

# **How To Read The New TradeStation 2000/ Performance Report**

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# Introduction

This book is an introduction to the new performance reports available in TradeStation 2000*i*. RINA Systems, a co-developer of Portfolio Maximizer and of the new TradeStation 2000*i* System Report, hopes that you will find this educational material useful in your efforts to develop and trade profitable systems.

Traders need to be able to perform systematic and objective statistical analysis of their trading performance. That's why, through the cooperation between RINA Systems and Omega Research, TradeStation 2000*i* now has enhanced performance reporting capabilities that were once only available to institutional traders. With this release, you will have the power to view a tremendous amount of information vital for the serious systems trader.

The new TradeStation 2000*i* performance report is divided into several sections. Each section presents a different aspect of trading system performance. This booklet covers these sections, providing you with a broad overview of the information presented in the report, discussing differences between the old and new report, and providing with tips on using these new evaluation tools. These sections include

- Performance Ratios
- Trade Analysis
- Equity Curve Analysis

The first section describes the new reward to risk ratios and their role in analysis of trading results. Sharpe ratio as the most accepted one is considered a measure of the smoothness of equity curve. Smoothness of equity curve over a period of time is perceived to be a very important factor for money managers. This is also one of the interesting characteristics, because combining several performances with good Sharpe ratios does not guarantee a good Sharpe ratio on the combined portfolio. A new index, called RINA Index, is described in this section.

New trading characteristics are introduced in the second section. These characteristics help traders analyze an individual trade performance on average and point to strengths and weaknesses of the trading performance.

A very important component of trading performance, Equity Curve Analysis, described in the third section lets traders to view the equity performance mark-to-market daily, weekly, monthly, yearly, seasonal, underwater and others.

The new performance report also has several settings that play a role in viewing the information in the report. These settings change the numbers in the report and the look of the report. The settings that change the numbers are:

- Number of Standard Deviations
- Investment Type
- Advanced Trade-by-Trade Report.

The Number of Standard Deviations lets user select how many Standard Deviations from the average to include in the analysis 1, 2 or 3. Assuming normal distribution of the values being analyzed the range between the average plus one standard deviation and the average minus one standard deviation holds about 68% of all the numbers. For the average plus two standard deviations and the average minus two standard deviations it is 95% and for the average plus three standard deviations and the average minus three standard deviations it is 99.7%. For example, for trade P/L there are about 68% of all trades P/L for the case of

one standard deviation. Even though the normal distribution does not necessarily take place these numbers provide with a good estimate of what happened.

If Investment Type box is checked (Mutual Fund) the report will be done based on reinvestment of all the capital into the next trade as it is done when trading mutual funds.

The software has two kinds of Trade-by-Trade reports: Standard and Advanced. Advanced report has much more information and it is described below. By checking this checkbox the user will always see the advanced report by default.

## Section One: Performance Ratios

A key area of analysis for system traders is evaluating performance using risk based return measures. The performance ratios in the new TradeStation 2000i System Report include:

- Sharpe Ratio
- Return Retracement Ratio
- K-Ratio
- RINA Index

### System Analysis Exhibit

TradeStation System Report - RINA1 S&P 500 Index-I 6300 63/00-Daily SP 63/00-5 (1/3/89-1/20/99)			
System Analysis			
Net Profit	\$376,375.00	Open Position	\$4,800.00
Gross Profit	\$407,987.50	Interest Earned	\$25,885.88
Gross Loss	(\$31,612.50)	Commission Paid	\$3,800.00
Percent profitable	77.14%	Profit factor	12.91
Ratio avg. win/avg. loss	3.82	Adjusted profit factor	8.92
Annual Rate of Return	18.05%	Sharpe Ratio	0.33
Return on Initial Capital	376.38%	Return Retracement Ratio	4.93
Return on Max. Drawdown	680.61%	K-Ratio	1.48
Buy/Hold return	142.12%	RINA Index	158.65
Cumulative return	287.42%	Percent in the market	48.84%
Adjusted Net Profit	\$312,951.81	Select Net Profit	\$334,200.00
Adjusted Gross Profit	\$352,467.43	Select Gross Profit	\$365,812.50
Adjusted Gross Loss	(\$39,515.63)	Select Gross Loss	(\$31,612.50)

## SHARPE RATIO

Nobel Laureate William Sharpe introduced the Sharpe Ratio, in 1966, under the name reward-to-variability ratio. This ratio is perhaps the best known of the return to risk measures. The formula for the Sharpe ratio is

$$SR = (\mu - I) / \sigma$$

where  $\mu$  is the average monthly return for the period in consideration,  $I$  is the risk free rate of return,  $\sigma$  is the standard deviation of monthly returns.

Thus, this formula yields a value that could be loosely defined as return per unit risked if we accept the premise that variability is risk. The higher Sharpe ratio the smoother the equity curve on a monthly basis. Having a smooth equity curve is a very important objective for many traders. That is why this ratio is widely used both at an individual market and at a portfolio level. Schwager and other authors have noted that risk might be more accurately defined as downside variability of returns which has led to the introduction of some alternative measures. The Sharpe ratio remains, however, one of the main measures for evaluating the performance of professional portfolio managers.

## RETURN RETRACEMENT RATIO

Jack Schwager created the Return Retracement Ratio as another reward to risk measure. A major distinction between this measure and the Sharpe ratio is the use of equity retracement versus variability of returns as a measure of risk. The Return Retracement Ratio places more emphasis on downside volatility. Specifically, this ratio is the average annualized compounded return divided by an average maximum retracement measure.

For the detailed calculation of the Return Retracement Ratio see Appendix A.

## K - RATIO

Lars Kestner created a ratio that gauges performance by examining the consistency of returns with respect to time. Calculations for return and risk are derived from VAMI (value added monthly index). VAMI is a monthly plot of the progress of a hypothetical \$1000 initial investment.

For the detailed calculation of K - Ratio see Appendix B.

Because the consistency of returns is examined with respect to time, the K – ratio provides a good evaluation of equity performance.

## RINA INDEX

The previous three ratios are equity performance measures. RINA Systems has developed a new ratio, called RINA Index, that is a trade performance measure. The RINA Index is calculated by taking the net profit without trades that are outside of 3 sigma from the average trade weighted by the average drawdown and by the percent time in the market.

$$\text{RINA Index} = (\text{Net Profit} - \text{Net Profit in Outliers}) / (\text{Average Drawdown} * \text{Percent Time in the Market})$$

The index is a good substitute for the ratio Net Profit/ Maximum Drawdown. It gives more realistic reward/risk value for a trading performance. In addition to drawdown as an element of risk in the measurement of performance, time-in-the-market is included as another element of risk. The premise is that there is an inherent risk any time a position is established. Following this logic, the RINA Index would be higher (all other variables equal) for a system that spends less time in the market. Generally, a system with a RINA Index of 30 or higher could be considered to have a reasonably good performance.

Using the RINA Index traders get a performance measure independent of the return on equity and initial capital. The RINA Index will not change whether you select fifty thousand or one hundred thousand dollars as your initial capital to trade a strategy. It will, however, change with the price of the underlying moving up or down during the trade. The Sharpe Ratio, for instance, is dependent on the capital in the account upon which monthly returns are calculated. The RINA Index is one of the few ways to measure the quality of the trades themselves, which are generated by a trading system.

Another main difference between the RINA Index and some of the other measures of trading performance is that the RINA defines risk as time in the market and average drawdown. The RINA Index will be biased against a system that has outlier trades. A good example of this is a long-term trend following strategy applied to several markets that attempts to catch the “fat tails” of price distributions.

With the addition of these performance measures to TradeStation 2000i traders have a greatly expanded capability to compare the results of various systems.

For more information about RINA Index please refer to the article “Performance Analysis Using RINA Index” on RINA Systems web site [www.rinasystems.com](http://www.rinasystems.com).

The new report also has the ratios like Return on Initial Capital, Annual Rate of Return, Return on Maximum Drawdown and others.



## Section Two: Trade Analysis

This section covers the analysis of individual trades that includes individual trade drawdown, run-up, maximum adverse excursion, maximum favorable excursion, efficiency analysis, new advanced trade-by-trade report, winning and losing trade analysis.

### Total Trade Analysis Exhibit

#### Performance Tip

The Total Trade Analysis section centers on individual trades. The Maximum Drawdown in this section means the maximum drawdown on an individual trade. It should not be confused with Maximum Equity Drawdown, which uses consecutive trades. Refer to the Time Analysis section for more information concerning Maximum Equity Drawdown.

Total Trade Analysis			
Number of total trades	70	Total stopped trades	0
Average trade	\$5,376.79	Avg. trade ± 1 STDEV	\$14,171.55 / (\$3,417.98)
1 Std. Deviation (STDEV)	\$8,794.76	Coefficient of variation	163.57%
<b>Run-up</b>			
Maximum Run-up	\$49,600.00	Max. Run-up Date	5/15/97
Average Run-up	\$8,088.38	Avg. trade ± 1 STDEV	\$18,073.83 / \$0.00
1 Std. Deviation (STDEV)	\$9,985.45	Coefficient of variation	123.45%
<b>Drawdown</b>			
Maximum Drawdown	(\$29,562.50)	Max. Drawdown Date	10/28/97
Average Drawdown	(\$4,312.85)	Avg. trade ± 1 STDEV	\$0.00 / (\$9,445.04)
1 Std. Deviation (STDEV)	\$5,132.19	Coefficient of variation	119.00%
<b>Reward/Risk Ratios</b>			
Net Prft/Largest Loss	54.45	Net Prft/Max Drawdown	12.73
Adj Net Prft/Largest Loss	45.27	Adj Net Prft/Max Drawdown	10.59

## DRAWDOWN ANALYSIS

Drawdown in this section is defined as the system's maximum loss potential during an individual trade. This differs from maximum equity drawdown which centers on multiple trade analysis. Equity drawdown is discussed in the next section.

Drawdown is especially important to consider because it represents loss of equity, perhaps unrealized, that occurred during the course of a trading. This might be easily overlooked because many of the trades may have been exited with a profit. However, professional traders tend to focus more on limiting drawdown rather than seeking the maximum possible return. The section also includes average trade drawdown, standard deviation of trade drawdown and the coefficient of variation. Coefficient of variation is equal to one standard deviation divided by the average expressed in percent.

Trade drawdown is the drawdown on an individual trade. The calculation of drawdown includes the retracement from the trade high including intra-trade run-up. This means that if a trade was entered at a price of 6, subsequently rose to 10 and then fell to 6 the drawdown would be calculated to be 4 points or 40%.

Average trade drawdown is calculated as an addition of all trades maximum drawdown numbers divided by the number of trades.

## RUN-UP ANALYSIS

Run-up is defined as the system's maximum profit potential. It's essentially the opposite of drawdown. The greater the run-up the better the performance, assuming the system captures the majority of the move. The most obvious benefit of looking at run-up is the ability to determine if a system is "leaving too much on the table" in terms of potential profits that were not realized.

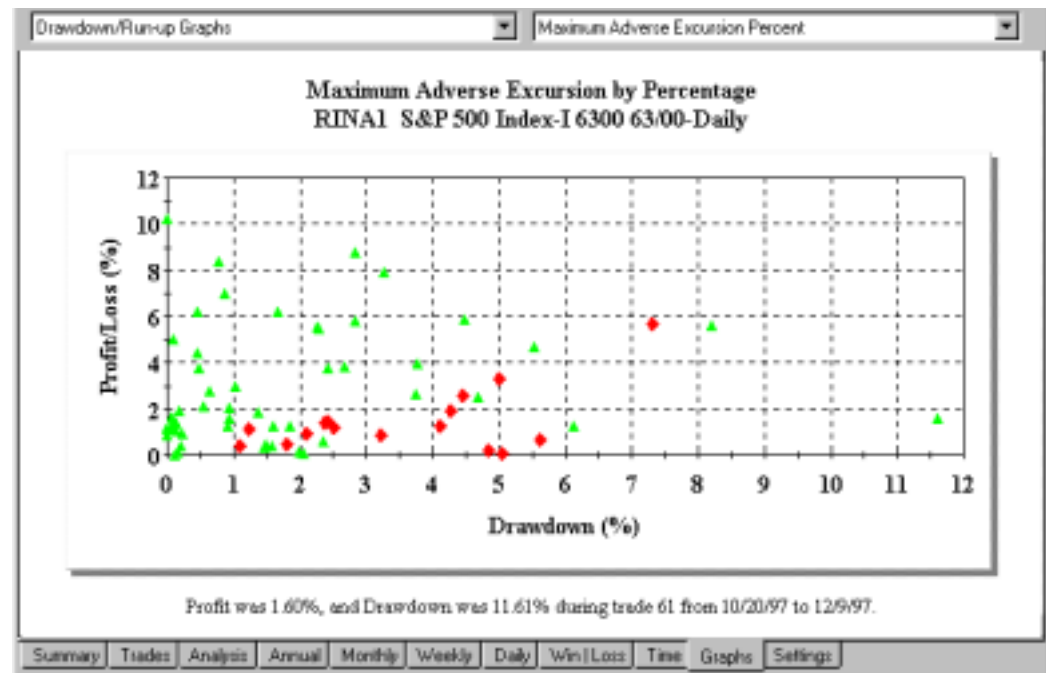
A lot of unrealized run-up may, for example, indicate that the system was able to position itself in the right direction of price movement, but the timing of the exit was not effective in capturing all of the potential profits.

## MAXIMUM ADVERSE EXCURSION

Maximum Adverse Excursion is a concept that was introduced by John Sweeney, the technical editor of Technical Analysis of Stocks and Commodities magazine. The Maximum Adverse Excursion graph found in the new TradeStation performance report is an important aid in determining stop levels for trading systems.

The Maximum Adverse Excursion graph is shown in Maximum Adverse Excursion Exhibit below. The Y-axis represents the profit/loss at which a trade was closed out. The X-axis represents the drawdown that occurred during a trade. By looking at all of the trades for a particular system a trader can often see patterns that indicate whether system's trades are likely to come back from various drawdowns. For example, in the Exhibit below trades that experienced intra-trade drawdown of more that 5% hardly ever come back to be closed out profitable. This may have some useful implications for placing stops. This graph can also be used to determine if opportunity exists to add to trades during drawdown.

### Maximum Adverse Excursion Exhibit



## MAXIMUM FAVORABLE EXCURSION

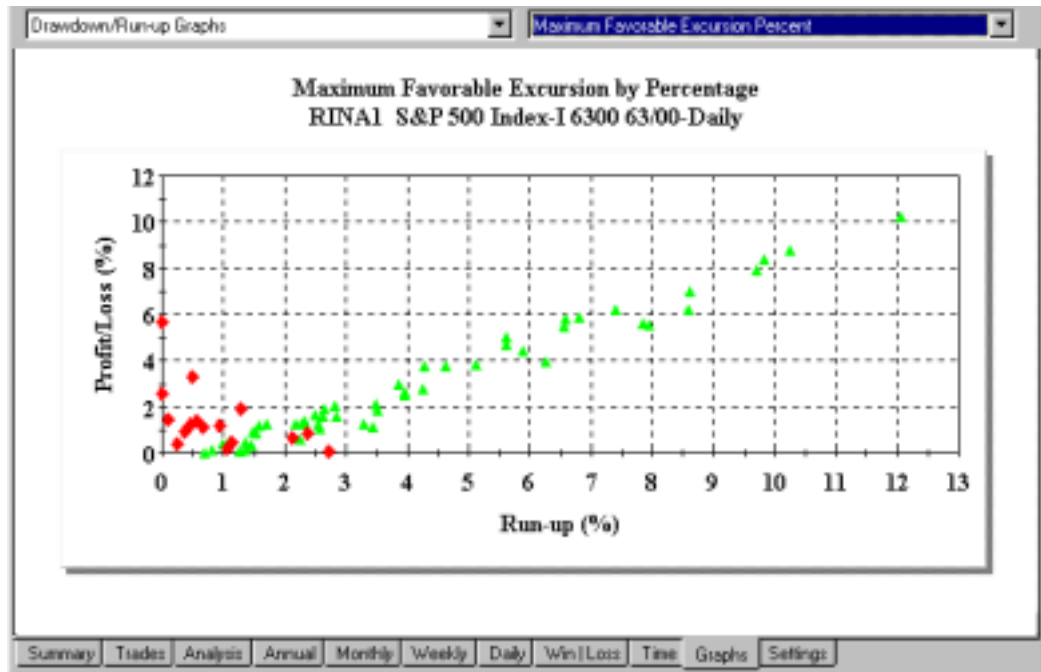
The Maximum Favorable Excursion graph allows traders to compare each of a trade profit and run-up that occurred during the trade.

This graph may be helpful in determining potential places to add to positions. Using this graph, traders can see at what level a trade is likely to be closed out at an even greater profit. In addition it may be possible to notice if a system has a tendency to return even greater profits on average after some level of profitability has been achieved on a trade.

### Performance Tip

*The run-up analysis section plays an important role in the evaluation of the Maximum Favorable Excursion (MFE) risk management strategy. For more information concerning MFE refer to RINA Systems article "Maximum Favorable Excursion" in the March 1999 issue of Stocks and Commodities magazine.*

### Maximum Favorable Excursion by Percentage Exhibit



## EFFICIENCY ANALYSIS

Trades may have the same duration, start from the same price and make the same profit but there could be a big difference between them. Using the concept of efficiency traders can quantify and analyze these differences and determine the steps to improve the performance.

Total Efficiency is defined as a realized difference in prices from a trade expressed as a part of the total profit potential during that trade. It shows how well the total move of a trade has been used. The following formula is used to compute Total Efficiency for a trade.

Total Efficiency =  $\text{Realized\_Difference\_in\_Prices} / \text{Profit\_Potential}$ .

Realized\_Difference\_in\_Prices is the difference between Exit Price and Entry Price taken into account the direction of the trade.

Profit\_Potential is the difference between the highest and the lowest prices during the trade. That means

For Long Trades

Total\_Efficiency =  $(\text{Exit\_Price} - \text{Entry\_Price}) / (\text{Highest\_Price} - \text{Lowest\_Price})$ ,

For Short Trades

$$\text{Total\_Efficiency} = (\text{Entry\_Price} - \text{Exit\_Price}) / (\text{Highest\_Price} - \text{Lowest\_Price}).$$

Entry Efficiency is defined as a maximum possible realized difference in prices from a trade that has the trade entry price expressed as a part of the total profit potential during that trade. Entry Efficiency shows how well a system enters into a trade. If a trade is long - how close an entry to the lowest point within the trading period, if a trade is short - how close an entry to the highest point within the trading period. The following formula is used to compute Entry Efficiency for a trade.

Entry Efficiency =  
Maximum\_Possible\_Difference\_in\_Prices\_For\_This\_Entry/Profit\_Potential.

Maximum\_Possible\_Difference\_in\_Prices\_For\_This\_Entry is the difference between the Highest Close Price (for Long Trade or the Lowest Close Price for Short Trade) and Entry Price.

That means

For Long Trades

$$\text{Entry\_Efficiency} = (\text{Highest\_Price} - \text{Entry\_Price}) / (\text{Highest\_Price} - \text{Lowest\_Price}).$$

For Short Trades

$$\text{Entry\_Efficiency} = (\text{Entry\_Price} - \text{Lowest\_Price}) / (\text{Highest\_Price} - \text{Lowest\_Price}).$$

Exit Efficiency is defined as a maximum possible realized difference in prices from a trade that has the trade exit price expressed as a part of the total profit potential during that trade. Exit Efficiency shows how well a system exits a trade. If a trade is long - how close an exit to the highest point within the trading period, if a trade is short - to the lowest point within the trading period. The following formula is used to compute Exit Efficiency for a trade.

Exit Efficiency =  
Maximum\_Possible\_Difference\_in\_Prices\_For\_This\_Exit/Profit\_Potential.

That means

For Long Trades

$$\text{Exit\_Efficiency} = (\text{Exit\_Price} - \text{Lowest\_Price}) / (\text{Highest\_Price} - \text{Lowest\_Price}).$$

For Short Trades

$$\text{Exit\_Efficiency} = (\text{Highest\_Price} - \text{Exit\_Price}) / (\text{Highest\_Price} - \text{Lowest\_Price}).$$

These are all the results for individual trades. To analyze a system efficiency traders can use Average Efficiency, Average Entry Efficiency and Average Exit Efficiency for all trades.

#### **Performance Tip**

*For more information concerning Efficiency Analysis refer to RINA Systems article "Evaluating System Efficiency" in the October 1997 issue of Stock and Commodities magazine.*

Low results for efficiency may suggest an opportunity for improvement in the entry or exit logic. However, low efficiency, or even negative total efficiency, does not necessarily imply low profitability of the trading system. If a system exhibits low efficiency it can be helpful to try and understand why that is the case but does not necessarily require a change in the system logic. The efficiency of a system can also have implications for how money management might be applied to a system. For example, a system with poor entry efficiency that still exhibits high accuracy might offer possibilities for scaling into a trade (averaging down). Conversely, a system that exhibits poor exit efficiency could offer opportunity to scale out of positions before giving back profits.

#### **Efficiency Analysis Exhibit**

Efficiency Analysis			
<b>Total Efficiency</b>			
Average Total Efficiency	29.28%	Avg. trade ± 1 STDEV	70.50% / -11.94%
1 Std. Deviation (STDEV)	41.22%	Coefficient of variation	140.76%
<b>Entry Efficiency</b>			
Average Entry Efficiency	60.82%	Avg. trade ± 1 STDEV	90.76% / 30.88%
1 Std. Deviation (STDEV)	29.94%	Coefficient of variation	49.22%
<b>Exit Efficiency</b>			
Average Exit Efficiency	68.46%	Avg. trade ± 1 STDEV	88.62% / 48.30%
1 Std. Deviation (STDEV)	20.16%	Coefficient of variation	29.44%
<div> Summary Trades Analysis Annual Monthly Weekly Daily Win/Loss Time Graphs Settings </div>			

The new performance report has advanced trade-by-trade reporting capability. This new trade-by-trade report allows users to review individual trades in greater detail. Each trade lists its number, entry and exit date and price, dollar profit/loss, % profit/loss, Run-up, drawdown, entry, exit and total efficiency. The trade-by-trade report can be sorted based on any of the evaluation fields. Simply double click on any field to sort the information in ascending order. Click on the trade # To return the report to its original format double click on the trade #.

#### Trade-by-Trade Report Exhibit

Adv. <input type="button" value="▼"/>	Trade #	Date	Price	Contracts	% Profit	Run-up	Entry Eff.	Total
Trade #	Type			Profit	Cum Profit	Drawdown	Exit Eff.	Efficiency
61		10/20/97	\$1,018.750	1	1.63%	\$6,662.500	18.39%	
Buy		12/9/97	\$1,035.400	\$4,062.500	\$210,000.000	(\$29,562.500)	93.10%	11.49%
62		10/28/97	\$981.000	2	5.55%	\$32,200.000	74.11%	
Buy		12/9/97	\$1,035.400	\$27,000.000	\$237,000.000	(\$11,250.000)	88.49%	62.60%
63		10/28/97	\$981.000	1	5.55%	\$16,100.000	74.11%	
Buy		12/9/97	\$1,035.400	\$13,500.000	\$250,500.000	(\$5,625.000)	88.49%	62.60%
64		12/15/97	\$1,019.800	1	4.72%	\$14,325.000	50.35%	
Buy		2/13/98	\$1,067.900	\$11,925.000	\$262,425.000	(\$14,125.000)	91.92%	42.27%
65		12/22/97	\$1,008.400	1	5.90%	\$17,175.000	60.37%	
Buy		2/13/98	\$1,067.900	\$14,775.000	\$277,200.000	(\$11,275.000)	91.92%	52.28%
66		4/28/98	\$1,124.900	1	6.22%	\$24,150.000	83.71%	
Buy		7/21/98	\$1,194.900	\$17,400.000	\$294,600.000	(\$4,700.000)	76.95%	60.66%
67		5/8/98	\$1,149.400	1	3.96%	\$18,025.000	62.48%	
Buy		7/21/98	\$1,194.900	\$11,275.000	\$305,875.000	(\$10,825.000)	76.95%	39.43%
68		6/4/98	\$1,131.600	2	5.59%	\$44,950.000	77.90%	
Buy		7/21/98	\$1,194.900	\$31,450.000	\$337,325.000	(\$12,750.000)	76.95%	54.85%
69		10/2/98	\$1,024.900	1	5.66%	\$20,125.000	48.94%	
Buy		10/28/98	\$1,082.900	\$14,400.000	\$351,725.000	(\$21,000.000)	86.32%	35.26%
70		12/15/98	\$1,175.000	1	8.43%	\$28,875.000	92.77%	
Buy		1/11/99	\$1,274.000	\$24,650.000	\$376,375.000	(\$2,250.000)	86.75%	79.52%
<div> Summary Trades Analysis Annual Monthly Weekly Daily Win/Loss Time Graphs Settings </div>								

The new performance report allows traders to study their winning and losing trades separately, find out the average winning and losing series, average profit/loss per series and other characteristics.

## Winning Trade Analysis Exhibit

Winning Trade Analysis				
Number of winning trades	54	Stopped trades w/profit	0	
Avg. winning trade	\$7,555.32	Avg. win ± 1 STDEV	\$16,425.89 / (\$1,315.24)	
1 Std. Deviation (STDEV)	\$8,870.57	Coefficient of variation	117.41%	
Largest profit	\$42,175.00	Largest consec. profit	\$342,175.00	
% of Net Profit	11.21%	% of Net Profit	90.91%	
Consecutive Winning Series Data				
Consec.	# of	Average	Average Loss	
Winners	Series	Gain/Series	Next Trade	
1	3	\$1,395.83	(\$1,783.33)	
2	3	\$7,229.17	(\$2,895.83)	
3	1	\$24,787.50	(\$1,337.50)	
4	1	\$4,462.50	(\$562.50)	
5	0	\$0.00	\$0.00	
6	0	\$0.00	\$0.00	
7	0	\$0.00	\$0.00	
8	0	\$0.00	\$0.00	
9	1	\$10,687.50	(\$2,112.50)	
<div> Summary Trades Analysis Annual Monthly Weekly Daily Win/Loss Time Graphs Settings </div>				



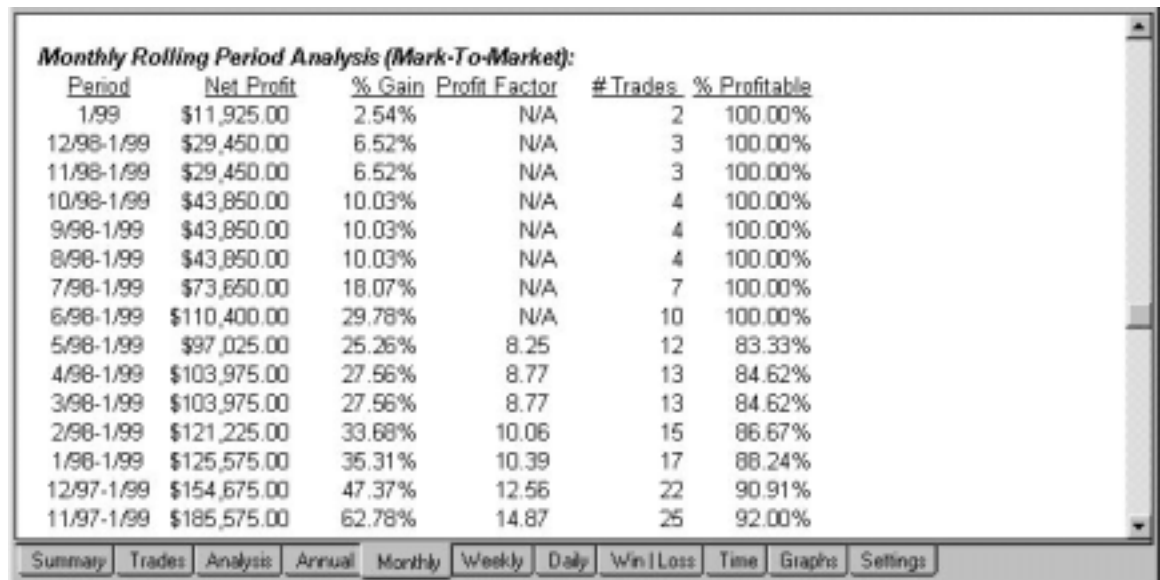
## Section Three: Equity Curve Analysis

The Equity Curve Analysis section is divided into Trading Summary that consists of annual, monthly, weekly, daily and rolling period analysis, Equity Curve analysis and Time analysis. A mark-to-market is performed at the end of each period to generate the performance figures in the Trading Summary. The software also includes many graphs that plot equity over different time scales.

### MARK-TO-MARKET ANALYSIS

Mark-to-market on a monthly basis means the account is theoretically closed and valued at the end of each month. The same is for any other period. It is similar to receiving an account statement from your broker with a bottom line on all open and closed positions. This is important because without a mark-to-market it would be impossible to know where profits or losses are to be allocated. For example, let's consider a trade that makes 30%, begins on November 1st and closes January 15<sup>th</sup> of the next year. The mark-to-market allocates the proper profits/losses to each month as opposed to the entire amount at the end of the period. Measuring performance in this manner is useful for a variety of reasons. For example, this is likely to be the way a client would evaluate the performance of their money manager. That is, the client typically determines the quality of trading at fixed intervals or more precisely when quarterly or monthly statements are received. Without reviewing equity performance on a mark-to-market basis it might be easy to assume a trader could tolerate, as an example, a 30 percent drawdown from which it took nine months to recover.

#### Monthly Rolling Period Analysis Exhibit



Period	Net Profit	% Gain	Profit Factor	# Trades	% Profitable
1/99	\$11,925.00	2.54%	N/A	2	100.00%
12/98-1/99	\$29,450.00	6.52%	N/A	3	100.00%
11/98-1/99	\$29,450.00	6.52%	N/A	3	100.00%
10/98-1/99	\$43,850.00	10.03%	N/A	4	100.00%
9/98-1/99	\$43,850.00	10.03%	N/A	4	100.00%
8/98-1/99	\$43,850.00	10.03%	N/A	4	100.00%
7/98-1/99	\$73,650.00	18.07%	N/A	7	100.00%
6/98-1/99	\$110,400.00	29.78%	N/A	10	100.00%
5/98-1/99	\$97,025.00	25.26%	8.25	12	83.33%
4/98-1/99	\$103,975.00	27.56%	8.77	13	84.62%
3/98-1/99	\$103,975.00	27.56%	8.77	13	84.62%
2/98-1/99	\$121,225.00	33.68%	10.06	15	86.67%
1/98-1/99	\$125,575.00	35.31%	10.39	17	88.24%
12/97-1/99	\$154,675.00	47.37%	12.56	22	90.91%
11/97-1/99	\$185,575.00	62.78%	14.87	25	92.00%

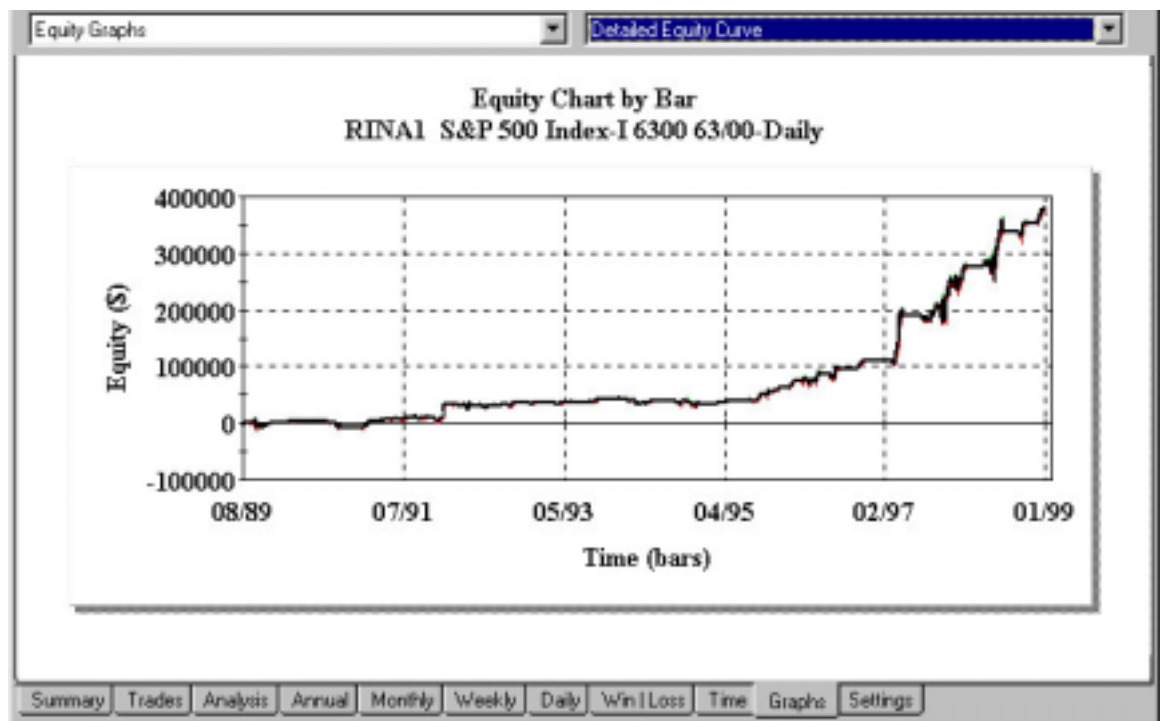
### EQUITY CURVE ANALYSIS

Previously, to perform equity performance analysis required the use of a spreadsheet application. Now it is possible to view equity performance utilizing equity graphs. There are seven equity graphs that display the system's equity performance in different formats. These equity graphs now available in TradeStation 2000i are:

- Equity line curve
- Equity area curve
- Detailed equity curve
- Underwater equity curve
- Monthly Net Profit
- Monthly Rolling Net Profit
- Average Profit by Month.

While equity curve line and equity curve area graphs are on a trade by trade basis the detailed equity graphs is on a bar-by-bar basis.

### Detailed Equity Curve Exhibit



The Underwater Equity curve, popularized by Jack Schwager, presents a trader with a unique way of evaluating equity performance. Using this graph the trader can view the relationship between time and magnitude of drawdown as they relate to new equity highs. This graph enables trader to look at the performance from a pessimistic viewpoint pinpointing how much drawdown occurred and how long it took to rebound to hit a new equity high.

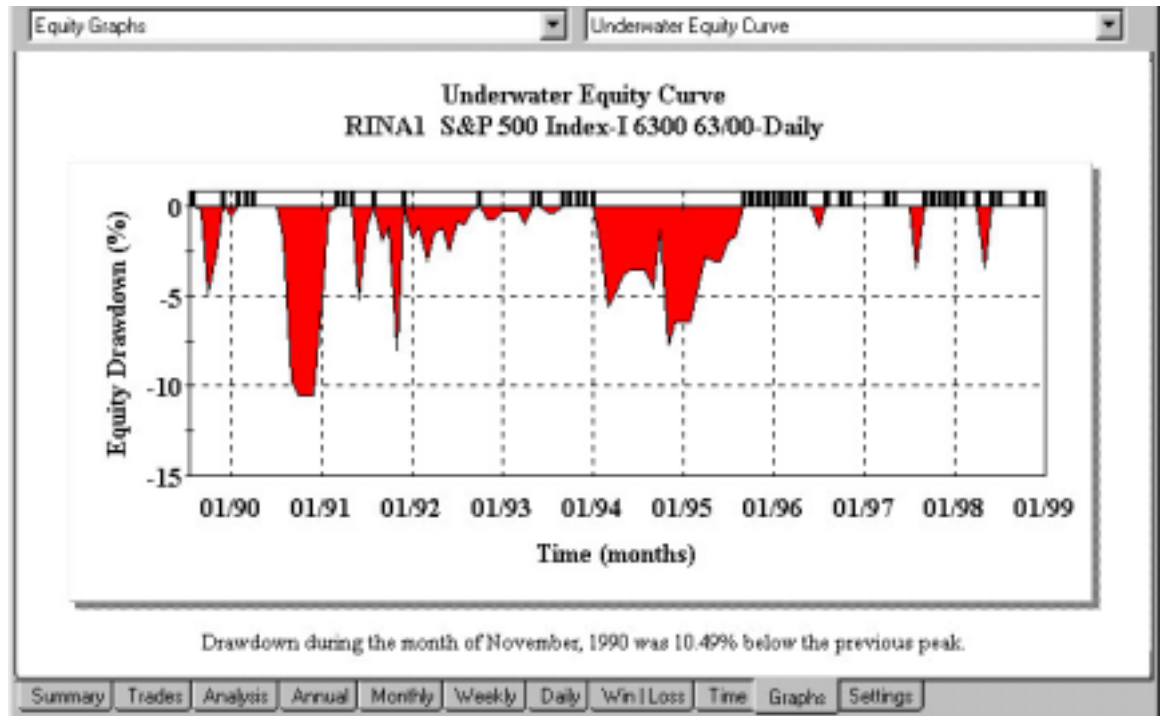
As an example, considered below on the chart is RINA1 system that trades S&P500. From looking at the chart it is possible to see that the system experienced a few period of extended drawdown. The largest in terms of magnitude occurred in late 1990, when it experienced a 10.49% drawdown based on the previous equity peak. The largest drawdown in terms of duration occurred from early 1994 through mid 1995. During that time period the maximum drawdown amounted to 7.91% based on the previous equity peak. Drawdown can take on many different formations. The underwater equity curve serves as yet another tool to measure a variety of drawdown figures.



## Underwater Equity Curve Exhibit

### Performance Tip

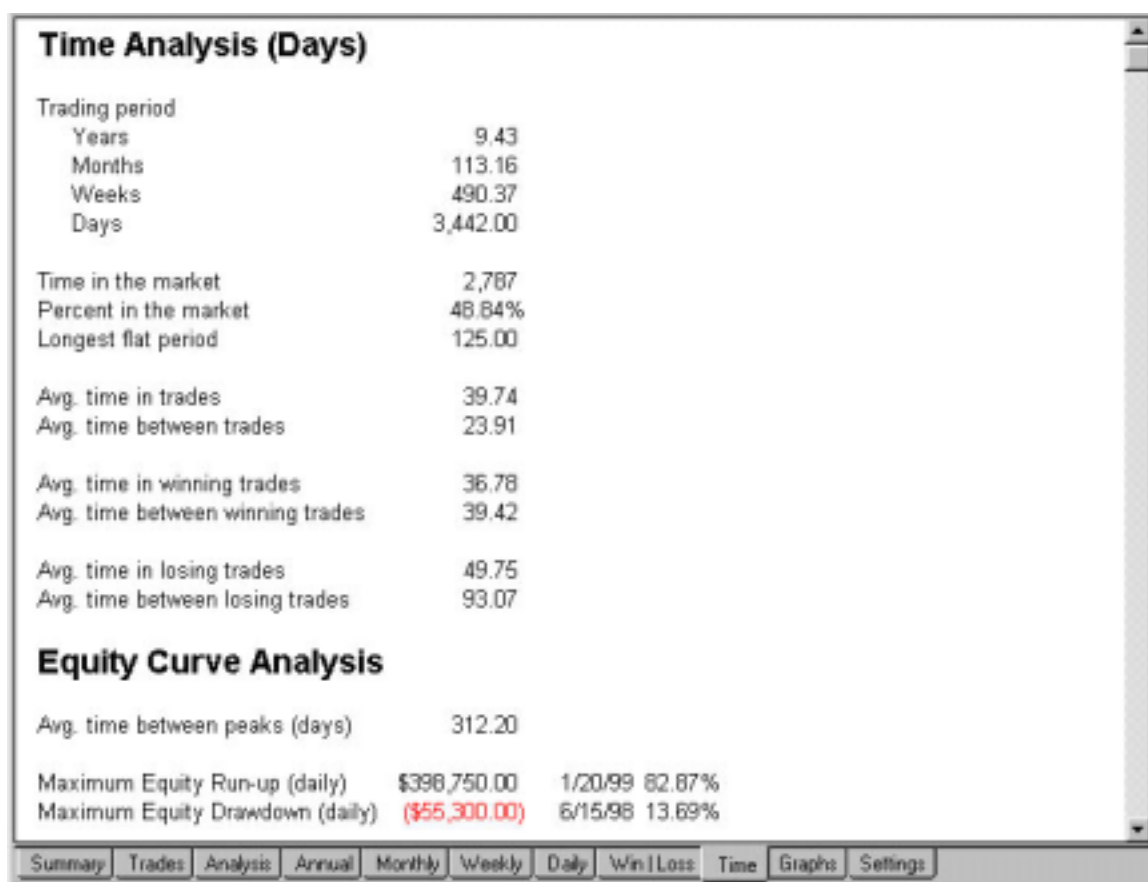
By moving your cursor over the graphic, users can determine the exact amount of drawdown that occurred from the previous peak. This information will be displayed at the bottom of the underwater equity curve graphic.



The underwater equity curve can also be used to determine equity-based money and risk management strategies. For more information about equity-based money and risk management strategies please contact RINA Systems.

Average profit by month from January through December during the period traded graph helps to find out if there is any seasonal tendency in the performance in analysis. If yes this tendency should be studied more for the specific system to determine the improvements to the trading methodology. The time analysis is helpful to compare several performances. If a trader A has similar performance to the trader B but he is in the market less time that means his equity can be invested to generate additional profit during the time the trader B is in the market. To be in the market also means to get more exposure to risk. Percent time in the market is used in RINA index to compare trading performances.

## Time Analysis Exhibit



## MAXIMUM EQUITY DRAWDOWN

Maximum equity drawdown is used to measure the maximum equity loss a system had over consecutive trades. There is a difference between Maximum Equity Drawdown in the Time Analysis section and Maximum Drawdown found in the old report. Although both measure drawdown that took place over consecutive trades the new Maximum Equity Drawdown shows the difference between the highest high and the subsequent equity low. TradeStation 4 maximum drawdown calculation references back to the close of the first trade.

The new equity drawdown measure is more pessimistic than the old measure because it includes the first trade maximum run-up as part of the maximum equity drawdown calculation.

The new calculation of drawdown includes the retracement from the equity high including intra-trade run-up. This means that if a trade was entered at a price of 10, subsequently rose to 12 and then fell to 6 the drawdown would be calculated to be 6 points or 50%. TradeStation 4 would have a 4-point drawdown or 40%.

An important addition to the maximum equity drawdown is the ability to reference the drawdown in a percentage format. Let us consider the following example. A system starts with \$100,000, trades for ten years and makes the account grow to \$375,000. Assuming the maximum drawdown was \$55,000 it is important to know what portion of the total equity was lost during the drawdown period. This number is the percent drawdown. There is also the date when the maximum equity drawdown occurred.

# The System Improvement Process

The performance analysis should lead to performance improvement. Improvement may mean to increase profit, reduce risk or both. To achieve that traders can use money management, scaling or equity management strategies. RINA Systems implemented these strategies and developed Money Manager™ that works for any trading system written in Easy Language.

## MONEY MANAGEMENT OVERVIEW

Money management strategies are used to determine the position size to take on the next trade. The strategies implemented in Money Manager are:

- Martingale
- Anti-Martingale
- Losing Series
- Winning Series
- Fixed Fractional
- Optimal  $F$
- Secure  $F$
- Diluted Optimal  $F$
- Fixed Contract Amount.

## SCALING & EQUITY MANAGEMENT OVERVIEW

While money management strategies help determine the position size, scaling and equity management strategies determine what to do while in an open position.

By applying scaling and equity management strategies to a system trader may reduce the risk level and enhance the system's performance.

Scaling and equity management strategies in Money Manager™ include:

- Maximum Adverse Excursion
- Maximum Favorable Excursion
- Equity Curve Breakout Filtering
- Equity Curve Based System Filtering
- Underwater Equity Shutdown
- Equity Performance Scaling.

Money management, scaling and equity management strategies can be combined together. That creates a great variety of strategies that can be used to improve performance. Each strategy can be optimized on one or several markets for one or several trading systems. The result of an application of any strategy can be analyzed using the new TradeStation 2000i System report for an individual market or system and using Portfolio Maximizer for a portfolio of markets or systems or both.

These topics however are beyond the range of this publication. If you have questions please call RINA Systems at 513-469-7462.

RINA Systems offers a free "Portfolio Analysis and Money Management Workshop Video". Please visit RINA Systems web site [www.rinasystems.com](http://www.rinasystems.com) or call RINA Systems for details. Also please refer to the book "Elements of Money Management" by David Stendahl from RINA Systems published by Traders Library to appear in May 1999.

# Technical Support

RINA Systems now offers technical support for the new TradeStation 2000i performance report through the Internet. With a click of a button you can easily transfer your performance information directly to RINA System for fast and efficient technical support. For that purpose iTrans software is included on the CD with TradeStation 2000i. See the paragraph below "Where to find iTrans" for details. The iTrans software transfers the information necessary to analyze and resolve technical issues directly to RINA Systems web site. The only information that will be transferred is related to trading performance. This performance data includes basic information such as when and how many contracts/shares were traded. Let's take a closer look at what iTrans can do for you.

## Technical Support

If you experience any technical problems with the new Performance Report now instead of wasting time on the phone with technical support staff you can simply by one click upload the relevant information to our web site with a description of the problem. Our quality assurance professionals will then analyze the files and respond to you in a timely manner via email or phone. This new form of support dramatically improves the response time to your problem and creates a seamless process for users trying to resolve technical issues. Technical support people no longer have to keep customer on the phone to explain which files to copy and send. This process helps avoid many errors.

## Where to find iTrans

iTrans is either already loaded on your computer or can be easily downloaded from RINA Systems web site. To find it on your computer select the Windows Explorer by selecting Start-Programs. Once Windows Explorer is running select the Omega Research/Program directory. In this directory look for a file called **iTrans.exe**. The file is easy to identify because it will have a red target icon. Double-click on the file to activate the iTrans software.

If iTrans is not loaded on your computer you will need to download the free software from RINA Systems web site located at [www.rinasystems.com](http://www.rinasystems.com). Once you have accessed the web site go to the download page, which is accessible from the main page. The download page itemizes all of RINA Systems downloads, search and click on the iTrans download. The download takes approximately twenty minutes. Once downloaded you will need to run the installation to get the software up and running. Follow the instructions above to locate the iTrans.exe file.

## What information does iTrans transmit?

The only information that is transferred to RINA Systems via iTrans is the standard system settings (e.g. Initial Capital, Interest Rate), the system trade-by-trade report which includes profit/loss per trade, number of contract/shares traded, dates related to trading and the price data that includes Open, High, Low and Close data. Your system and indicator ELA files are **NOT** transferred.

## How to use iTrans.

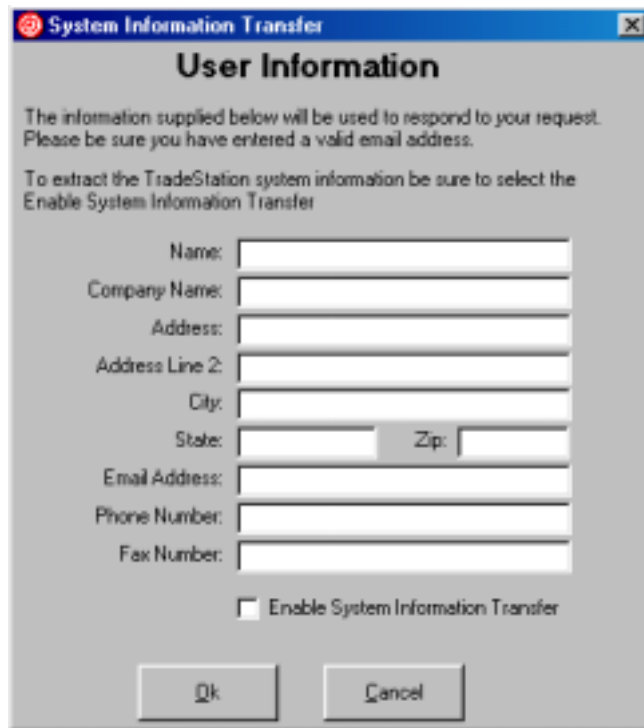
iTrans is very easy to use. Follow the steps below.

1. Fill in the fields with your name, address, email address and phone number. Make sure that either email address or the phone number is filled in. If you do not do that RINA Systems will not be able to get back to you with the solution to the problem you have.
2. Check the check box "Enable System Information Transfer".
3. Click OK.

4. Go to your system and generate the System Report. The data will be automatically transferred to RINA Systems web site.

RINA Systems will get back to you about your problem.

To avoid transferring data for every system you have, the box “Enable System Information Transfer” is automatically disabled after the data transfer. If you have another problem or would like to transfer another information to RINA Systems please repeat the steps 1 – 4.



The image shows a Windows-style dialog box titled "System Information Transfer" with a subtitle "User Information". The dialog box contains a message: "The information supplied below will be used to respond to your request. Please be sure you have entered a valid email address." Below this, it says: "To extract the TradeStation system information be sure to select the Enable System Information Transfer". The form includes several input fields: "Name:", "Company Name:", "Address:", "Address Line 2:", "City:", "State:", "Zip:", "Email Address:", "Phone Number:", and "Fax Number:". At the bottom, there is a checkbox labeled "Enable System Information Transfer" which is currently unchecked. Below the checkbox are two buttons: "Ok" and "Cancel".

# Appendix A

## Return Retracement Ratio Calculation.

Return Retracement Ratio (RRR) represents the average annualized compounded return (R) divided by an average maximum retracement (AMR) measure:

$$RRR=R/AMR$$

$$AMR=1/n * \sum_{i=1}^n MRi ,$$

Where n=number of months in survey period.

$$MRi = \max (MRPPi, MRSLi),$$

Where

$$MRPPi=(PEi - Ei)/PEi,$$

$$MRSLi=(Ei - MEi)/Ei,$$

Where Ei = equity at the end of the month i,

PEi = peak month-end equity on or prior to month i,

MEi = minimum month-end equity on or subsequent to month i.

R is the average annual compounded return equals to

$$R=\sqrt[N]{E/S} - 1,$$

Where S is starting equity, E is ending equity, N is the number of years.

For more information please refer to Jack Schwager book *Managed Trading. Myths and Tactics*.

## Appendix B

### K - Ratio Calculation.

Calculations for return and risk are derived from VAMI (value added monthly index). VAMI is a monthly plot of the progress of a hypothetical \$1000 initial investment. Although the example below employs a base 10 log, using other log base will result in the same final value.

Running a linear regression on the log-VAMI curve reveals several details about performance. The slope of the regression line (the numerator of the K-ratio) characterizes the return. The steeper the slope, the faster the money has been made. Risk in the K-ratio is measured by the standard error of the slope, a value calculated from the regression. The standard error measures the smoothness of the regression line of the log-VAMI. The higher the standard error the higher volatility of returns which is usually viewed as an equivalent of risk. The denominator of the K – ratio is multiplied by the square root of observations to normalize the measure across different time frames.

$$K - ratio = (\text{Slope of Log VAMI Regression line}) / ((\text{Standard error of the slope}) * (\text{Number of period in the Log VAMI}))$$

For more information please see Futures Magazine, January, 1996.



## About RINA Systems

RINA Systems is the World Leader in Performance Analysis Software for traders and investors. The company has committed to developing the State-of-the Art Performance Analysis software for traders to analyze and improve trading performance, to help determine problems with a selected methodology before they occur in real trading. Our talented team of mathematicians, traders, and software developers has produced several innovative software applications for traders including Performance Summary Plus, Portfolio Evaluator, Portfolio Maximizer (co-developed with Omega Research), Money Manager, 3D SmartView, Portfolio Tracker and the Dynamic Zones Indicator. In addition, RINA Systems technology is used by professional and individual traders, fund managers, and trading advisors in over 30 countries.

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# Workshop Overview

## SYSTEM DEVELOPMENT, PORTFOLIO ANALYSIS AND MONEY MANAGEMENT

This intensive three-day workshop covers the six stages to building and trading profitable systems. Several fully disclosed trading systems will be used to illustrate how to design, develop, analyze and ultimately improve trading systems performance.

### Key Topics:

#### The Big Picture

Differentiating between Trending and Non-trending markets.

Discussing the advantages of mechanized trading.

Examining the benefits of trading over various time horizons.

#### System Design

Placing intelligent stops using Maximum Adverse Excursion.

Designing systems with independent long and short entry and exit signals.

Determining the stability and robustness of a trading system.

Evaluating the efficiency of entry and exit signals.

#### Performance Evaluation

Evaluating historical performance using annual, monthly and weekly mark-to-market trading summaries.

Reviewing a variety of risk measures, including drawdown from at least seven different perspectives.

Recognizing the early warning signs of a failing system using the Underwater Equity Curve.

Constructing balanced portfolios using the RINA Index, Sharpe Ratio, and other performance measures.

#### Money Management

Using a system's equity curve to enhance trading performance.

Adding to positions using the Maximum Favorable Excursion risk management strategy.

Understanding the application of Optimal  $f$ , Secure  $f$ , and other fractional money management strategies.

Combining money and risk management strategies to maximize trading performance based on an individual's risk tolerance.

### Who should attend this intensive three-day Workshop?

*Traders and Investors interested in:*

- A variety of technical analysis methodologies.
- The basic operations of TradeStation®/SuperCharts®.
- Building mechanical trading systems from the ground up.
- Evaluating performance results using Portfolio Maximizer™.

- Improving trading performance with a variety of Money Management techniques using Money Manager™.
- Analyze the robustness of systems using 3D SmartView.
- Learning the art of trading Index Futures, Options and Mutual Funds.

**What do Workshop participants receive?**

*Look at what you receive by attending:*

- Three days of the personalized training.
- Seminar time to evaluate personal trading systems (\$399 Value).
- Dynamic Zones Indicator (\$299 Value).
- A comprehensive workshop manual.
- Several real trading systems code.

Each workshop is limited to five (5) participants to allow for intensive hands-on training. Contact RINA Systems for more information.

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