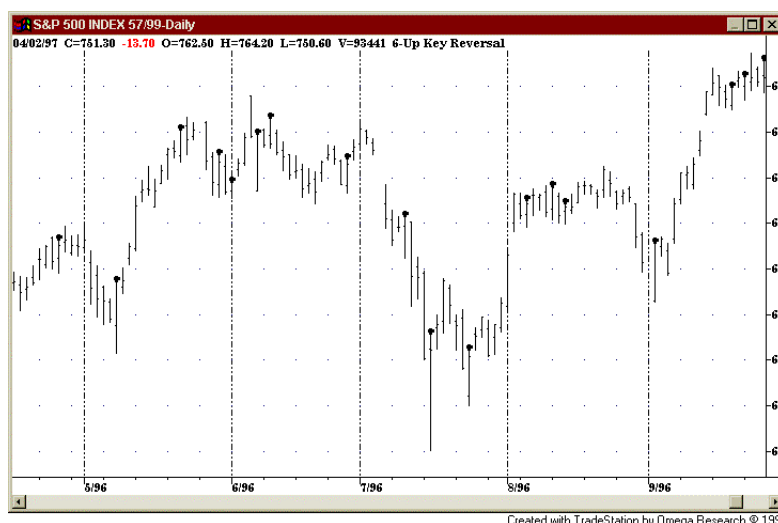


# Chapter 6: The Art of Strategy Design – In Practice

Let's walk through the process of creating a strategy discussing the steps along the way. I think we should be able to develop a strategy using the up key reversals (UKR) that I pointed out in the last chapter. If you recall, we had looked at a full chart of UKRs and realized that there was more substance there than we had originally thought. UKRs were not only at bottoms but occurred all over the chart. I have reproduced the chart as Chart 1 below.



**Chart 1**

This is the same as Chart 5 in Chapter 5. It includes a ShowMe Study marking every up key reversal (“UKR”).

The first question we will ask ourselves is what type of strategy are we trying to create? Will it be a trend-following, support and resistance, or volatility expansion strategy? In this case, I will choose to create a volatility expansion strategy, making

the assumption that with a UKR will come an increase in volatility that will last for a few days. We could also try to create a trend-following strategy based on the UKR as the long entry and a down key reversal as the short entry, but you can try that on your own. For this example, we will stick to a volatility expansion strategy based only on the up key reversal.

So at this point we have chosen the market type: volatile. For our time frame we'll choose daily charts. We have designed and charted the indicator (UKR) and written the criteria as a ShowMe study (Chart 1) and have started to modify our thinking based on what we saw in the ShowMe study.

Now let's test the UKRs knowing that there might be some problems we will find along the way. Our set-up will be the UKR itself. The current bar's low lower than the previous bar, and the close higher than the close of the previous bar.

For the entry, we want to start with something that meets our two entry rules. First, our entry must force prices to move in the direction of the set-up (in this case up). Second, our entry must guarantee that we get in the market after a UKR (we won't miss a move after an UKR). We could justify a market on close order because the close is in the direction of the set-up, but I always try to use a breakout entry with a stop order. So I chose to force prices to get us long with a buy stop one tick above the high of the UKR.

I write this signal so that the breakout must occur on the day following the UKR, reasoning that if it did not, the volatility has diminished and that I didn't want to be in the trade. The result is that if we are not filled on the following day, we will have to cancel the order, and wait for the next signal.

We also need an exit for this strategy. A volatility expansion strategy is not in the market all the time, and it is not a reversal strategy, so an exit is necessary. As I view Chart 1, it looks as if we might make a profit by exiting the market on the entry day at the close. A significant number of these trades look as if they will make money. SPF 1 outlines the parameters of this strategy.

Strategy Parameter File Up Key Reversal Breakout			
Set-Up	Up Key Reversal (“UKR”)		
Entry	Breakout over High of UKR		
Stops	None	Exits	Entry day on Close
MaxBarsBack	50	Slippage	0
Margin	None Used	Commission	0
Data Source	S&P Futures – Omega Research CD		
Data Duration	4/21/82 to 4/2/97		

**SPF 1****TradeStation EasyLanguage  
Strategy: Up Key Reversal**

Condition1 = Low < Low[1];  
Condition2 = Close > Close[1];

If Currentbar > 1 and Condition1  
and Condition2 then Buy at High  
+ 1 point stop;

At this point, we will test this on the S&P futures. I have not used any slippage and commission, although please note that I always recommend at least \$100 for this cost. I keep an eye on this cost by watching the profit per trade results on the Performance Summary, and I always put it in the last test of the strategy. PS 1 shows the results of this strategy.

Performance Summary: All Trades			
Total net profit	\$ -17675.00	Open position P/L	\$ 0.00
Gross profit	\$ 169400.00	Gross loss	\$ -187075.00
Total # of trades	379	Percent profitable	48%
Number winning trades	181	Number losing trades	198
Largest winning trade	\$ 8100.00	Largest losing trade	\$ -6050.00
Average winning trade	\$ 935.91	Average losing trade	\$ -944.82
Ratio avg win/avg loss	0.99	Avg trade(win & loss)	\$ -46.64
Max consec. winners	8	Max consec. losers	9
Avg # bars in winners	0	Avg # bars in losers	0
Max intraday drawdown	\$ -23825.00		
Profit factor	0.91	Max # contracts held	1
Account size required	\$ 23825.00	Return on account	-74%

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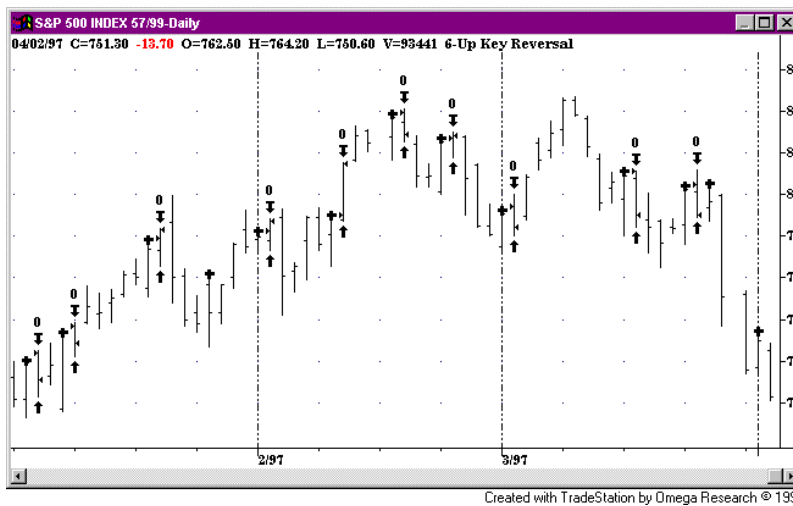
**PS 1**

Note that 48% of the trades were profitable.

The important statistic here is that the average losing trade was greater than the average winning trade.

This obviously was unsuccessful. The only way we are going to find out what went wrong is to look at the chart. We need to scroll through the trades and look at the execution to see what is going on.

Out of the ten trades shown on Chart 2, I count four winners, with only one being very profitable (mid-February). In several cases, had we held on for a few more days, we would have made more money. It looks like the exit may be the problem. Also, remember from our previous discussion that we were concerned about taking all of the trades, that we wanted some sort of filter to ensure that the market was in a downtrend before we used the UKR.



**Chart 2**

The key reversals are still marked with the cross on the high.

The entries and exits from the strategy test are marked as well.

So we now have two things to try as we attempt to improve the strategy. The first is varying the length of the holding period, and the second is filtering the signals themselves so that the market is in more of a downtrend before we use a UKR.

First, let's look at making sure that the market is in a downtrend before we take a UKR. To do this we require that instead of the low being lower than the previous low, we will require that the low be lower than the last 10 lows. Using a two-week low rather than only the previous day's low should make sure that the market is in a downtrend.

System Report: Performance Summary

6-UKR Lower Lows S&P 500 INDEX 57/99-Daily 04/21/82 - 04/02/97

Performance Summary: All Trades			
Total net profit	\$ -1000.00	Open position P/L	\$ 0.00
Gross profit	\$ 49400.00	Gross loss	\$ -50400.00
Total # of trades	96	Percent profitable	51%
Number winning trades	49	Number losing trades	47
Largest winning trade	\$ 8100.00	Largest losing trade	\$ -6050.00
Average winning trade	\$ 1008.16	Average losing trade	\$ -1072.34
Ratio avg win/avg loss	0.94	Avg trade(win & loss)	\$ -10.42
Max consec. winners	7	Max consec. losers	8
Avg # bars in winners	0	Avg # bars in losers	0
Max intraday drawdown	\$ -11600.00	Max # contracts held	1
Profit factor	0.98	Return on account	-9%
Account size required	\$ 11600.00		

**PS 2**

**TradeStation EasyLanguage Strategy:UKR Ten Lows**

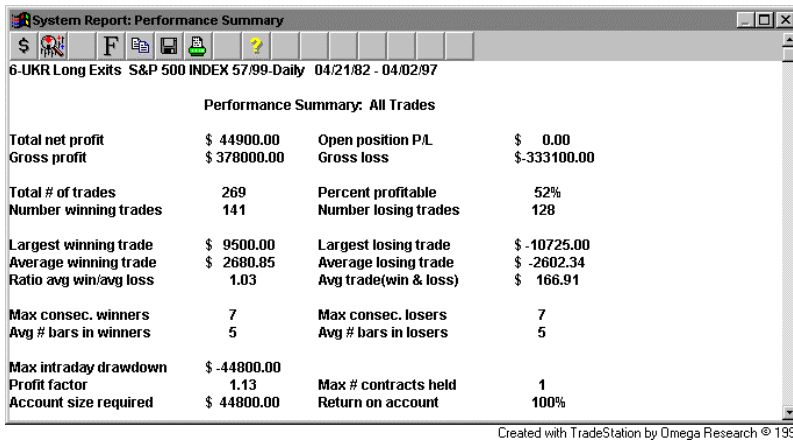
Condition1 = Low < Lowest(Low,10)[1];  
Condition2 = Close > Close[1];

If Currentbar > 1 and Condition1 and Condition2 then  
Buy at High + 1 point stop;

As PS 2 shows, this change resulted in substantial improvement even though overall it was still a loss. We will keep in mind that there probably is an optimal number of lows before entry, but remember, we want the strategy to be profitable without optimization.

Since this was a major improvement, let's move on to testing the holding period. We'll change the low back to the low of the previous day so that we are only testing one change at a time.

From looking at the Chart 1, I think holding for 5 days instead of exiting on the day of entry should be interesting. PS 3 shows the results, a major improvement over PS 1. In fact, we actually moved into profitability. The average winning trade has finally become greater than the average losing trade, and this, coupled with the 52% profitable trades, has put us into the black.



**PS 3**  
**TradeStation EasyLanguage**  
**Strategy: UKR Long Exits**

Condition1 = Low < Low[1];  
 Condition2 = Close > Close[1];  
 If Currentbar > 1 and Condition1 and Condition2 then Buy at High + 1 point stop;  
 IF BarsSinceEntry(0) = 5 then Exitlong on Close;

At least now we know that we have something to work with and we don't have to throw out the whole concept. If this had not worked, I probably would have started over with a new idea.

Now its time to add the two improvements at the same time and run a test. We will call this test UKR Breakouts 2. The Strategy Parameter File is shown in SPF 2.

Strategy Parameter File			
Up Key Reversal Breakout			
Set-Up	UKR – 10 day low		
Entry	Breakout over High of UKR		
Stops	None	Exits	5 day Close
MaxBarsBack	50	Slippage	0
Margin	None Used	Commission	0
Data Source	S&P Futures – Omega Research CD		

**SPF 2**

**TradeStation EasyLanguage**  
**Strategy: UKR Breakouts 2**  
 Inputs:BSI(5),LL(10);

Condition1 = Low < Lowest(Low,LL)[1];  
 Condition2 = Close > Close[1];  
 If Currentbar > 1 and Condition1 and Condition2 then Buy at High + 1 point stop;  
 IF BarsSinceEntry(0) = BSI then Exitlong on Close;

Data Duration	4/21/82 to 4/2/97
---------------	-------------------

The results of this test combining the two were surprising, as you can see in PS 4. I did not expect the improvement to be so good.

Performance Summary: All Trades			
Total net profit	\$ 95200.00	Open position P/L	\$ 0.00
Gross profit	\$ 164750.00	Gross loss	\$ -69550.00
Total # of trades	86	Percent profitable	63%
Number winning trades	54	Number losing trades	32
Largest winning trade	\$ 11025.00	Largest losing trade	\$ -7400.00
Average winning trade	\$ 3050.93	Average losing trade	\$ -2173.44
Ratio avg win/avg loss	1.40	Avg trade(win & loss)	\$ 1106.98
Max consec. winners	7	Max consec. losers	4
Avg # bars in winners	5	Avg # bars in losers	5
Max intraday drawdown	\$ -30925.00	Max # contracts held	1
Profit factor	2.37	Return on account	308%
Account size required	\$ 30925.00		

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**PS 4**

There are substantial improvements in every category of this strategy. Clearly there is synergy between the two improvements that we used.

This strategy is actually getting to where we might consider trading it. Now we have several things to consider as we go forward. First, we might want to optimize the parameters, both the number of days that we should hold the trade and the number of days we should go back for the lowest low. Second, we might want to work on the largest losing trade and the drawdown, as both are a little steep for my blood. Let's work on the optimization first.

Performance Summary: All Trades			
Total net profit	\$ 142775.00	Open position P/L	\$ 0.00
Gross profit	\$ 221575.00	Gross loss	\$ -78800.00
Total # of trades	82	Percent profitable	68%
Number winning trades	56	Number losing trades	26
Largest winning trade	\$ 17150.00	Largest losing trade	\$ -8750.00
Average winning trade	\$ 3956.70	Average losing trade	\$ -3030.77
Ratio avg win/avg loss	1.31	Avg trade(win & loss)	\$ 1741.16
Max consec. winners	10	Max consec. losers	6
Avg # bars in winners	8	Avg # bars in losers	8
Max intraday drawdown	\$ -26900.00	Max # contracts held	1
Profit factor	2.81	Return on account	531%
Account size required	\$ 26900.00		

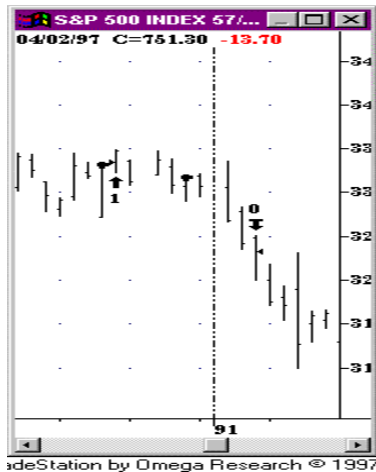
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**PS 5**

The two best parameters are the low of today being lower than the lowest low of the last 10 days; coupled with holding the trade for 8 days.

The results after optimization, shown in PS 5, clearly show that we are on to something here. We improved a strategy that already was profitable, which fits our criteria for optimization. We also made improvements overall on the strategy. What still bugs me about this strategy is the \$8,750 largest losing trade. I don't know if would want to be exposed to that big a trade.

When you scroll through the chart, you can see that the losses are uncontrolled. See Chart 3. The strategy currently does not have any stop loss to limit the risk; the strategy simply exits the market after eight days. This leaves us exposed to the market with no downside protection. For my own trading, I usually want some sort of protection, if only for my peace of mind.



**Chart 3**

You can see from this chart that there is no stop loss to get us out if the market goes against us. We must simply wait for the eight days.

We need to try to fix this because it could be difficult to trade; having a position on with no stop can be very painful.

This is where the money management stops come in. I always recommend that, if possible, you design a money management stop to reflect market action. Usually I try to place money management stops one tick below some recent low. It is only when I haven't been able to find some market action that works, that I try the plain old dollar amount stop. The dollar amount money management stop is always my last resort.

The problem with money management stops is that they invariably interfere with market action. If they are too close, we end up getting stopped out of profitable trades that take a little more room to develop. If they are too far away, you might as well not have one at all. In the end, I just look for a balance. I always know that the performance of the strategy is going to get worse using a money management stop. However, using a stop may permit me to trade a strategy that I would not otherwise feel comfortable trading. This is the tradeoff that you will be forced to make.

In our UKR strategy, the logical thing to try first is to put a stop below the low of the UKR. We know that the UKR represents a volatility type signal that we want to use to take a long trade. It is my first thought that if the low of the bar is violated, the signal is then invalid. Let's see whether the additional stop helps the strategy or makes it worse.

If you look at PS 6, you will note that it pretty much came out as we had expected. The profit was down as we took more losing trades because of the stop. The percentage profitable was also down. Clearly we have made some winners into losers by using the stop. The largest losing trade increased, which is the opposite of what we had wanted, and the drawdown also increased, which is counter to what we had expected. For the most part this was not a great idea.

Performance Summary: All Trades			
Total net profit	\$ 85475.00	Open position P/L	\$ 0.00
Gross profit	\$ 201600.00	Gross loss	\$ -116125.00
Total # of trades	96	Percent profitable	49%
Number winning trades	47	Number losing trades	49
Largest winning trade	\$ 17150.00	Largest losing trade	\$ -10075.00
Average winning trade	\$ 4289.36	Average losing trade	\$ -2369.90
Ratio avg win/avg loss	1.81	Avg trade(win & loss)	\$ 890.36
Max consec. winners	6	Max consec. losers	8
Avg # bars in winners	8	Avg # bars in losers	3
Max intraday drawdown	\$ -37275.00	Max # contracts held	1
Profit factor	1.74	Return on account	229%
Account size required	\$ 372750.00		

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## PS 6

### TradeStation EasyLanguage Strategy: UKR Breakouts 3

```

Inputs: BSI(8), LL(10);
Condition1 = Low < Lowest(Low,LL)[1];
Condition2 = Close > Close[1];
If CurrentBar > 1 and Condition1 and
Condition2 then begin
    Buy at high + 1 point Stop;
End;
If BarsSinceEntry(0) = BSI then
Exitlong on Close;
Exitlong("UKR Low") at Value1 - 1 point
Stop;

```

One thing to understand is the details on how testing a stop alters a strategy. If TradeStation is long on an UKR breakout, it will ignore any subsequent signals until it is flat. Even though there may be another UKR breakout two bars after an entry, the strategy will not take it if it is already long.

If, because of placing a stop, as we did in PS 6, the strategy gets prematurely flat, TradeStation will take the next UKR Breakout. This could be a signal that was overlooked in the previous test. Thus we incurred additional trades. We can conclude that using this stop really altered the strategy more than we had wanted. It forced us to take signals that were not taken in the original test.

Since this didn't work, let's try using a straight dollar amount money management stop instead. Since we know from PS 5 that our largest loss is \$8,750, reducing that to \$5,000 is a reasonable goal, so we'll add a \$5,000 money management stop.



System Report: Performance Summary

6-UKR Breakouts 2 S&P 500 INDEX 57/99-Daily 04/21/82 - 04/02/97

Performance Summary: All Trades			
Total net profit	\$ 87000.00	Open position P/L	\$ 0.00
Gross profit	\$ 213225.00	Gross loss	\$ -126225.00
Total # of trades	87	Percent profitable	62%
Number winning trades	54	Number losing trades	33
Largest winning trade	\$ 17150.00	Largest losing trade	\$ -20025.00
Average winning trade	\$ 3948.61	Average losing trade	\$ -3825.00
Ratio avg win/avg loss	1.03	Avg trade(win & loss)	\$ 1000.00
Max consec. winners	10	Max consec. losers	6
Avg # bars in winners	8	Avg # bars in losers	6
Max intraday drawdown	\$ -33275.00	Max # contracts held	1
Profit factor	1.69	Return on account	261%
Account size required	\$ 33275.00		

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**PS 7**

This is the same strategy as in SPF 2 (UKR Breakouts 2) but with a \$5,000 Money Management Stop.

If you look at PS 7, you will see that we took another step backward. The most troubling is the largest losing trade moved up to over \$20,000. When I see something like this, I have to check it out and find it on the chart. Here's what I found.

As you can see from Chart 4, the strategy got long two days after the crash in 1987. This day in fact was a huge UKR. After getting long and closing at 258.25 on the 21<sup>st</sup> the market gapped down and opened at 202.00. That's a 56-point loss. And with my luck there probably would have been slippage!

**Chart 4**

The day of the 1987 Crash and for a good period of time afterward the stock index future market was very illiquid and volatile. When I test an S&P strategy, or stocks for that matter, I always check and see what would have happened on October 19<sup>th</sup> and several months after.

I did not want to trade for several months after the crash, because of the craziness of the market. One way I deal with this is to simply write out the day of the crash and a subsequent length of time. For me, I did not feel like getting back in the market until after the first of December.

The TradeStation code for this is:  
**Condition1 = Date < 871019 or Date > 871201;**

The reality is that any stop loss would have been hit on the open as the market opened so much lower. There are two considerations for this trade. First, it is

highly unlikely that you would have put on this trade given the emotions that were bubbling up at this time. The S&P pit itself was in chaos. I personally did not put on any trades for the last few weeks of October, and all of November. Let's see what removing these dates does to the strategy.

PS 8 show the results of eliminating the days after the crash. There is substantial improvement by eliminating just that one trade. This is why you should take a look at the important trades in a Performance Summary. Scroll through the chart and look at the worst couple of trades and the best trades to see if there is anything unusual there. I also look at the periods of the largest drawdown to see if I can learn anything from that period as well. And, be careful when testing the S&P and stocks around the crash of 1987.

Performance Summary: All Trades			
Total net profit	\$ 112025.00	Open position P/L	\$ 0.00
Gross profit	\$ 213225.00	Gross loss	\$ -101200.00
Total # of trades	85	Percent profitable	64%
Number winning trades	54	Number losing trades	31
Largest winning trade	\$ 17150.00	Largest losing trade	\$ -7500.00
Average winning trade	\$ 3948.61	Average losing trade	\$ -3264.52
Ratio avg win/avg loss	1.21	Avg trade(win & loss)	\$ 1317.94
Max consec. winners	10	Max consec. losers	6
Avg # bars in winners	8	Avg # bars in losers	6
Max intraday drawdown	\$ -33275.00	Max # contracts held	1
Profit factor	2.11	Return on account	337%
Account size required	\$ 33275.00		

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## PS 8

### TradeStation Easy Language Strategy:UKR Breakouts 4

Inputs:BSI(8),LL(10);

Condition1 = Low < Lowest(Low,LL)[1];

Condition2 = Close > Close[1];

**Condition3 = Date < 871019 or  
Date > 871201;**

If Currentbar > 1 and Condition1  
and Condition2 and Condition3  
then Buy at High + 1 point Stop;

If BarsSinceEntry(0) = BSI then  
Exitlong on Close;

The last thing I try before wrapping up a test series is a profit target. There is just something appealing about having a price target in the market and getting out with some money on a short-term basis. When I can get the percentage profitable trades up over 60%, I begin to think in terms of a 1-to-1 risk/reward ratio with a high percentage chance that I will win. So in this case I opted to try a \$5,000 price target. This means that when I have \$5,000 profit, I will take it.

As you can see from PS 9, there is substantial improvement again. We have moved up to 68% winners with the price target. In this version of the strategy, if I don't hit the target I will either get stopped out with a \$5,000 loss or get out 8 days after the entry. The drawdown has come down substantially as we have worked on this strategy.

Performance Summary: All Trades			
Total net profit	\$ 117825.00	Open position P.L.	\$ 0.00
Gross profit	\$ 200850.00	Gross loss	\$ -83025.00
Total # of trades	85	Percent profitable	68%
Number winning trades	58	Number losing trades	27
Largest winning trade	\$ 8050.00	Largest losing trade	\$ -5175.00
Average winning trade	\$ 3462.93	Average losing trade	\$ -3075.00
Ratio avg win/avg loss	1.13	Avg trade(win & loss)	\$ 1386.18
Max consec. winners	12	Max consec. losers	4
Avg # bars in winners	6	Avg # bars in losers	6
Max intraday drawdown	\$ -24975.00	Max # contracts held	1
Profit factor	2.42	Return on account	472%
Account size required	\$ 24975.00		

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**PS 9**

This is Strategy:UKR Breakouts 4 with a \$5,000 money management stop and a \$5,000 price target.

However, if you look at PS 5, we have done all of this work and have really made only slight improvements. PS 5 was the original version of the strategy with no stops and not targets, just a simple UKR breakout entry with an 8-day exit. All of the work we have done to soothe our psychological problems associated with risk (no stop), largest losing trades and drawdown have not really made us that much more money.

However, we could and should argue that with a \$5,000 stop loss and profit target, UKR Breakout 4 in PS 9 is much easier to trade than UKR Breakout 2 in PS 5. We could argue that giving up the profit advantage would be worth the ability to sleep better at night.

And finally, when I get a strategy that looks pretty good, I like to test the final version without any stops. SPF 3 reflects this strategy. I really want to see the financial price I am paying for being unable to trade without stops.

Strategy Parameter File Up Key Reversal Breakout			
Set-Up	UKR – 10 day low		
Entry	Breakout over High of UKR		
Stops	None	Exits	8 day Close & \$5,000 Target
MaxBarsBack	50	Slippage	0
Margin	None Used	Commission	0
Data Source	S&P Futures – Omega Research CD		
Data Duration	4/21/82 to 4/2/97		

**SPF 3**

**TradeStation Easy Language**  
**Strategy: UKR Breakouts 4**  
Inputs:BSI(8),LL(10);

Condition1 = Low < Lowest(Low,LL)[1];  
Condition2 = Close > Close[1];  
Condition3 = Date < 871019 or  
Date > 871201;

If Currentbar > 1 and Condition1  
and Condition2 and Condition3 then  
Buy at High + 1 point Stop;

IF BarsSinceEntry(0) = BSI then  
Exitlong on Close;

The results for our last test in this run are shown in PS 10.

Performance Summary: All Trades			
Total net profit	\$ 156275.00	Open position P.L.	\$ 0.00
Gross profit	\$ 207725.00	Gross loss	\$ -51450.00
Total # of trades	80	Percent profitable	75%
Number winning trades	60	Number losing trades	20
Largest winning trade	\$ 8050.00	Largest losing trade	\$ -8175.00
Average winning trade	\$ 3462.08	Average losing trade	\$ -2572.50
Ratio avg win/avg loss	1.35	Avg trade(win & loss)	\$ 1953.44
Max consec. winners	15	Max consec. losers	4
Avg # bars in winners	6	Avg # bars in losers	8
Max intraday drawdown	\$ -14925.00	Max # contracts held	1
Profit factor	4.04	Return on account	1047%
Account size required	\$ 14925.00		

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## PS 10

These results are from the UKR Breakout 4 Strategy with a \$5,000 price target and no stop.

Here is a strategy that is profitable 75% of the time, the drawdown below \$15,000 and almost a \$2,000 average profit per trade. The price we have to pay for these characteristics is trading with no stop.

Frankly, this is a good strategy. It has all of the performance characteristics that you would want to have behind you to actually trade it. Even if you take out the largest winner, the strategy performance is hardly affected.

## Summary

In this chapter, we followed the steps previously outlined to create a strategy. I tried to give you some of the thought process that I go through as I look at the results of each of my design moves. Sometimes there are improvements, sometimes there are none. But if you follow the principles, you will stay on the right track.

Conventional wisdom tells us that to make money you have to cut your losses short and let your profits run. This is human nature. This is what we all strive to do, because it is easy to take small losses and big profits. However, as I have said previously, in order to make money trading you have to trade against your human nature.

If we want to trade against conventional wisdom we would actually trade the strategy in PS 10. Why? Because the strategy is designed to manage trades in opposition to our human nature. It limits profits to \$5,000 and lets its losses run for eight days without any stops. After what I have told you, it shouldn't be a surprise that the most profitable version of the strategy is the hardest to trade.

One more caveat. This is a strategy that only takes long trades. The market we tested, the S&P futures, had been in a bull market since its inception in 1982. It is not surprising that we could find a strategy that made money with long trades. The real challenge would be to take the down key reversal and see if we could find a strategy to short this market. Finding a strategy that made money shorting the biggest bull market in history would be a challenge worth taking.

What should we do next? Well, we could keep working on the strategy or add the short signals. We could try other exits, other money management strategies, and other stops. You could literally keep on fiddling with this strategy indefinitely. What I like to do is to take all of the performance summaries, get a cup of tea, put on some Mozart, and contemplate which strategy I could trade and how to make it better.

Could I trade without stops? Note that the drawdown is actually less without any stops. If not, and if I insist on having a stop, how much of a stop? What price am I willing to pay for my human nature?

Next, I would wait for some signals and get a feel for how the strategy works. I would paper trade a few signals to see if they in fact work as I have imagined. I would then trade one or two to get a live feel for the strategy. There is no substitute for putting your money on the line to get a feel for whether or not you could trade the strategy.

After all of the testing and all of the analysis, trading is still a visual undertaking. We still need to get a feel for the market and the strategy in real time. Once we get that feel, we will know which of the versions we should trade and how we might alter the strategy to make it easier to trade.

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