Trading System Development
using
FastBreak

&

FastGraph

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Abstract

Many investors believe that they are incapable of developing good trading strategies and leave this work to others. These "others" attain "guru" status. The attitude of the average investor may be "The guru is smarter than me, or he does this as a full time job and therefore must be good." The list goes on and on.

This workshop has the following goals:

1) Take the mystery out of trading strategy development.

2) Allow participants to develop and adjust strategies to meet their needs.

3) If participants **do** want to use strategies developed by others, understand how these strategies were developed, ask the right questions, and determine if the strategy meets the investor's needs.

If you're so smart, why are you here talking to me rather than sailing your yacht?

1) Developing tools for others forces us to develop better tools for our own investing.

2) We enjoy the tool development process. We all like the challenge of solving problems, building a product etc. Satisfaction isn't always about $.

3) We enjoy the rapport of working with people. It feels good when somebody tells you how much they like what you have built.

4) We can always use a few more $$ selling you software!

Agenda

Why use Mechanical/Systematic Trading Systems?

Example - The Pankin System

Mild - Trading Bonds

Medium - Conservative Select Trading

Hot - Aggressive Select Trading

Nitro - Trading Aggressive Funds with Market Timing

FastGraph - Overview

Why use Mechanical/Systematic Trading Systems?

"Because that's where the money is." *Bank robber Willie Sutton*

Other less flippant answers:

1) These strategies can be rigorously tested for past performance. If you don't know how a strategy would have performed in the past then what chance do you have to expect to know how it will work in the future?

2) Get the emotional baggage out of trading. You don't need to "interpret" where the trend line is drawn, world events, future earnings, etc.

3) Time. You can work on your systems when you have the time. It only takes a few minutes each day or weekend to check the system for trades.

A Few Words about Optimization

Optimization has gotten a somewhat undeserved bad reputation. Optimization isn't a bad thing, actually it is a necessary process, however, ***over*** optimization can be very bad. For example, an Indy racing car is over optimized for speed. Take it off a dry, smooth race track, and try to take a family of four to Grandma's house on a muddy road.

Almost any indicator you can name has been optimized, i.e., 14 day RSI, 12/48 AccuTrack parameters, 200 day moving average, etc. However, these indicators have not been "over" optimized.

System Development Traps

"A man's just got to know his limitations." *Clint Eastwood as Dirty Harry*

1) Going for total return only.

   Babe Ruth was the home run king, but he was also the strikeout king. Swinging for the fences isn't usually the best approach. **Do not** concentrate on eye-popping annual performance.

2) Jumping from one system to another.

   The grass is always greener on the other side of the fence. Is it also greener over the septic tank.

   If you feel obligated to start trading a new system, at least keep a core holding in a good solid system. You must stay in the game to win.

   It is Okay to enjoy investing, it may even be your hobby, just remember the primary reason you are investing.

3) We like the action. Some investors just can't wait to make that next trade.

4) Market timing.

   We all want the holy grail. It doesn't exist, however, that doesn't mean market timing has no benefit.

5) If something is new and more complex, that doesn't make it better.

Someone always has a better system. Investors always brag about their winners but not their losers.

6) There are no “magic” parameters.

7) Do not fixate on the “last” trade.

A system should not be dropped just because the last trade was bad.

Approach to Strategy Development

“Truly relaxed trading comes only from back-testing with vigor and persistence to the point that the subconscious is wholly satisfied.” *Robert Krausz in Technical Anaysis of Stocks & Commodities*

Developing a strategy is similar to sculpting a fine statue from a large block of stone.

1) Determine your goal.

2) Be sure you select the right raw materials.

3) Make a few large cuts to get a feel for how the raw material behaves.

4) Detail work

5) Polish the final product.

6) Always ask the question “What can go wrong?”

Basics of Relative Strength Trading

Rules: Sell poor performing funds and buy good performing funds.

Make certain you strategy has a fundamental reason for market rotation:

1) Interest rates go down, long term bonds perform better than short term bonds or cash. If the economy is strong with rising interest rates, go to high yield bonds where companies debt is upgrading or go into money market.

2) Large cap vs. Small cap

3) Growth vs. Value

4) Change in fund managers.

5) Both stocks and bonds go up when interest rates decline but stock go up faster. Therefore, it is probably not a good idea to make stock and bond funds in a trading family.

6) These are trend following systems. Sometimes the trend reverses. Cut your losses and move on.

7) Keep losses small, take all the many small gains, every now and then get the home run.

Example - The Pankin System

Mark Pankin's Select trading system has become very popular. How can you recreate his parameters and how robust are they?

Note: FastBreak can run the Pankin System with one exception. Mark always ranks on a weekly basis and FastBreak uses market days. These will be exactly the same except when there are market holidays.

Ground rules:

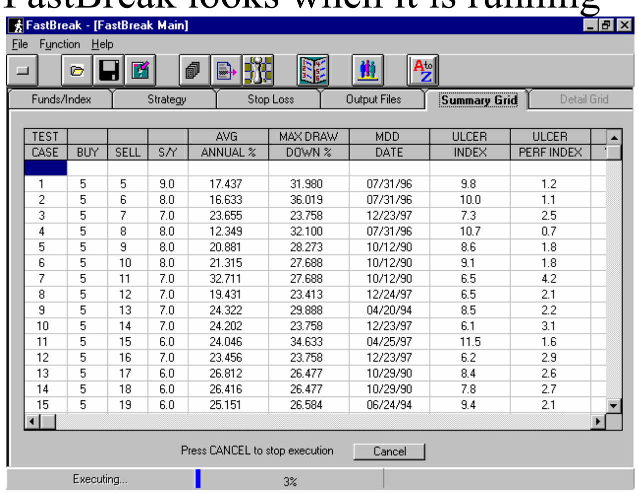
Only trade after a Friday close
Remove the two gold funds from the "Classic" Select family
Hold a minimum of 30 days to avoid the .75% fee

We will make two FastBreak runs:

The first run will sell the fund when it no longer ranks in the top 50% of the Select family - Pankin 1

The second run will sell the fund when it no longer ranks in the top 25% of the Select family - Pankin 2

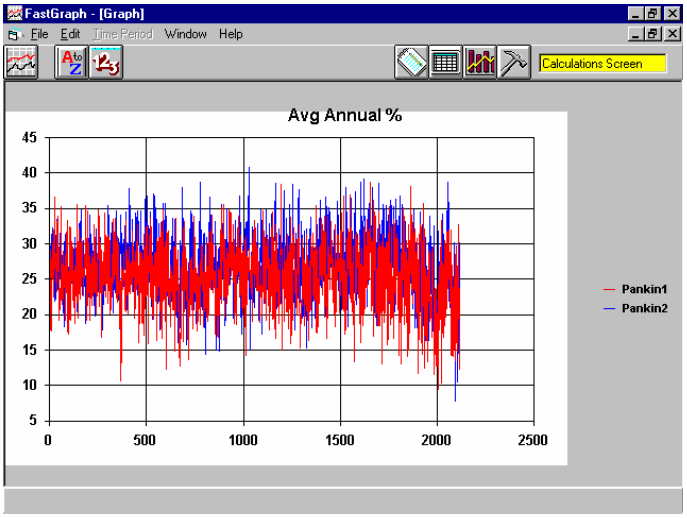
This is how FastBreak looks when it is running



TEST CASE	BUY	SELL	S/Y	AVG ANNUAL %	MAX DRAW DOWN %	MDD DATE	ULCER INDEX	ULCER PERF INDEX
1	5	5	9.0	17.437	31.980	07/31/96	9.8	1.2
2	5	6	8.0	16.633	36.019	07/31/96	10.0	1.1
3	5	7	7.0	23.655	23.758	12/23/97	7.3	2.5
4	5	8	8.0	12.349	32.100	07/31/96	10.7	0.7
5	5	9	8.0	20.881	28.273	10/12/90	8.6	1.8
6	5	10	8.0	21.315	27.688	10/12/90	9.1	1.8
7	5	11	7.0	32.711	27.688	10/12/90	6.5	4.2
8	5	12	7.0	19.431	23.413	12/24/97	6.5	2.1
9	5	13	7.0	24.322	29.888	04/20/94	8.5	2.2
10	5	14	7.0	24.202	23.758	12/23/97	6.1	3.1
11	5	15	6.0	24.046	34.633	04/25/97	11.5	1.6
12	5	16	7.0	23.456	23.758	12/23/97	6.2	2.9
13	5	17	6.0	26.812	26.477	10/29/90	8.4	2.6
14	5	18	6.0	26.416	26.477	10/29/90	7.8	2.7
15	5	19	6.0	25.151	26.584	06/24/94	9.4	2.1

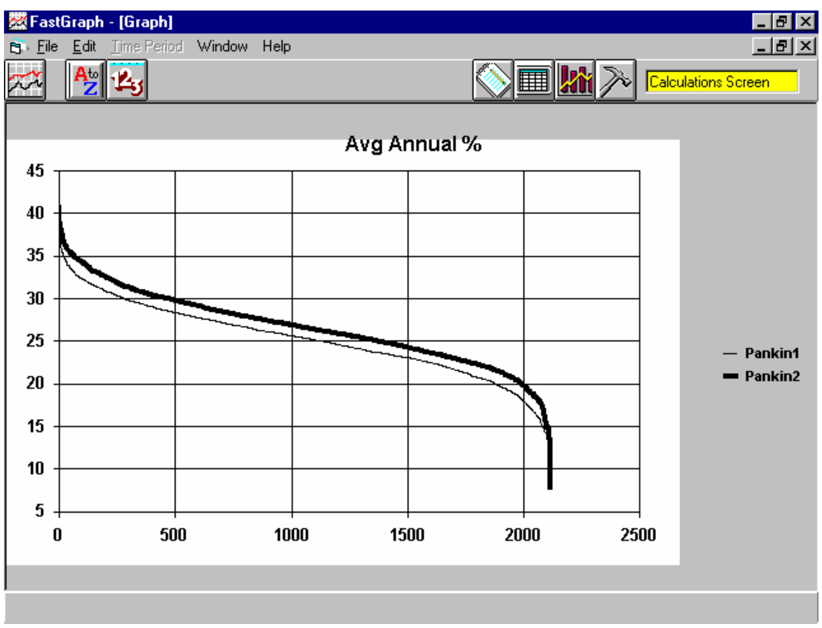
We now load the output from the two runs into FastGraph - *Note you can use a spreadsheet for the following steps.*

If we graph the annual return for the two runs we get the following:



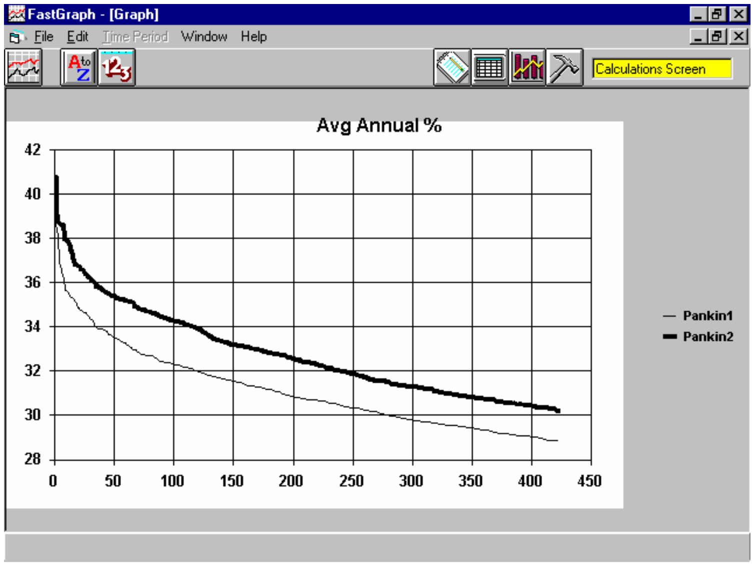
Not very informative!

Now, sort the annual returns from "Best" to "Worst" and graph:



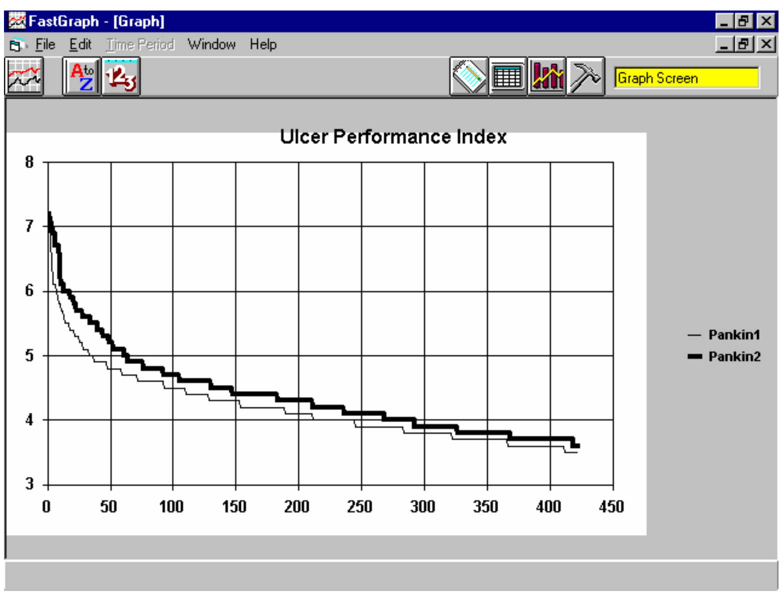
It is obvious that the second run (Pankin 2) is better

Let's look at the best (20%) of the cases to zoom in on the difference:

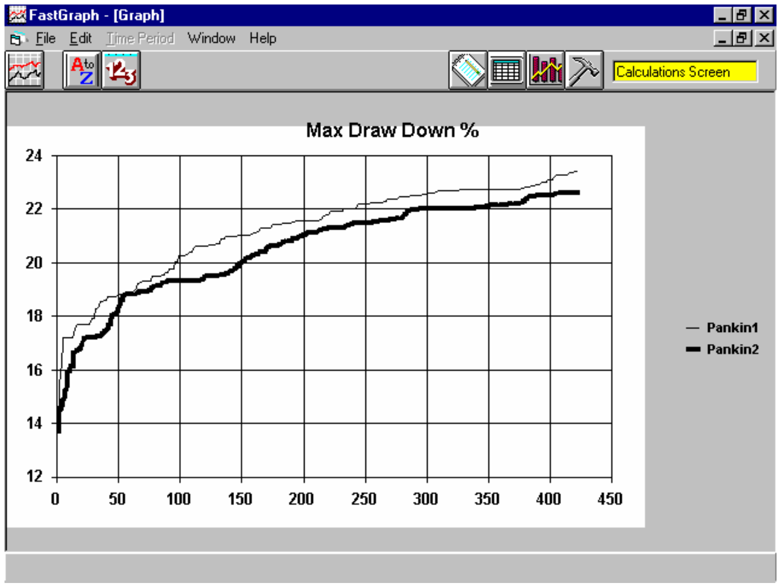


We get about a 2% improvement in annual return with using 25% as the sell point vs. 50%

Sort UPI and look at the difference:

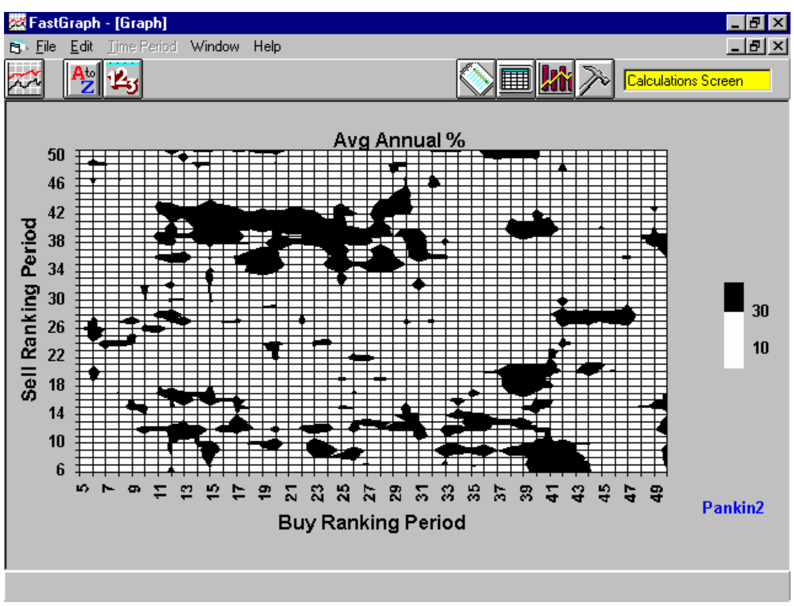


And MDD:

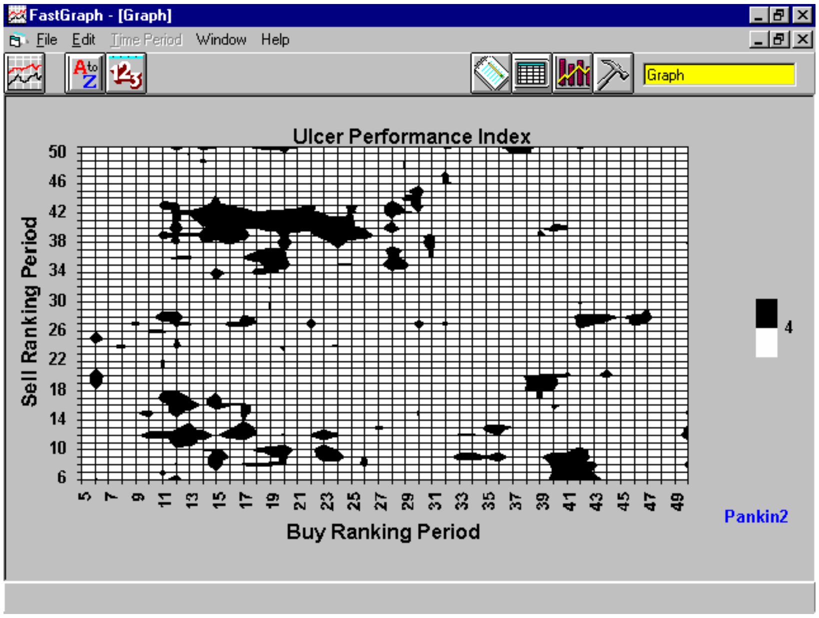


It is clear that Pankin 2 (Top 25%) is the best under all cases

Using contour graphs we can determine which ranking parameters are "Optimum/Robust" *Note: We have changed the color graphs to black and white to improve the quality in the workbook.*

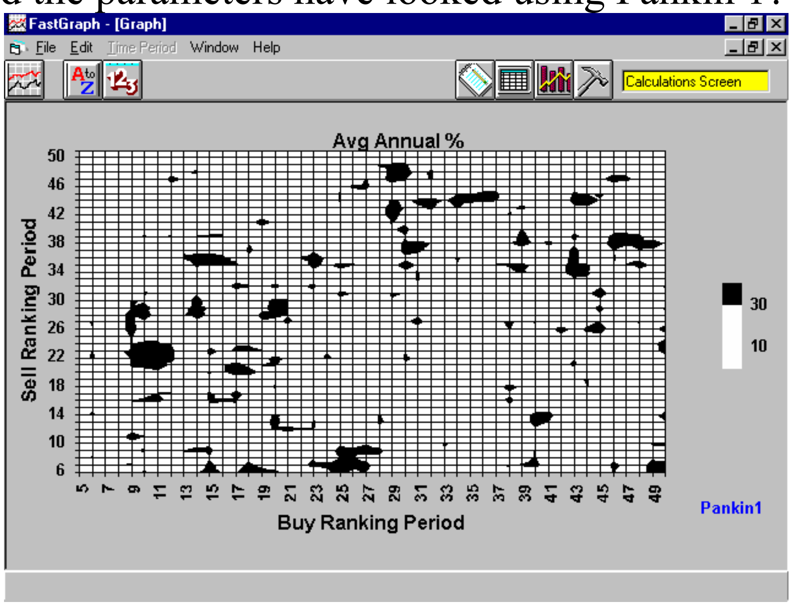


Do the same with the UPI:



It is clear from both charts that Mark did a very good job of selecting the 3 week (15 day) Buy parameter and the 8 week (40 days) Sell parameter.

How would the parameters have looked using Pankin 1?



You can see that the parameters are not as robust and are grouped in a different location than Pankin 1.

Mild - Trading Bonds

Goals:

Very low MDD
Possible substitute for money market
Few switches

How many directions can interest rates move?

Up
Down
Sideways

When interest rates decrease bond prices go - Up
When interest rates increase bond prices go - Down

When rates are going up - Hold CASH or High Yield
When rates are going down - Hold Long Term or High Yield
When rates are going sideways - Hold Long Term or High Yield

High Yield bonds can be counter intuitive because they are sensitive to the tug of war between interest rates and bond upgrading

What about short term bonds? The additional yield you get when interest rates are rising is offset by loss of the underlying bonds. We are looking for significant changes in interest rate direction

What about zero coupon bonds? These may be appropriate for a more aggressive strategy, but it is difficult to keep the MDD to a very small value.

To keep it simple we will use only two bond funds that can be purchased through Fidelity without a fee. *Note: Fidelity has two excellent high yield inhouse bond funds but they have back end loads.* We will also use FDRXX as the money market fund

The performance of the bond funds and money market funds from 11/11/88 through 12/31/97:

Fund	Ann%	UI	UPI	MDD %
FHYTX	11.3	4.9	1.2	-21.1
RSGVX	10.0	5.9	0.8	-18.4
FDRXX	5.5	----	----	-------

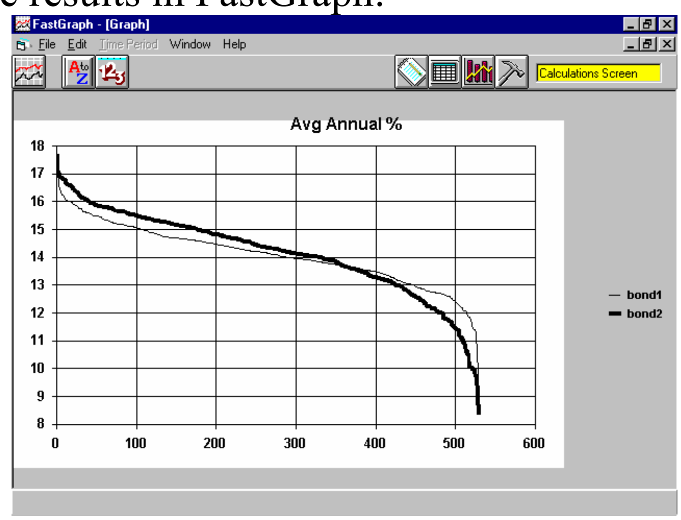
We will make two FastBreak runs holding only the top fund:

Bond 1 - Ranking periods from 6 to 50 market days (using increments of 2 days) and minimum holding period of 35 days

Bond 2 - Same as Mild 1 but with a minimum holding period of 65 days

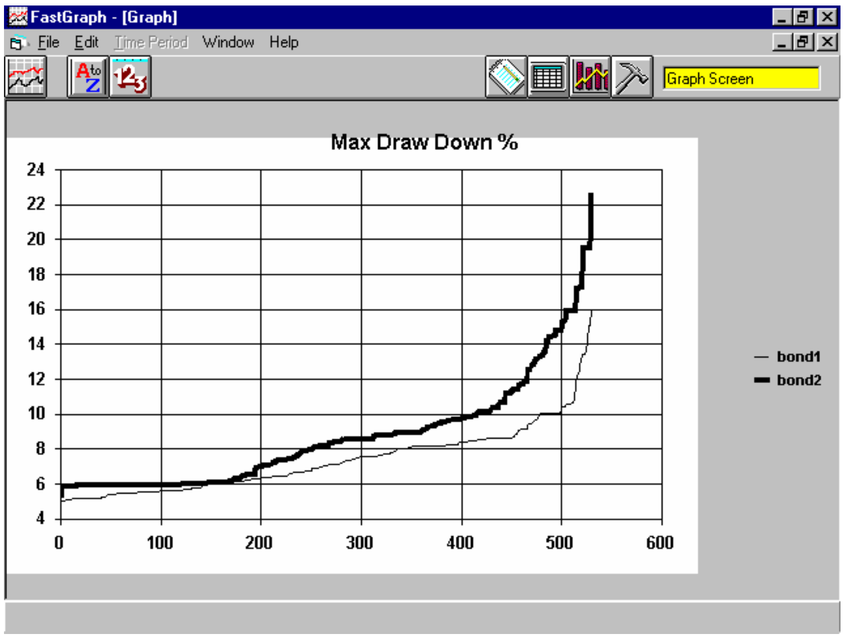
Note: Why did we look at unusual holding periods? FastTrak applies interest to FDRXX monthly. We wanted to "collect" the interest in our strategy.

Looking at the results in FastGraph:



Using a minimum holding period of 35 days rather than 65 days gains us about 0.5% per year for the best cases, and under performs in the worst cases.

The returns are very good but the MDD doesn't really meet our needs:

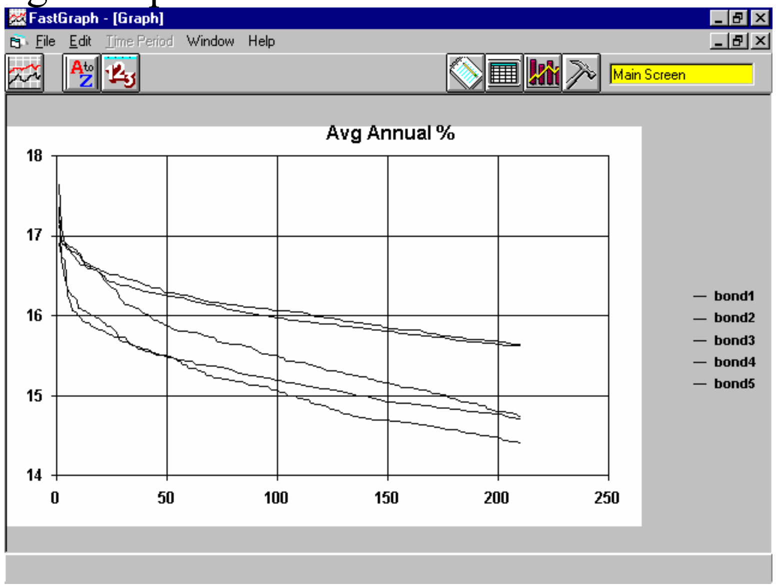


Let's try an exponential moving average as a stop to try and reduce the MDD. We normally change a couple parameters and look at results to see the effect.

Bond 3 - Simple ranking, EMA of 50 days
Bond 4 - Simple ranking, EMA of 40 days
Bond 5 - Simple ranking, EMA of 60 days

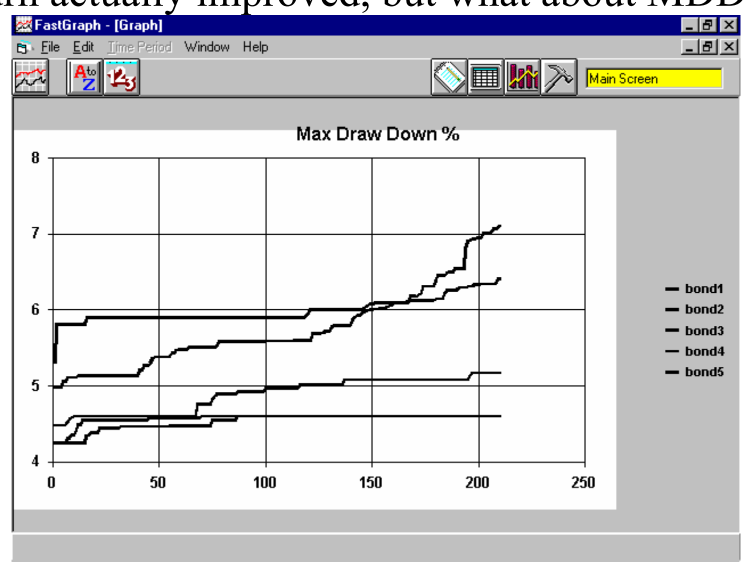
Note: We used a minimum hold of 65 days on all the runs.

How do things compare on a return basis?



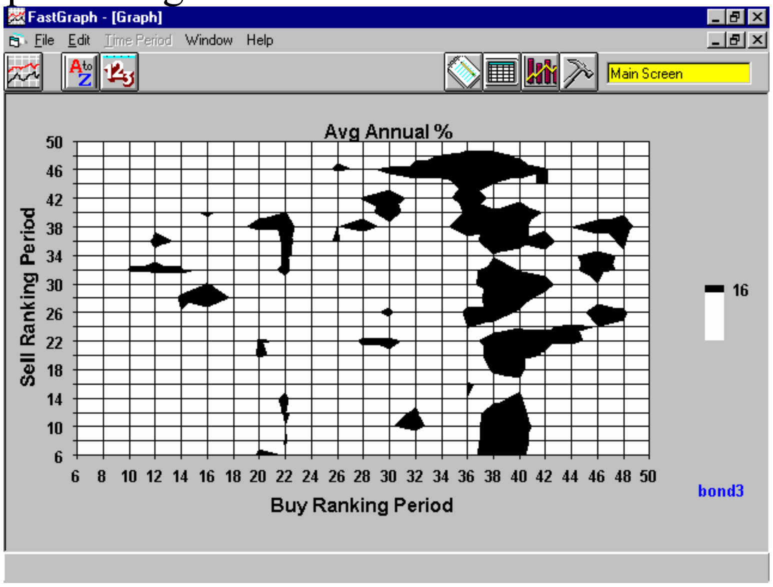
The order (best-worst) of the above lines is Bond 4, 3, 2, 5, and 1.

Annual return actually improved, but what about MDD?

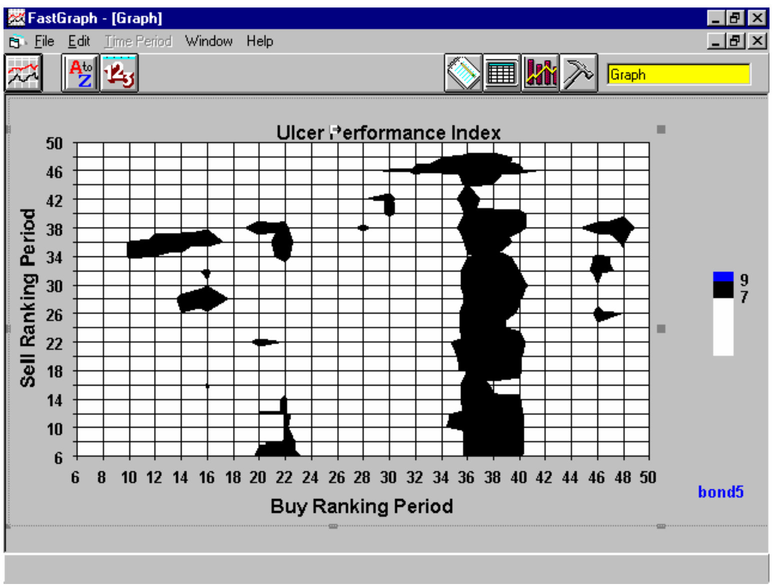


The order (best-worst) in the above chart is bond 4, 3, 5, 1, and 2. The addition of an EMA stop not only improves the annual return, but more significantly the MDD is **dramatically** reduced. Another observation is that there is little difference in MDD between EMAs of 40, 50, or 60 days.

Now we need to find some robust ranking parameters using the contour graph. Using bond 3:



And UPI:

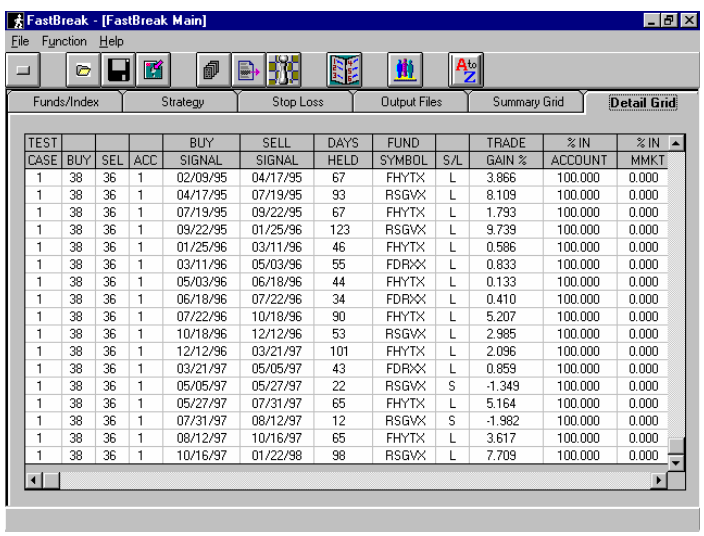


It would appear that a buy ranking of approximately 38 market days is optimum. It also appears that the sell ranking is not sensitive at all.

Here are the best (from an annual return basis) test cases:

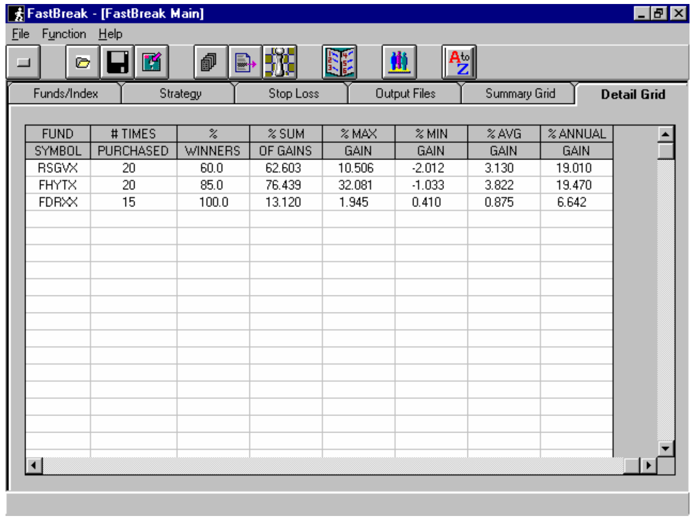
Buy	Sell	S/Y	Ann %	MDD	MDD Date	UI	UPI	%Win
36	38	6	17.221	4.593	8/14/89	1.5	8.1	81.5
38	36	6	16.93	4.593	8/14/89	1.4	8.3	80
38	6	6	16.889	4.593	8/14/89	1.4	8	79.6
16	28	7	16.886	4.477	3/24/97	1.3	9.2	77
38	8	6	16.832	4.593	8/14/89	1.4	8	79.6
30	40	6	16.828	4.593	8/14/89	1.5	7.5	79.6
40	10	6	16.764	4.593	8/14/89	1.5	7.4	76.4
40	8	6	16.735	4.593	8/14/89	1.5	7.4	78.2
38	38	6	16.698	4.593	8/14/89	1.4	7.9	78.6
40	30	6	16.684	4.593	8/14/89	1.5	7.3	78.2
38	10	6	16.641	4.593	8/14/89	1.4	7.8	79.6
28	38	6	16.638	4.593	8/14/89	1.5	7.6	80.8
38	28	6	16.619	4.593	8/14/89	1.4	7.9	79.6
38	20	6	16.594	4.593	8/14/89	1.4	7.8	79.6

It appears that there are several good choices. Compare the results to the characteristics of the individual funds shown earlier. Using a Buy rank of 38 days and Sell rank of 36 days, run in FastBreak. Here is the recent trading history:



TEST CASE	BUY	SEL	ACC	BUY SIGNAL	SELL SIGNAL	DAYS HELD	FUND SYMBOL	S/L	TRADE GAIN %	% IN ACCOUNT	% IN MMKT
1	38	36	1	02/09/95	04/17/95	67	FHYTX	L	3.866	100.000	0.000
1	38	36	1	04/17/95	07/19/95	93	RSGVX	L	8.109	100.000	0.000
1	38	36	1	07/19/95	09/22/95	67	FHYTX	L	1.793	100.000	0.000
1	38	36	1	09/22/95	01/25/96	123	RSGVX	L	9.739	100.000	0.000
1	38	36	1	01/25/96	03/11/96	46	FHYTX	L	0.586	100.000	0.000
1	38	36	1	03/11/96	05/03/96	55	FDRXX	L	0.833	100.000	0.000
1	38	36	1	05/03/96	06/18/96	44	FHYTX	L	0.133	100.000	0.000
1	38	36	1	06/18/96	07/22/96	34	FDRXX	L	0.410	100.000	0.000
1	38	36	1	07/22/96	10/18/96	90	FHYTX	L	5.207	100.000	0.000
1	38	36	1	10/18/96	12/12/96	53	RSGVX	L	2.985	100.000	0.000
1	38	36	1	12/12/96	03/21/97	101	FHYTX	L	2.096	100.000	0.000
1	38	36	1	03/21/97	05/05/97	43	FDRXX	L	0.859	100.000	0.000
1	38	36	1	05/05/97	05/27/97	22	RSGVX	S	-1.349	100.000	0.000
1	38	36	1	05/27/97	07/31/97	65	FHYTX	L	5.164	100.000	0.000
1	38	36	1	07/31/97	08/12/97	12	RSGVX	S	-1.982	100.000	0.000
1	38	36	1	08/12/97	10/16/97	65	FHYTX	L	3.617	100.000	0.000
1	38	36	1	10/16/97	01/22/98	98	RSGVX	L	7.709	100.000	0.000

And here is the history of the funds traded:



FUND SYMBOL	# TIMES PURCHASED	% WINNERS	% SUM OF GAINS	% MAX GAIN	% MIN GAIN	% AVG GAIN	% ANNUAL GAIN
RSGVX	20	60.0	62.603	10.506	-2.012	3.130	19.010
FHYTX	20	85.0	76.439	32.081	-1.033	3.822	19.470
FDRXX	15	100.0	13.120	1.945	0.410	0.875	6.642

Other things to try:

- Apply the EMA only during the minimum holding period
- Try other stop out functions
- Use a different minimum holding period

Medium - Conservative Select

Goals

- Better return than the bond system
- "Reasonable" MDD
- Low UI
- High UPI
- Do not depend on timing signals

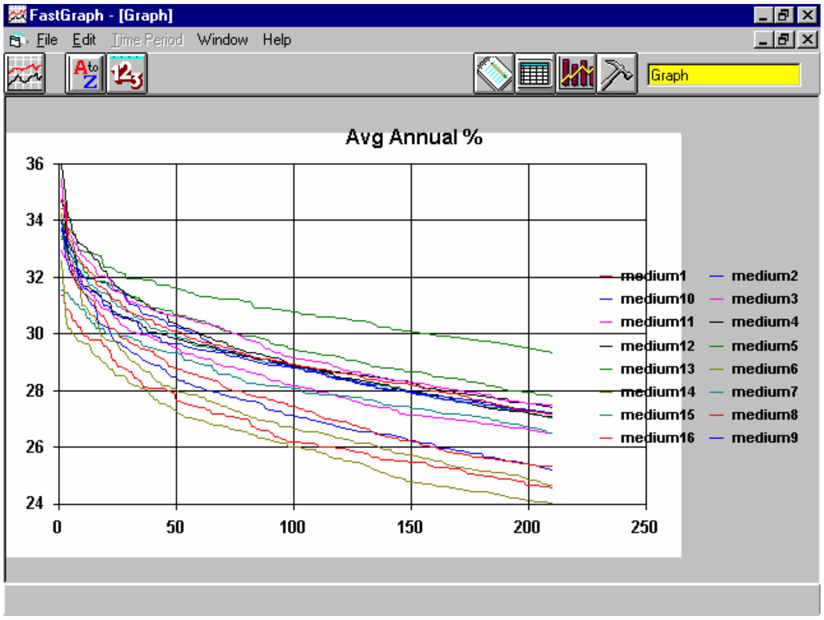
Ground rules

- No gold funds
- Hold two funds
- Testing period 12/18/88 - 12/31/97
- Check parameters from 6 to 50 in increments of 2
- FDRXX as money market

Here is a table of the different FastBreak runs that were made.

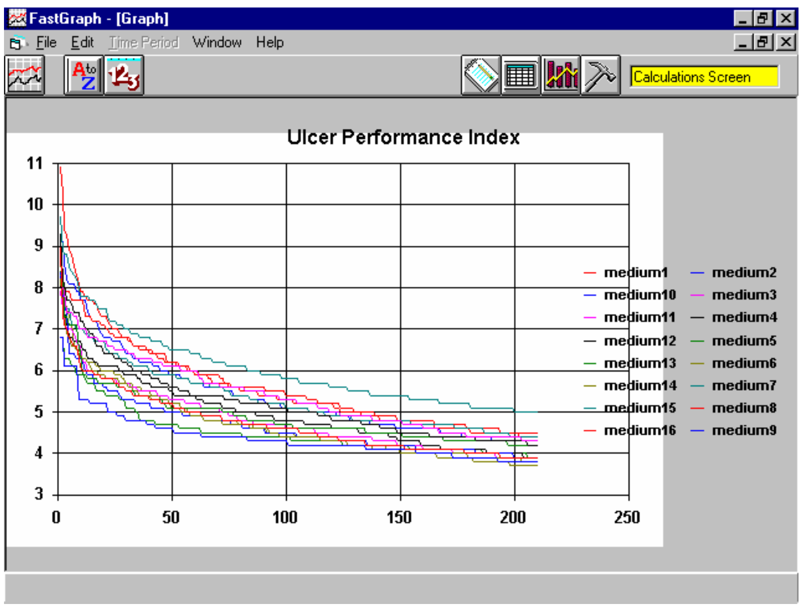
File	Buy/Sell	Top%	Notes
Medium1	Rank	40	
Medium2	Rank	25	
Medium3	Harnsberger	40	
Medium4	Harnsberger	25	
Medium5	AccuTrack	10	
Medium6	Rank	25	Max Cor=0.9
Medium7	Rank	25	POP=2.0
Medium8	Rank	25	Max Cor=0.9, POP=2.0
Medium9	Rank	25	Max Cor=0.9, POP=1.5
Medium10	Gain*Gain	25	
Medium11	Rank*Rank	25	
Medium12	Rank+Rank	25	
Medium13	Rank*Rank	40	
Medium14	Rank*Rank	25	Max Cor=0.9
Medium15	Rank*Rank	25	POP=2.0
Medium16	Rank*Rank	25	Max Cor=0.9, POP=2.0

During development a few FastBreak runs would be made and then results compared in FastGraph. For brevity here is a black and white composite of annual return:



FastGraph - [Graph]
File Edit Time Period Window Help
Graph
Avg Annual %
36
34
32
30
28
26
24
0
50
100
150
200
250
medium1 medium2
medium10 medium3
medium11 medium4
medium12 medium5
medium13 medium6
medium14 medium7
medium15 medium8
medium16 medium9

And UPI:



FastGraph - [Graph]
File Edit Time Period Window Help
Calculations Screen
Ulcer Performance Index
11
10
9
8
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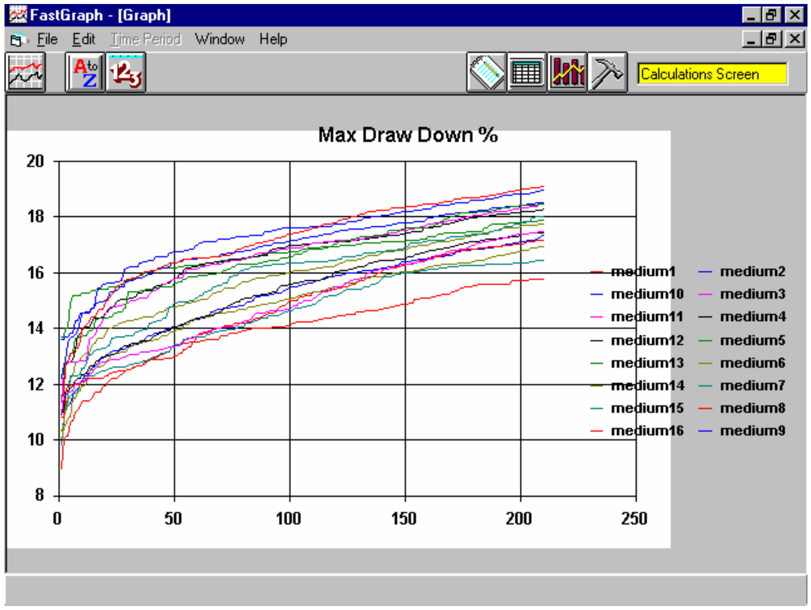
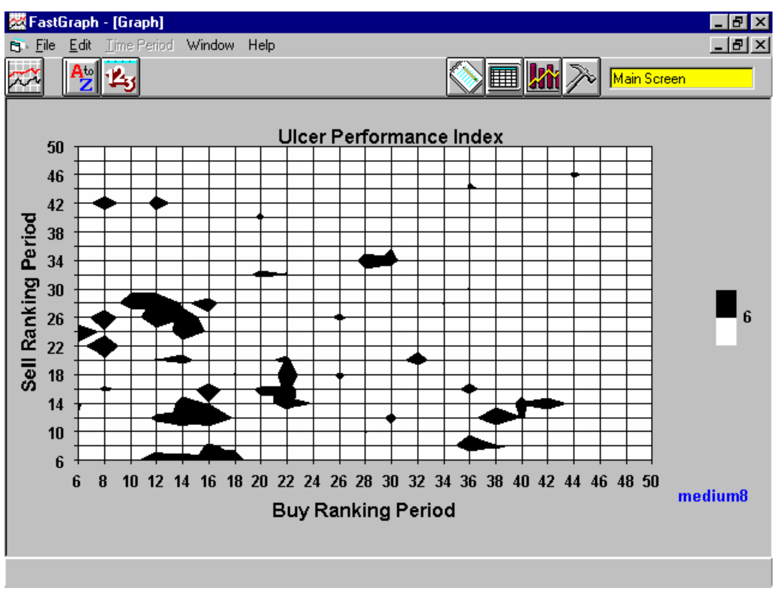
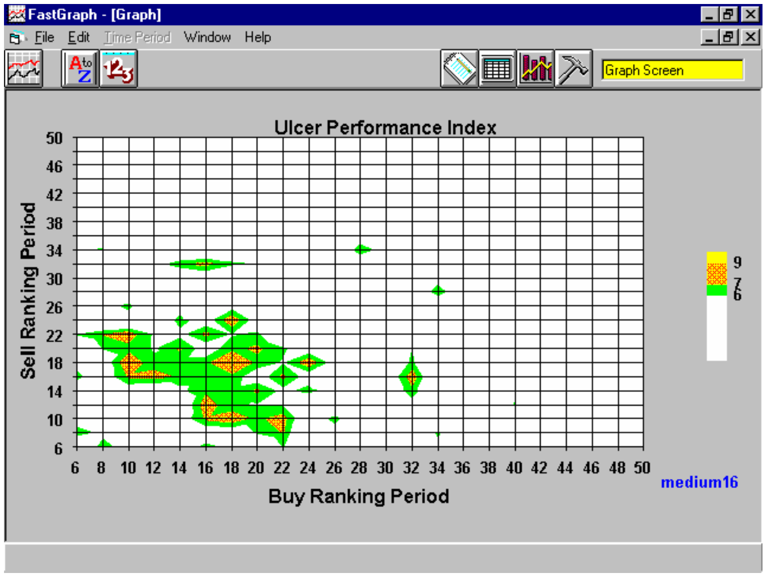
6
5
4
3
0
50
100
150
200
250
medium1 medium2
medium10 medium3
medium11 medium4
medium12 medium5
medium13 medium6
medium14 medium7
medium15 medium8
medium16 medium9

Finally MDD:



Studying these charts (in color) the best MDD and UPI is found with Medium 8 which also has a very good annual return. However, Medium 16 is a close second. Looking at the contour graph of UPI we check on robust parameters :





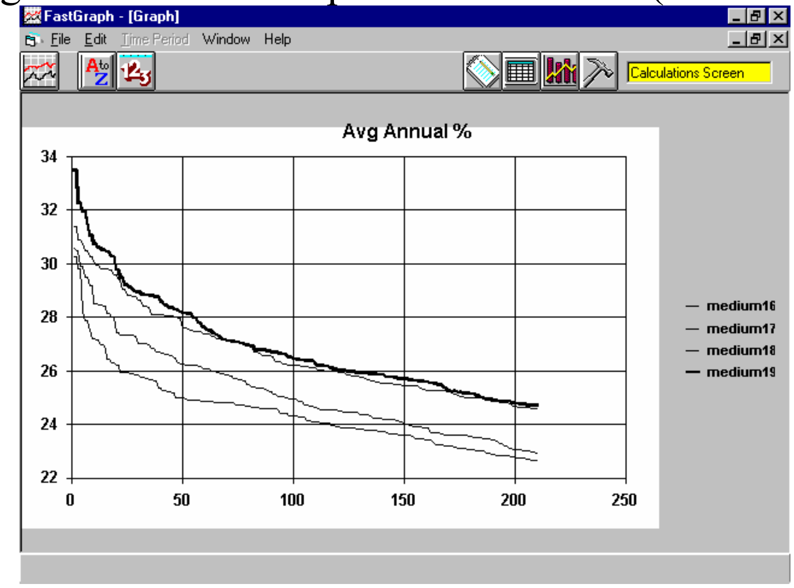
We like Medium 16 the best because of the well defined parameter region.

Note: Although the chart has Buy Ranking/Sell Ranking the parameters are actually Short Ranking Period and Long Ranking Period. The optimum parameters appear to be near 18/18.

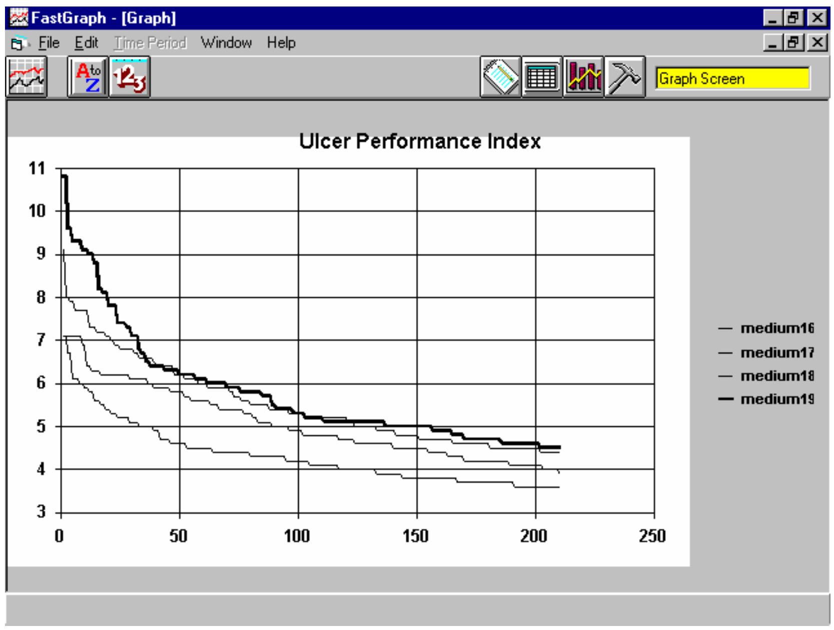
We have one final step. Since we are not using a signal file there is the possibility that we could get a sharp sell off in our funds during the 30 days of the minimum holding period. We need to have an exit. Therefore we will try a Parabolic stop and Dynamic stop in the first 30 days. Here are the test cases:

File	Buy/Sell	Top%	Notes
Medium17	Rank*Rank	25	Parabolic 0.02/0.0001
Medium18	Rank*Rank	25	Parabolic 0.01/0.0001
Medium19	Rank*Rank	25	Dynamic Stop 6%,30 Days

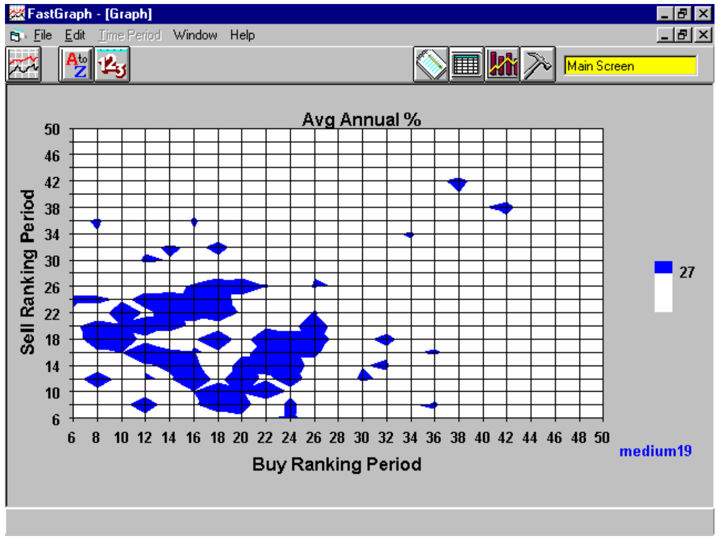
Comparing these runs to our previous best case (Medium 16):

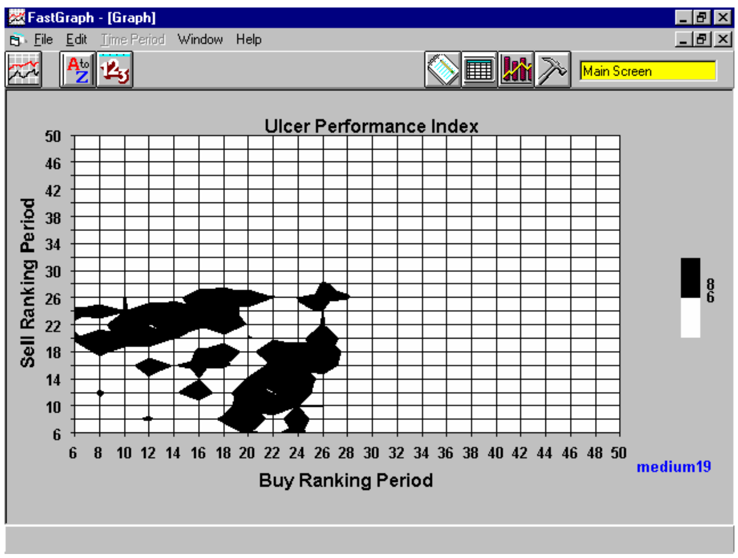


UPI:



The 6% Dynamic stop not only improves the return but significantly improves the UPI in some cases. Now, what did it do to the parameters contour:





There are several good points but we picked 18/24 for a comparison. A good reference point for comparison is the Vanguard Index 500 (VGINX):

Fund	Ann%	UI	UPI	MDD %
VFINX	18.1	3.9	3.2	-19.2
Medium 19	31.1	2.9	9.3	-11.9

I think we can be very satisfied.

Hot - Aggressive Select Trading

Goals

- Better return than the conservative (Medium) system
- Market Timing not fund selection to control MDD & UI
- High UPI

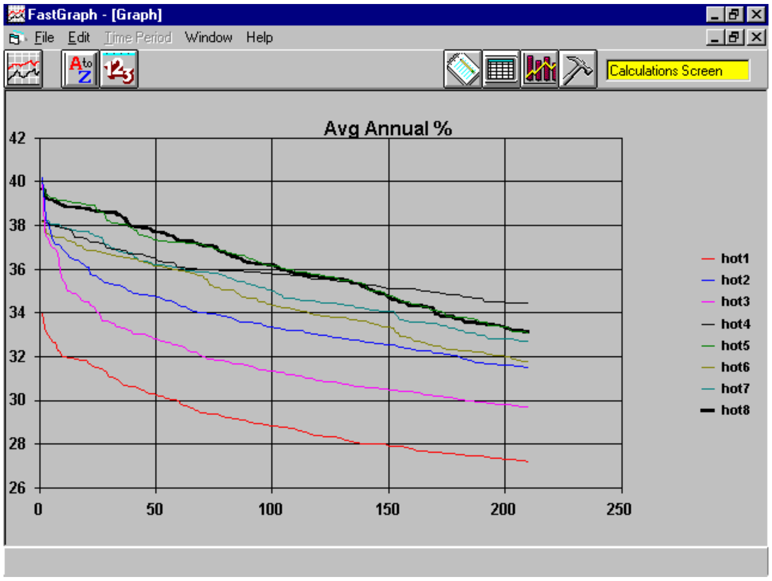
Ground rules

- No gold funds
- Hold two funds
- Testing period 12/18/88 - 12/31/97
- Check parameters from 6 to 50 in increments of 2
- FDRXX as money market

This strategy contains more risk because it will hold more aggressive funds and be dependent on the market timing signal. For this added risk we will expect a better historical return.

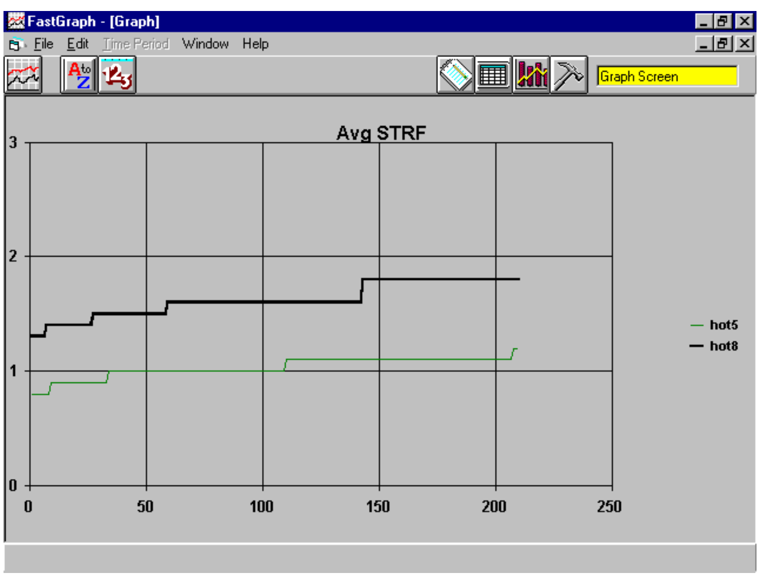
We will not show as many details as in the previous strategies. Here are the different FastBreak trials that were run:

File	Buy/Sell	Top%	Signal	Notes
Hot1	Rank	25	None	
Hot2	Rank	25	T17	
Hot3	Rank	25	T87	
Hot4	AccuTrack	10	T17	
Hot5	AccuTrack	15	T17	
Hot6	AccuTrack	15	T17	Dynamic 6%,30 Days
Hot7	AccuTrack	15	T17	Dynamic 8%,30 Days
Hot8	AccuTrack	15	T17	Para 0.01/0.0001, 30 Days

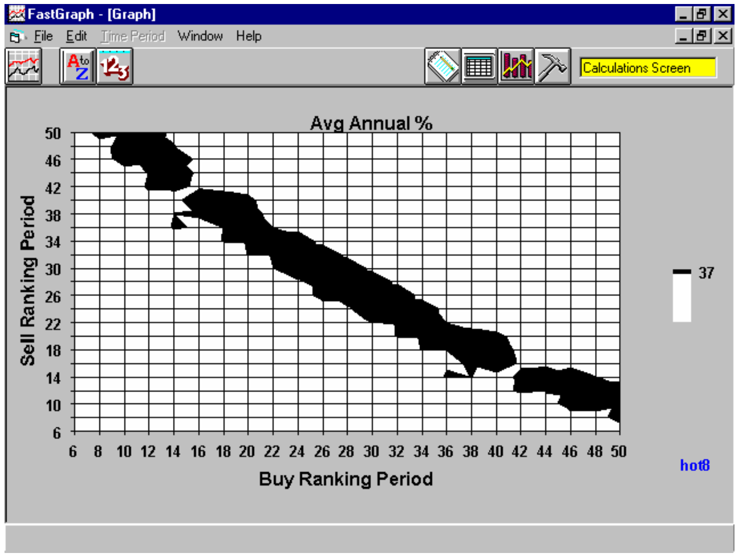


T17 Proved to be the better timing signal and was used for subsequent runs.

The parameters for stopping out in the first 30 days need to be selected carefully. Any benefit of the stop can quickly be overcome with redemption fees. Note that the parabolic parameters in Hot 8 only slightly increase the number of Short Term Redemption Fees (STRF) compared to the non-stop case.



Here are the optimum parameters:



Here are the top ten (from a return basis) parameter sets:

Parm1	Parm2	S/Y	Ann %	MDD	MDD Date	UI	UPI	%Win
46	14	15	39.665	12.786	12/24/97	3.3	10.5	79.1
14	46	15	39.638	12.785	12/24/97	3.3	10.5	79.1
26	32	14	39.207	13.172	12/24/97	3.6	9.4	80.5
32	26	14	39.207	13.172	12/24/97	3.6	9.4	80.5
28	30	14	39.144	13.173	12/24/97	3.6	9.4	80.5
30	28	14	39.144	13.173	12/24/97	3.6	9.4	80.5
16	40	15	39.063	11.852	12/24/97	3.2	10.5	81.4
40	16	15	39.063	11.852	12/24/97	3.2	10.5	81.4
12	50	15	38.99	12.193	12/24/97	3.2	10.4	80.5
24	32	15	38.889	12.904	12/24/97	3.5	9.5	82.2

There are several good choices.

Nitro - Trading Aggressive Funds with Market Timing

Goals

- Better return than the Aggressive Select system
- Marker Timing to control MDD & UI
- High UPI

Ground rules

- Hold one fund - Rely on the fund manager to diversify
- Testing period 12/18/88 - 12/31/97
- Check parameters from 6 to 50 in increments of 2
- Examine using Rydex Ursa rather than MMkt

This strategy contains more risk because it will hold a single aggressive fund and be dependent on the market timing signal in both the long and short direction. For this added risk we will expect a very high historical return.

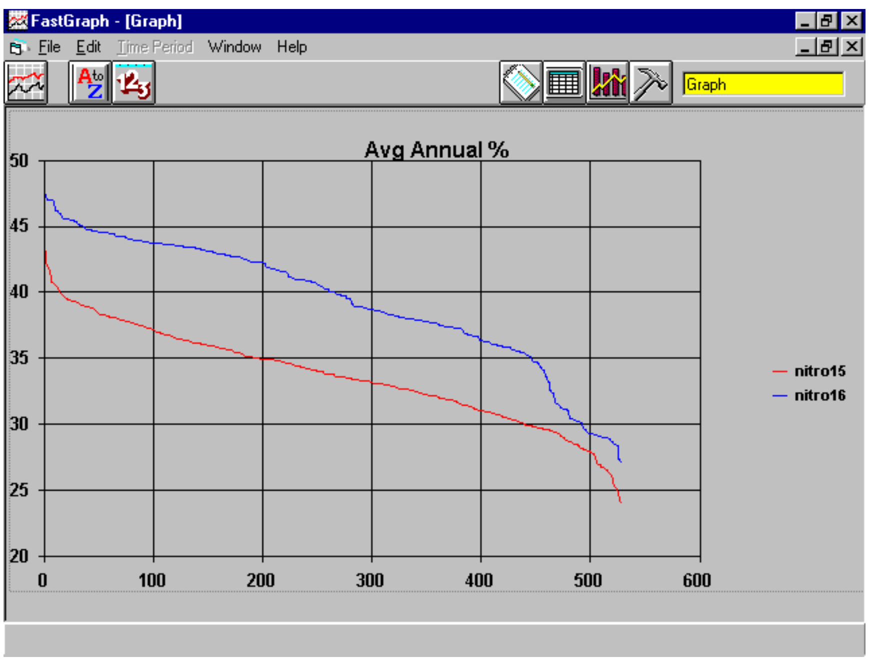
The following funds were selected from the Fidelity FundsNetwork Directory. The selection was made based on 10 year performance from the capital appreciation, growth, mid-cap & small cap categories. The final requirement was that they were no or low transaction fee funds.

Alger Spectra	SPECX	Longleaf PartnersLLPFX	
AmerCent 20th Ultra	TWCUX	MAS Small Cap	MPSCX
Baron Asset	BARAX	Nicholas Limited Edition	NCLEX
Berger Small Company	BESCX	PGHG Growth	PGHGX
Founders Growth	FRGRX	Safeco Growth	SAFGX
Gabelli Asset	GABAX	Skyline Special Equity	SKSEX
Heartland Value	HRTVX	SoundShr Fund	SSHFX
Janus Twenty	JAVLX	Rydex Nova	
Kaufmann	KAUFX	Rydex OTC	

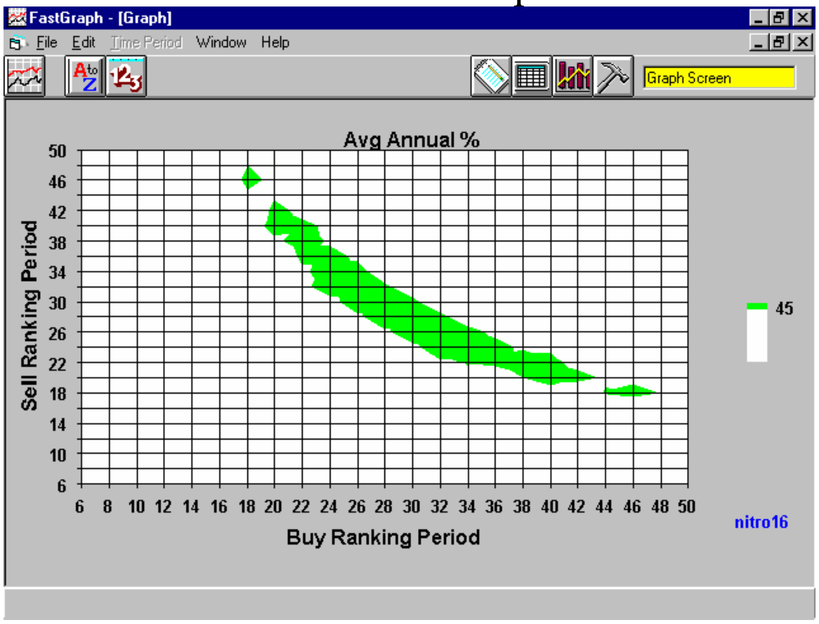
The two Rydex funds were used based on recent performance since the funds were not available for 10 years. FastGraph was used to create a simulated version.

A number of runs were made and here are the final charts:

File	Buy/Sell	Signal	Top%	Notes
Nitro1	Rank		30	
Nitro2	Rank		10	
Nitro3	Rank	T17	30	
Nitro4	Rank	T17	10	
Nitro5	Rank	T37	30	
Nitro6	Rank	T76	30	
Nitro7	Rank	T87	30	
Nitro8	AccuTrack		10	
Nitro9	AccuTrack	T17	10	
Nitro10	AccuTrack	T17	20	
Nitro11	Rank	T17	30	
Nitro12	Rank*Rank	T17	30	
Nitro13	AccuTrack	T17	5	
Nitro14	AccuTrack	T17	15	
Nitro15	Rank	T17	30	Ursa, exclude Mmkt from Ranking
Nitro16	AccuTrack	T17	10	Ursa, exclude Mmkt from Ranking



Nitro 16 is the best case and here is the parameter contour:



Again note that the X axis is AT parameter 1 and the Y axis is AT parameter 2.

Results using best test (AT 26/32):

Fund	Ann%	UI	UPI	MDD %
VFINX	18.1	3.9	3.2	-19.2
Nitro16	47.4	3.8	11.1	-14.8

This strategy switches 7 times per year and has an excellent return.

What could we do to improve this strategy?

Look at newer aggressive funds that do not have a full ten year record

Add a stop function in the first 30 trading days for protection

FastGraph - Overview

FastGraph began life making 3D contour graphs to help select optimum parameters using FastBreak. It now has many advanced features:

Import files from FastWays to visually select parameters

Build simulated “super charged” index funds for testing

Cycle analysis of the market or individual funds

Composite timing signal analysis

Point & Figure charts

Candlestick charts

Correlation analysis

Hurst Exponent trend analysis

Bollinger Bands

Parabolics

Exponential Moving Averages

Display multiple funds at the same time