion, I am going to explain how I recently used MultiCharts to update a price pattern table that originally appeared in Toby Crabel's 1990 book "Day Trading With Short Term Price Patterns & Opening Range Breakout". As part of this discussion, I have included the PowerLanguage code used to generate the tables, as well as a completed Excel spreadsheet that shows the completed table for the CBOT 10 Year Note market for the last ten years.

For those of you not familiar with Crabel's book, it explores a number of important trading concepts, such as the opening range breakout trading strategy, the importance of low volatility days preceding trend days and the analysis of short-term price patterns. Crabel is not the only one to explore the concept of pattern trading, with traders like Jeff Cooper, Michael Harris and Steve Nison also writing great books on the subject.

Twenty years after it was published, Crabel's book now is notoriously difficult to find, and on Amazon.com, prices for it range as high as \$800. I bought a copy of the book from Trader's Press about twelve or thirteen years ago, and reading it as a novice trader opened my eyes to using quantitative methods in trading. If you are seriously committed to the idea of trading the markets quantitatively, I strongly suggest buying a copy. Not only will you gain specific insights into the markets, but you'll also see a vivid example of how one very intelligent and successful trader approaches the mysteries of the market. It's a very thought-provoking book.

It's also a very old book. Some of the tables only use data as recent as 1987, a time so long ago it feels like another epoch. None of his tables reflect important market events such as the breakdown of the European ERM in 1994, the rise of the Internet, the collapse of Long-Term Capital and the Russian bond default, the tech boom and bust, the conflicts in the Gulf, the housing boom or the recent recession. Like the people who trade it, markets change too and so one must wonder how relevant Crabel's data is for the markets of today.

## About The Tables

Reading Crabel's book is like reading a series of lab reports on the market, and the table we are going to update here represents a small fraction of the knowledge uncovered in the book. Specifically, I will focus on the table which appears on page 44, within the section entitled "Price Pattern Studies II / Close To Close Patterns".

In there, you will see a table that looks like this (I have reproduced only a small portion of the table):

### BOND CLOSE TO CLOSE PATTERNS

<u>PATTERN #</u>	<u>PATTERN</u>	<u>B/S</u>	<u># TRADES</u>	<u>% PROFIT</u>	<u>GROSS PROFIT</u>
1	++	S	517	52	12,791
2	-+	S	555	51	4,067
3	+-	S	561	51	12,040

At first, this table may seem a bit confusing. Here's how to read it:

1. The first column (marked "Pattern #") simply lists the patterns by number.
2. The second column lists the pattern. In this case, the data is read from left to right, much like you would read price data on a chart. For Pattern #1 (a "close-to-close" type pattern), you would read the pattern as follows: Yesterday's close was higher (+) than the close of the day before and today's close is higher (+) than yesterday's close. For Pattern #2, you would read it as: Yesterday's close was lower (-) than the close of the day before and today's close is higher (+) than yesterday's close. For Pattern #3, you would read it as:

Yesterday's close was higher (+) than the close of the day before and today's close is lower (-) than yesterday's close.

3. The performance results are generated based upon the following approach. Depending on whether the third column ("B/S") says to buy or to sell, you would buy or sell the market on the close after the particular pattern occurs and then exit the position at the close of the following day. In Crabel's analysis, and in the analysis that appears below, no reductions are made for either slippage or commissions.

It's very important to note here that in his book, Crabel did not recommend trading these patterns mechanically, but rather saw them as providing the foundations for a mechanical trading approach, one that would ostensibly include other techniques. Crabel used this analysis to identify a market bias, a tendency for the market to move in a certain direction following certain price behavior. By using additional strategies and indicators, one could try to capitalize upon the market moves signaled through this price pattern research.

### **Recreating The Tables**

In his book, Crabel mentions that his tables were created using a customized program. Although I know how to program stand-alone applications, I thought it might be easier to use a robust research platform like MultiCharts to update some of the tables found in Crabel's book. Since MultiCharts has a good programming language in PowerLanguage and is very versatile in how it can output data, I thought it would be easier to go this route.

As you'll see by looking at the table on page 44 in Crabel's book, he lists 60 patterns, ranging from two bar close-to-close patterns to five bar close-to-close patterns. Consequently, the code I wrote had to be able to generate and test patterns of varying lengths.

The solution to this, I found, lay in using MultiChart's ability to optimize strategies. Optimization is an approach whereby MultiCharts tests every possible value within a specific range of values for a given number of inputs in a strategy. By writing my program in a certain way, I could leverage MultiCharts' optimization capability to generate and test each possible N-bar pattern (N being the number of bars in a pattern). For this project, I gave the program the ability to test up to 7-bar patterns (whether testing 7-bar patterns is useful, given how infrequently they occur, is something to be discussed elsewhere).

The other insight I used when completing this project is how to best represent a close-to-close pattern and how to test that pattern against market data. Here is the outline of the process I used. For this illustration, I will discuss testing 4-bar patterns, although this logic would apply to patterns of any length:

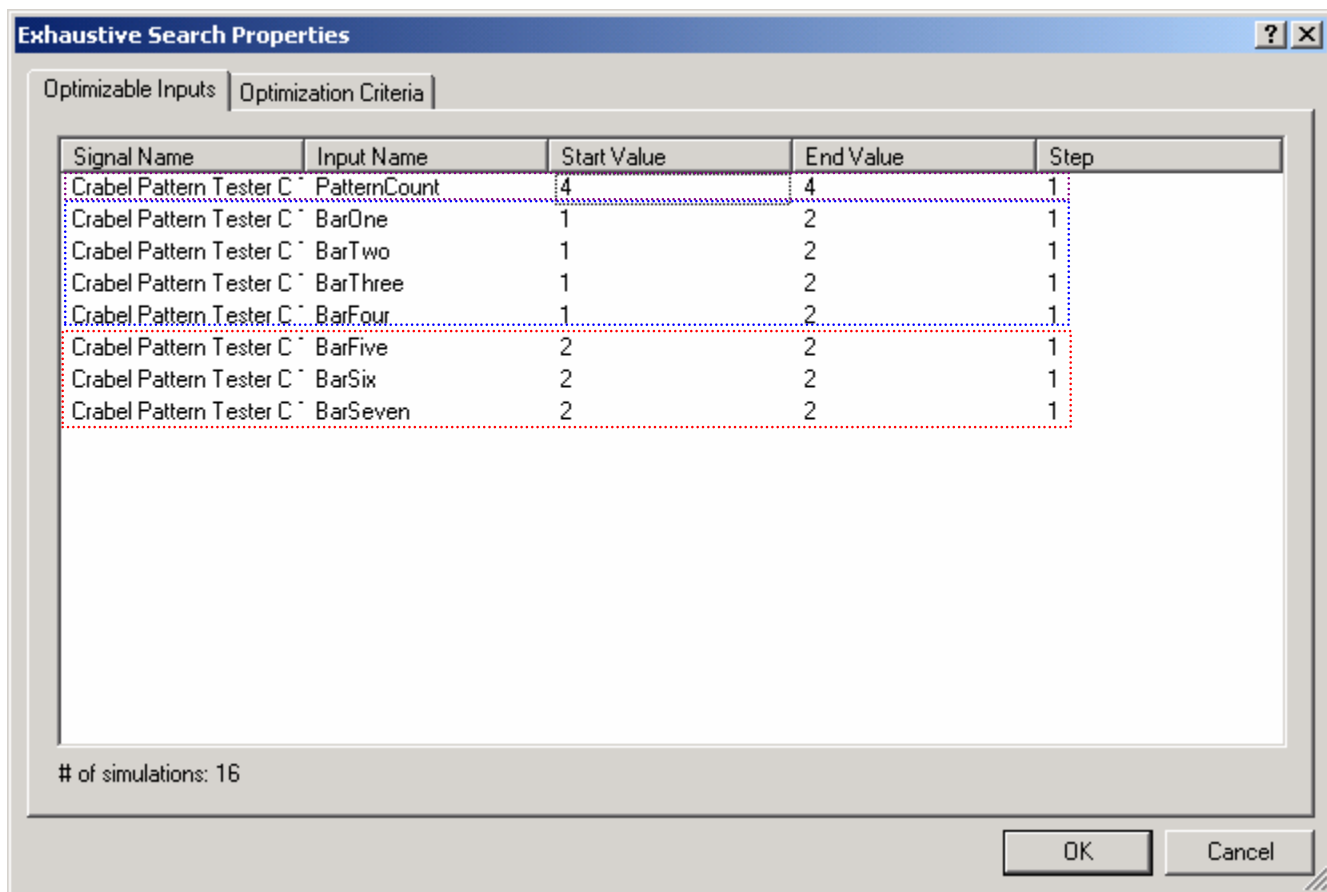
1. In my program, I designated four inputs called: BarOne, BarTwo, BarThree, BarFour.
2. Each of these "Bar" inputs can assume one of two values: 1 or 2.
  - a. "1" refers to a bar where the close is equal or higher than the close of the bar preceding it;
  - b. "2" refers to a bar where the close is lower than the close of the bar preceding it.
3. Depending on the value of the "Bar" input, the program will create a "TestString" made up of pluses and minuses. So if BarOne = "1" and BarTwo = "2" and BarThree = "1" and BarFour = "1" then the TestString will equal = "+++" (for the pattern, we substitute "+" for "1" and "-" for "2").

**Important:** Because we read the pattern from left (the oldest bar) to right (the newest bar), the value of BarOne (the most recent bar) will appear all the way to the right while the value of BarFour (the oldest bar) is all the way on the left. This can be very confusing, as we might be prone to think that BarOne would appear "first" (that is, on the left). It's the opposite!

4. Once we've created a test pattern based upon the value of our inputs, we go through each bar in the market and create the same kind of pattern based upon the most recent four price bars and the relative position of the close of each bar to the close of the bar immediately preceding it.
5. If the test pattern created in Step #3 equals the price pattern seen in the market in Step #4, we buy the market on the close of that bar.
6. We exit any open position at the end of the first bar it's open on. This allows us to use MultiChart's built in ability to analyze trading results in order to generate helpful statistics for each test pattern we explore.

The PowerLanguage code that shows how this is done is attached.

Again, the key here is to use MultiChart's ability to optimize a strategy to make the program go through possible pattern and test it. This is done by correctly setting the parameters to test:



For the purpose of this demonstration, set the input name "PatternCount" to a Start Value of "4" and an End Value of "4". This means that the program will only search bar patterns that are four bars in length. You could change this value to represent a range, but if you do so, you must then set a range of "1" to "2" for each Bar input that could possibly appear in a pattern.

Since we are testing a four bar pattern, we want to set the range for the inputs "BarOne" through "BarFour" to have a Start Value of "1" and an End Value of "2". This means that MultiCharts will test all pattern combinations involving each of these bars.

Since we are only testing four bars, we do not want to set a range for BarFive, BarSix, or BarSeven. By setting the StartValue and EndValue for each of these inputs equal to "2", this means MultiCharts will not test them.

Turning the optimization of these extra inputs off by keeping the start and end values equal means that the number of tests done by MultiCharts will be limited.

Once we're done setting these parameters, we hit okay and the optimization runs. Pretty soon we see a report that looks something like this:

Net Profit	Gross Profit	Gross Loss	Total Trades	% Profitable	Winning Trades	Losing Trades	Avg Trade	Avg Winning Trade	Avg Losin
12750.00	31750.00	-19000.00	136.00	55.15	75.00	56.00	93.75	423.33	
14234.38	37656.25	-23421.88	172.00	61.05	105.00	60.00	82.76	358.63	
8453.13	41781.25	-33328.13	190.00	54.21	103.00	83.00	44.49	405.64	
6234.38	25343.75	-19109.38	145.00	55.17	80.00	58.00	43.00	316.80	
4031.25	18406.25	-14375.00	95.00	57.89	55.00	37.00	42.43	334.66	
4984.38	25187.50	-20203.13	127.00	50.39	64.00	62.00	39.25	393.55	
6718.75	32203.13	-25484.38	181.00	56.35	102.00	76.00	37.12	315.72	
4906.25	35000.00	-30093.75	192.00	46.35	89.00	93.00	25.55	393.26	
1140.63	26109.38	-24968.75	131.00	48.85	64.00	64.00	8.71	407.96	
-234.38	33953.13	-34187.50	186.00	50.00	93.00	90.00	-1.26	365.09	
-546.88	27781.25	-28328.13	145.00	48.97	71.00	71.00	-3.77	391.29	
-4796.88	34140.63	-38937.50	191.00	48.17	92.00	92.00	-25.11	371.09	
-4890.63	22265.63	-27156.25	132.00	50.76	67.00	63.00	-37.05	332.32	
-8046.88	31625.00	-39671.88	185.00	49.73	92.00	90.00	-43.50	343.75	
-9906.25	32375.00	-42281.25	206.00	49.51	102.00	98.00	-48.09	317.40	
-8906.25	29656.25	-38562.50	180.00	43.33	78.00	98.00	-49.48	380.21	

There are a few important things to note:

- 1) This data was generated using daily data for the Chicago Board of Trade's Ten Year Note contract from January 1<sup>st</sup>, 2000 through June 30<sup>th</sup>, 2010. The data comes from eSignal and is a continuous futures contract using the symbol "ZN #F".
- 2) You can sort the results whichever way you want. In this case, I sorted by "Average Trade / Descending" which means that the results start with the input combination that shows the highest average trade and then goes lower.
- 3) At the bottom of this list, you will see some patterns that have very "poor" results (the second to last one lost almost \$10,000). These are not "useless" patterns – in fact, they are as valuable as the most successful patterns except that these patterns should be treated as "Sells" and not "Buys" (since the system is written to only buy after a pattern occurs). So, for example, the last pattern could be seen as generating a profit of \$8,906.25 over 180 trades with an average per-trade result of \$78 and a profitability % of 56.67% (100% - 43.33%) – if you sell the market on the close when this pattern occurs and buy it back at the close of the next day.

If you click on the "Export" button at the bottom of the screen, MultiCharts can save these results into a comma-delimited (.csv) file that can be read by spreadsheet programs like Excel.

## Converting The Data

Once we have generated our data, we can launch Microsoft Excel and import the data into a spreadsheet. Here is what we see:

	A	B	C	D	E	F	G	H	I	J	K
1	Net Profit	Gross Profit	Gross Loss	Total Trades	% Profitable	Winning Trades	Losing Trades	Avg Trade	Avg Win	Avg Loss	Win/Loss
2	12750	31750	-19000	136	55.14706	75	56	93.75	423.3333	-339.286	1.247719
3	14234.38	37656.25	-23421.9	172	61.04651	105	60	82.75799	358.631	-390.365	0.918708
4	8453.125	41781.25	-33328.1	190	54.21053	103	83	44.49013	405.6432	-401.544	1.010209
5	6234.375	25343.75	-19109.4	145	55.17241	80	58	42.99569	316.7969	-329.472	0.961529
6	4031.25	18406.25	-14375	95	57.89474	55	37	42.43421	334.6591	-388.514	0.861383
7	4984.375	25187.5	-20203.1	127	50.3937	64	62	39.24705	393.5547	-325.857	1.207753
8	6718.75	32203.13	-25484.4	181	56.35359	102	76	37.12017	315.7169	-335.321	0.941537
9	4906.25	35000	-30093.8	192	46.35417	89	93	25.55339	393.2584	-323.589	1.215303
10	1140.625	26109.38	-24968.8	131	48.85496	64	64	8.707061	407.959	-390.137	1.045682
11	-234.375	33953.13	-34187.5	186	50	93	90	-1.26008	365.0874	-379.861	0.961108
12	-546.875	27781.25	-28328.1	145	48.96552	71	71	-3.77155	391.2852	-398.988	0.980695
13	-4796.88	34140.63	-38937.5	191	48.16754	92	92	-25.1145	371.0938	-423.234	0.876806
14	-4890.63	22265.63	-27156.3	132	50.75758	67	63	-37.0502	332.3228	-431.052	0.770958
15	-8046.88	31625	-39671.9	185	49.72973	92	90	-43.4966	343.75	-440.799	0.779835
16	-9906.25	32375	-42281.3	206	49.51456	102	98	-48.0886	317.402	-431.441	0.735678
17	-8906.25	29656.25	-38562.5	180	43.33333	78	98	-49.4792	380.2083	-393.495	0.966234

It is fairly easy to “clean” up this data to shorten some of the column titles and to remove some superfluous columns (like gross profit and loss, the # of winning trades vs. losing trades, the maximum consecutive winners and losers, etc.) We now have a spreadsheet that looks like this:

	A	B	C	D	E	F	G	H	I	J	K	L
1	Net Profit	Trades	% Profit	Avg Trade	Avg Win	Avg Loss	Win/Loss	BarOne (C	BarTwo (C	BarThree (C	BarFour (C	BarFive (C
2	12750	136	55.147059	93.75	423.333333	-339.285714	1.247719	1	2	1	2	
3	14234.38	172	61.046512	82.75799	358.630952	-390.364583	0.918708	1	2	2	1	
4	8453.125	190	54.210526	44.49013	405.643204	-401.543675	1.010209	2	2	1	1	
5	6234.375	145	55.172414	42.99569	316.796875	-329.471983	0.961529	2	2	2	1	
6	4031.25	95	57.894737	42.43421	334.659091	-388.513514	0.861383	2	2	2	2	
7	4984.375	127	50.393701	39.24705	393.554688	-325.856855	1.207753	2	2	1	2	
8	6718.75	181	56.353591	37.12017	315.716912	-335.320724	0.941537	1	2	1	1	
9	4906.25	192	46.354167	25.55339	393.258427	-323.58871	1.215303	1	1	1	2	
10	1140.625	131	48.854962	8.707061	407.958984	-390.136719	1.045682	2	1	2	2	
11	-234.375	186	50	-1.260081	365.087366	-379.861111	0.961108	1	1	2	2	
12	-546.875	145	48.965517	-3.771552	391.285211	-398.987676	0.980695	1	2	2	2	
13	-4796.88	191	48.167539	-25.11453	371.09375	-423.233696	0.876806	2	1	1	1	
14	-4890.63	132	50.757576	-37.05019	332.322761	-431.051587	0.770958	2	1	2	1	
15	-8046.88	185	49.72973	-43.49662	343.75	-440.798611	0.779835	1	1	2	1	
16	-9906.25	206	49.514563	-48.08859	317.401961	-431.441327	0.735678	1	1	1	1	
17	-8906.25	180	43.333333	-49.47917	380.208333	-393.494898	0.966234	2	1	1	2	

You can now see several columns on the right that correspond to the specific settings for BarOne, BarTwo, BarThree and BarFour that resulted in these results. These columns represent our patterns. To convert these columns into the patterns we see Crabel's original table, we need to do three things:

- 1) Select only the columns for these four inputs and replace "1" with "+";
- 2) Select only the columns for these four inputs and replace "2" with "-";

You should now see a spreadsheet that looks like this:

	A	B	C	D	E	F	G	H	I	J	K
1	Net Profit	Trades	% Profit	Avg Trade	Avg Win	Avg Loss	Win/Loss	BarOne	BarTwo	BarThree	BarFour
2	12750	136	55.147059	93.75	423.333333	-339.285714	1.247719	+	-	+	-
3	14234.38	172	61.046512	82.75799	358.630952	-390.364583	0.918708	+	-	-	+
4	8453.125	190	54.210526	44.49013	405.643204	-401.543675	1.010209	-	-	+	+
5	6234.375	145	55.172414	42.99569	316.796875	-329.471983	0.961529	-	-	-	+
6	4031.25	95	57.894737	42.43421	334.659091	-388.513514	0.861383	-	-	-	-
7	4984.375	127	50.393701	39.24705	393.554688	-325.856855	1.207753	-	-	+	-
8	6718.75	181	56.353591	37.12017	315.716912	-335.320724	0.941537	+	-	+	+
9	4906.25	192	46.354167	25.55339	393.258427	-323.58871	1.215303	+	+	+	-
10	1140.625	131	48.854962	8.707061	407.958984	-390.136719	1.045682	-	+	-	-
11	-234.375	186	50	-1.260081	365.087366	-379.861111	0.961108	+	+	-	-
12	-546.875	145	48.965517	-3.771552	391.285211	-398.987676	0.980695	+	-	-	-
13	-4796.88	191	48.167539	-25.11453	371.09375	-423.233696	0.876806	-	+	+	+
14	-4890.63	132	50.757576	-37.05019	332.322761	-431.051587	0.770958	-	+	-	+
15	-8046.88	185	49.72973	-43.49662	343.75	-440.798611	0.779835	+	+	-	+
16	-9906.25	206	49.514563	-48.08859	317.401961	-431.441327	0.735678	+	+	+	+
17	-8906.25	180	43.333333	-49.47917	380.208333	-393.494898	0.966234	-	+	+	-
18											

Next, we'll create a new column all the way to the right and rebuild this pattern so that it appears in a single column. To do this, we are going to concatenate (add together) the contents of the four separate cells into one single cell. Also, and this is important, we are going to reverse the sequence of the four separate cells, so that the "+" or "-" that appears for BarFour is the first that appears in the pattern. Again, this is because Crabel's patterns are read from left to right, with the oldest bar (BarFour) appearing all the way on the left and the most recent bar (BarOne) appearing all the way on the right. For example, based upon the input values seen in row 2, the pattern should read "-+-+".

The formula in Excel to do generate the pattern for the first row would be:

"= K2 & J2 & I2 & H2"

In the screen shot below, we show the pattern representation for each data set (note that because we put a new column in ("Pattern") on the left side, all of the other columns move the right once, meaning the formula we used to create the pattern is slightly different from one the one above). We've also converted the font of this

spreadsheet to a mono-spaced font like New Courier to make it a little clearer (and as an homage to the old typewriter typeface used in Crabel's original book).

	A	B	C	D	E	F	G	H
	Pattern	Net Profit	Trades	% Profit	Avg Trade	Avg Win	Avg Loss	Win/Loss
2	-+++	\$ 12,750.00	136	55.15	\$ 93.75	\$ 423.33	\$ (339.29)	1.247719
3	++--	\$ 14,234.38	172	61.05	\$ 82.76	\$ 358.63	\$ (390.36)	0.918708
4	++--	\$ 8,453.13	190	54.21	\$ 44.49	\$ 405.64	\$ (401.54)	1.010209
5	++--	\$ 6,234.38	145	55.17	\$ 43.00	\$ 316.80	\$ (329.47)	0.961529
6	----	\$ 4,031.25	95	57.89	\$ 42.43	\$ 334.66	\$ (388.51)	0.861383
7	-+--	\$ 4,984.38	127	50.39	\$ 39.25	\$ 393.55	\$ (325.86)	1.207753
8	+++-	\$ 6,718.75	181	56.35	\$ 37.12	\$ 315.72	\$ (335.32)	0.941537
9	-+++	\$ 4,906.25	192	46.35	\$ 25.55	\$ 393.26	\$ (323.59)	1.215303
10	--+-	\$ 1,140.63	131	48.85	\$ 8.71	\$ 407.96	\$ (390.14)	1.045682
11	--++	\$ (234.38)	186	50.00	\$ (1.26)	\$ 365.09	\$ (379.86)	0.961108
12	----	\$ (546.88)	145	48.97	\$ (3.77)	\$ 391.29	\$ (398.99)	0.980695
13	+++-	\$ (4,796.88)	191	48.17	\$ (25.11)	\$ 371.09	\$ (423.23)	0.876806
14	+-+-	\$ (4,890.63)	132	50.76	\$ (37.05)	\$ 332.32	\$ (431.05)	0.770958
15	+-++	\$ (8,046.88)	185	49.73	\$ (43.50)	\$ 343.75	\$ (440.80)	0.779835
16	++++	\$ (9,906.25)	206	49.51	\$ (48.09)	\$ 317.40	\$ (431.44)	0.735678
17	-+--	\$ (8,906.25)	180	43.33	\$ (49.48)	\$ 380.21	\$ (393.49)	0.966234

In the attached spreadsheet, I have completed this process for all two-bar, three-bar, four-bar and five-bar patterns for the Chicago Board of Trade's Ten Year Note Contract, from January of 2000 through June of 2010.

If you see a pattern in this spreadsheet that you would want to examine on the charts, you can do so fairly easily. For example, if you look in the spreadsheet at Pattern #29 ("-++-"), it has some fairly attractive statistics: 65 trades with a percentage profitability of 69% and an average profit of \$132 per trade when you buy the market at the close and hold it for one day. To look at this chart in action, you would place the Pattern Tester strategy onto the chart of the Ten Year Note and enter the following parameters:

PatternCount = 5 (since it's a five bar pattern)  
 BarOne = 1 (+)  
 BarTwo = 2 (-)  
 BarThree = 2 (-)  
 BarFour = 1 (+)  
 BarFive = 2 (-)

You can leave the inputs BarSix and BarSeven alone, since they are not used in this analysis. If your timeframe is set from 01/01/2000 through 06/30/2010, you should get results identical to the ones that appear in the spreadsheet.

Again, it's important to note that this data is not presented as a recommended mechanical trading system. These are hypothetical results, and before you start blindly trading off of one pattern, realize that the future is never

identical to the past and these patterns can only provide the start, and not the finish, to a successful trading strategy. It is very easy to be seduced by attractive trading results, but doing so would be a huge mistake. Much more research is needed before one can start trading profitably from the data uncovered through this research.

### **Further Discussion**

In his book, Crabel explores many more types of prices pattern, far beyond the scope of this discussion. If you like the material discussed in this paper, get a copy of Crabel's book.

### **For More Information**

If you have any questions, suggestions or bug reports, feel free to contact me at my e-mail address:

[furytrader@gmail.com](mailto:furytrader@gmail.com)

Good luck!