



TRADING
THE

SQUARE OF NINE

WITH A
CALCULATOR AND A PENCIL

TRADINGFIVES

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INTRODUCTION

If you have been trading stocks, options or futures for any length of time you are probably familiar with W.D. Gann, at least by name. Gann was a prodigious researcher and a prolific author for most of the first half of the 20th century. He traveled to Egypt to experience first hand the proportional beauty of the Great Pyramid, and to India to experience first hand another source of ancient knowledge and wisdom. Many contemporary Gann researchers believe that the Square of Nine was first used in India hundreds and perhaps even thousands of years ago and that Gann rediscovered it there. So remarkable was Gann's reputation that people paid the price of a single family home to attend Gann's weekend trading seminars. His work has spawned hundreds of articles, books and computer programs attempting to decipher his often cryptic writing style or claiming to have discovered his "secret" for trading the markets.

If Gann had a secret, we don't know it. But secrets or no, Gann is credited with verbalizing an abstraction that captures the imagination of every person with the dream of making it big in the markets - "when price and time square change is inevitable." Even without having a clue what squaring of price and time could mean the idea that any method of market analysis could be used in the same sentence with the word inevitable will get your attention every time.

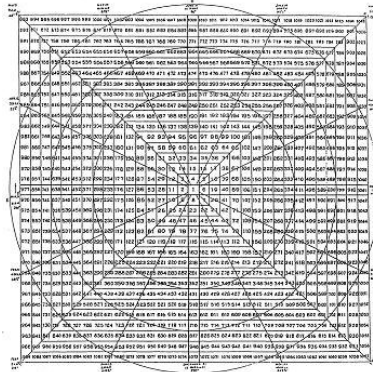
The momentum that started this tract came via a telephone call from a friend who trades stock futures. He related a call that he had received from another futures trader with whom he exchanged trading ideas and outlooks by email. The caller told the trader to get an historical chart, but not tell him what ticker the chart represented, or the trading period the chart represented. "Give me a price for an obvious swing high or low", the caller said. "Just to save time, tell me if it's a high or a low, and if the next swing off that pivot is major or minor." Who wouldn't be curious enough to participate in this? Over the next several minutes the trader gave the caller several instances of the minimal information he had asked for and after a brief period each time received back from the caller two or three price levels one or more of which the caller said would be major support or resistance or change the trend. The results were not perfect but they were darn close enough to what was actually happening with that ticker to instigate many hours of follow up, research, and experimentation, and finally, an understanding of what price squaring time means, and how to do it simply in any market without paying hundreds or even thousands of dollars for new software, special equipment, or Gann size seminar fees.

Gann wrote in metaphors. He described complex things with symbols instead of plain language. He often provided so much data that there was little information to be found. Much of what has been written about Gann and his methods adopts this cryptic style. The writers taunt you with "I know something you don't" and more often than not do not tell you what it is despite the price of the work or what the title of their book may claim. We have tried very hard to avoid that.

This is a book about technique. How to do things. We do not attempt to hide any "truths" in symbolic language. Within the first few chapters you will know how the caller was able to impress the trader with his prescience. You will be able to reliably duplicate the caller's results in any time frame with any ticker. You will learn how to print a plain-jane daily or intraday chart from a charting program or the internet and quickly turn it into a Square of Nine roadmap that will define the boundaries of the current trend and show you the exact price levels of the most likely major resistance and support. You will learn how to forecast exactly where and when the current trend could come to an end. You will have the knowledge to make the Square of Nine your own and to apply it with the simple tools you already have on hand.

THE GANN WHEEL

When presented with the idea of the Square of Nine, this illustration is most likely what you think of.



As with most things associated with Gann, they are described in colorful terms and made to look more difficult than they really are. The Gann Wheel or Square of Nine chart has been compared to or described as the floor plan of the Great Pyramid. Gann is said to have kept a scale model of the Great Pyramid with the peak labeled with the numeral one and each block consecutively numbered in a counterclockwise fashion. You can easily imagine how this pyramid would be constructed, by grabbing the number one on the Gann Wheel and pulling it straight up to create a three dimensional object from the two-dimensional flat surface of the paper. This is probably a fairly useful thought experiment because it creates a clear picture in the mind of opposing sides, distinct angles, and the increasing distance between numbers, what we relate to as volatility, as you move further away from the numeral one on the top of the pyramid.

That the Great Pyramid of Gizeh also features prominently in the work of R.N. Elliott and the adherence of Fibonacci ratios to something built thousands of years ago is probably more than coincidental. For example, the Great Pyramid is 5,813 inches high (5-8-13) and the inch was the standard unit of measure in ancient Egypt. The ratio of the elevation to the base is .618. The total of the four edges of the base, measured in inches, is 36,524.22 which is exactly 100 times the length of the solar year. What does it all mean, who knows? In a totally unscientific affirmation it does suggest that the human brain may be hard-wired to respond in a certain way to very specific mathematical ratios and spatial relationships.

The Real Square of Nine?

Gann gave many courses on different aspects of his method but he never gave a course exclusively on the Square of Nine. We understand from others who have studied much of Gann's original work that in one of his courses he did write about what he called a square of nine that looked something like this:

9	18	27		81
8	17	26		80
7	16	25		79
6	15	24		78
5	14	23		77
4	13	22		76
3	12	21		75
2	11	20		74
1	10	19		73

And although he never referred to it by any particular name Gann also produced his own illustration of the Gann Wheel, what we call today the Square of Nine that is the same as the illustration on the website. We know that Gann used what we call the Gann Wheel to trade along with the complete version of the above table of 81 numbers as well as several other tables of numbers and geometric charts. Today we take for granted things like hand-held computers and wireless communications. In Gann's day you had to be a lot more creative and resourceful.

Use the Gann Wheel then Put It Away

Although we will cover in this section a classic and simple use of the Gann Wheel to forecast price support and resistance levels, at the end of this section we will put the paper copy of the Gann Wheel away. The purpose of this short exercise is to provide a conceptual framework to the mathematical applications of the Square of Nine that is the heart of this work and much of Gann's work as well. Later on it will be much easier to make sense of an expression like "19 is on the 90 degree angle" after you've seen how that works in two dimensions on the Gann Wheel.

31	32	33	34	35	36	37
30	13	14	15	16	17	38
29	12	3	4	5	18	39
28	11	2	1	6	19	40
27	10	9	8	7	20	41
26	25	24	23	22	21	42
49	48	47	46	45	44	43

If you draw or imagine a circle around the outer edge of the above table we can conceptualize the table as a rectangle inside a circle with a 360 degree circumference. The vertical line from 34 to 46 is at 0-180 degrees, and the left to right horizontal line from 28 to 40 on the table is at 270-90 degrees. In the example above we can say that 19 is 90 degrees up from 15. The numeral 23 is 180 degrees up from 15 and 90 degrees up from 19. The numeral 8 would be 180 degrees down from 15. The "up" and "down" references mean greater or lesser numbers and not relative positions on the table. For example, 8 is 180 degrees down from 15 and 23 is 180 degrees up from 15 even though 8 and 23 are both on opposite sides of the horizontal 270-90 degree line.

In this very simple example we are using the Gann Wheel as a square root calculator. That may not be obvious to you at this point but when we start to do the math it will be. The number 15 lies conveniently on the 0-180 degree angle so it's easy enough to show a 90 degree or 180 degree rotation. What if the number is not one of those on the most convenient fixed angles, say 37 on our small chart, which lies in the upper right hand corner? Most commercial Gann Wheels come with an acetate overlay with several angles printed on it. To calculate targets from 37 you would move the overlay to the right so that the zero or 360 degree angle lay on 37 and then read the angles of interest directly from the repositioned overlay.

We neither encourage nor discourage using a two-dimensional (paper) version of this square root calculator. After all people have been successfully using this tool for long before there was a Wall

Street in New York or even a New World to put a New York in. Just be prepared for a steep learning curve. The paper version increments in whole numbers and can be difficult to apply to stock prices less than \$150 and to many futures prices which may require a radical conversion of one kind or another. Of course, the folks that know these conversion factors aren't going to tell you about them without serious cash changing hands, if at all. That being said, any number of books, courses and seminars on applying the paper version of the Gann Wheel or the Square of Nine are available on-line or in person, and some have been available for many years. We haven't traveled this road because we believe that there is an easier way.

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THE SQUARE ROOT THEORY

We have alluded to the Square Of Nine as a square root calculator. We have attributed not the discovery of this tool (the actual discovery or date of first use is an unsolved mystery) but its public application to trading stocks and commodities to W.D. Gann. Perhaps it's worthwhile to know that Gann was not the only financial writer to publicize the seemingly magic power of squares and square roots in forecasting stock prices. In the early 1950s William Dunnigan developed two stock trading systems called the *Thrust Method* and the *One Way Formula*. Both methods had several advantageous entry techniques but each had an absence of exit techniques. Dunnigan was above all a portfolio manager and not happy with the risk-reward aspects of his own trading methods, Dunnigan supported and publicized the Square Root Theory. He went so far as to call this theory the "golden key" and claimed recognition from some economics and statistical trade journals of the era.

References to the Square Root Theory as a predictor of stock prices pops up every now and then in financial writings. Norman Fosback used the theory in a 1976 publication called *Stock Market Logic* to make the case that the normal trading range of low price stocks provides greater profit opportunities than the normal trading range of high price stocks. In 1983, a book entitled *The Templeton Touch*, by William Proctor, disclosed that one of Templeton's 22 principles for stock market investing was that stock price fluctuations are proportional to the square root of the price. Square roots will always maintain a cozy mainstream relationship with stock prices if only because they are an essential component of almost every volatility or option pricing formula.

The theory holds that stock prices move over the long and short term in a square root relationship. For example, IBM made a monthly closing low of 4.52 in June, 1962 and monthly closing high of 125.69 in July, 1999. This is within a few percentage points of the square of the sum of the square root of the low price + 9 or $(2.12+9)^2$. GM made a low of 15 in November, 1974 and a high of 95 in May, 1999. Again, a few percentage points from the square of the sum of the square root of the low + 6 or $(3.87+6)^2$.

There are hundreds and hundreds of these examples across the stock, financial and commodity markets. Even a few minutes with a pile of stock charts and a calculator will build confidence that major highs and lows are related to each other by additions and subtractions to their square roots. The Square of Nine takes these square root relationships to a different level as you will learn in the pages ahead.

"We use the square of odd and even numbers to get not only the proof of market movements, but the cause." W. D. Gann, "The Basis of My Forecasting Method" (the Geometrical Angles course), p. 1

THE SQUARE OF NINE ROADMAP CHART

The first practical application of the Square of Nine will make use of the degrees of the circle concept we developed with the Gann Wheel, a calculator, a pencil and an expanded Square Root Theory. We are expanding the Square Root Theory by adding divisions of whole numbers, and not just whole numbers, to the mix, and by moving beyond only price calculations to include a simple time element on the charts we will construct shortly.

Circles Within the Wheel

In the Gann Wheel section we said things like "19 is 90 degrees up from 15." An expression like that makes sense only if we visualize a rectangular table of numbers enclosed in a circle of 360 degrees. It's imperative to embrace the terminology because expressions like degrees and angles from here to there, or such and such price squaring with time on the 108 degree line are the *lingua franca* of the Square of Nine and essential to understanding how the different pieces fit together.

31	32	33	34	35	36	37
30	13	14	15	16	17	38
29	12	3	4	5	18	39
28	11	2	1	6	19	40
27	10	9	8	7	20	41
26	25	24	23	22	21	42
49	48	47	46	45	44	43

Time for more visualization. Using the number 15 on the above illustration as the focus, we can visualize a circle with the number 15 on its perimeter at a starting point of zero degrees. 19 is at 90 degrees, 23 is at 180 degrees, and 28 is at 270 degrees. The number 34 is directly above the number 15 and is positioned one ring outside the "circle." Its position on the Square of Nine directly above 15 means that 34 is 360 degrees up from 15, or one complete rotation or cycle from 15. (28 is also outside the gray highlighted area but is not a rotation outside the "circle" because its position has not yet completed 360 degrees, or one full rotation from 15.)

Hopefully the square within the circle visualization hasn't created any confusion. We did this illustration so that we can put some visual perspective on the math that accomplishes the same thing as one 360 degree rotation on the Square of Nine.

The square root of 15 is 3.87. Adding the number 2 to the square root of 15 results in 5.87. ($3.87 + 2$). That result squared is 34.49. We can immediately learn two things from this exercise: One is that the whole numbers on the Square of Nine ignore decimals and will inherently create rounding errors; and the second is that adding 2 to the square root of a number and squaring the sum is the same thing as a 360 degree rotation up on the Square of Nine. Subtracting the number 2 from the square root of 15 and then squaring the difference would be the equivalent of a 360 degree rotation down on the Square of Nine.

The Degrees to Factor Table

Now that you have the knowledge that a 360 degree move is the same as adding (or subtracting) 2 to the square root and then squaring the resulting sum or difference, we can expand this knowledge to produce the following:

DEGREES	=	FACTOR
360		2.00
315		1.75
270		1.50
225		1.25
180		1.00
135		0.75
90		0.50
45		0.25
22.5		0.125

Degrees to Factor Conversion Table

The *factor* is the whole or decimal number that is added to or subtracted from the square root of the base number before squaring the result to move up, down or around on the Square of Nine. This simple table is Core Knowledge. Factors not shown on the Table can be derived easily. The *factor* for 67.5 degrees, for example, is $.25 + .125 = .375$. For most stock market work the major factors are those for 45 degrees and the multiples of 45 degrees.

Moving Around the Square of Nine

What number is 180 degrees up from 15? The answer is 23.75. The formula is $(N^{.5} + \text{factor})^2$, where $N=15$, the base number, and *factor* = 1 as determined from the Degrees-to-Factor table. Raising a number to the power of .5 or 1/2 is the same as solving for the square root. This is handy if your calculator has a power function key and does not have a square root function key.

90 degrees divides the circle into quarters, 45 degrees divides the circle into eighths, and 22.5 degrees divides the circle into sixteenths. You will find many cases where these divisions provide resistance and support from major and minor pivot points in every time frame.

Constructing a Roadmap Chart

Let's put our knowledge to work and create something useful. *Chart 1* is a price chart of the daily high-low bars of the SP 500 (SPX) for the period from November '02 to late May '03. The low of the bar on March 12, 2003 was 788.90. The low close of the swing occurred a day earlier on March 11, 2003 at 800.73.

SPX SQUARE OF NINE



Chart 1

You can construct all the new Square of Nine stuff you see in *Chart 1* on a simple price chart printed out from Excel or any of the dozens of technical analysis or stock charting programs or many stock charting web sites. Most of the illustrations in this book are produced from a Visual Basic program created to do the research for this book, but with a small amount of practice you can produce a useful Square of Nine Roadmap Chart with a pencil and a straight edge. If you can print a plain bar chart of the SPX for the period around March 12, 2003 you can follow along with this example.

Calculating the Horizontal Price Lines

The two obvious structures that would not be present on the Excel chart are the vertical/horizontal grid lines and the trend lines, or as we will refer to them, the channel lines. This is how to construct the horizontal grid lines. Pull out your calculator and do the math with the square root of 788.9 and the *factor* for 180 degrees from the Degrees-Factor Table and write down the first four or five 180 degree cycles up from the March 12 low of 788.9. Your worksheet will look something like this:

March 12 low - 788.9
 $= (\text{SQRT}(788.9) + \text{factor})^2$

180 degrees (<i>factor</i> = 1) =	846.07
360 degrees (<i>factor</i> = 2) =	905.25
540 degrees (<i>factor</i> = 3) =	966.42

720 degrees (*factor* = 4) = 1029.60

Using the price scale of the chart you printed, draw four horizontal lines on the price chart at 846 through 1029, the price levels of the 180 degree rotations you just calculated, and you will have completed the horizontal gridlines.

Calculating the Vertical Time Lines

The vertical gridlines are the time element of the Roadmap. You calculate the time element by taking the square root of the starting price of 788.9. The result is 28.08 which rounds to 28. Using a compass, the increments on your straight edge, or by any other method, mark off the distance of 28 bars from the last high-low price bar on the printed chart and draw a vertical line at that position. Repeat one or two times.

This completes the horizontal and vertical grid and by doing nothing more you will have mapped out likely key support and resistance prices for the SPX upswing from the March 12 low, but, of course, we're not done yet.

Placing the Channel Lines

The lowest channel line is drawn by connecting a straight line from the starting point at 788.9 through the intersection of the first 180 degree horizontal line (846 on the chart) and the first 28 unit vertical line and extending it upward at the same angle through the other 180 degree intersections. The procedure for the middle channel line is exactly the same but the starting point is the intersection of the first 180 degree horizontal line (905) and the same vertical position as the starting bar. The third channel line is done the same way one cycle higher (966).

If desired you could add horizontal grid lines at the 90 degree price levels. They can be calculated the same way using a factor of .50 and its multiples, or you can simply split the difference between the 180 degree horizontal lines and draw the 90 degree lines there.

Why 90 degrees and why 180 degrees? The 90 degree angle (and its multiples, 180, 270, 360...) are very important in the stock market, particularly with daily and longer data. You will find that many, many swings and pullbacks are stopped dead on a 90 degree angle from a pivot top or bottom. We used a 180 degree angle, or more fittingly a *factor* of 1.00, to construct this daily chart of the SPX because that particular angle is what worked the best for the swing that started on March 12, 2002 from a price level around 800.

You do not yet have all the basic information that you need to use the Square of Nine Roadmap Chart as an application, but you will soon enough. *Chart 2*, below, is an hourly chart of the DJX from a period in May, 2003. The Hourly chart was constructed with 45 degree angles, or a *factor* of .25. Study the chart for a few moments before moving on to the comments below the chart.

DJX SQUARE OF NINE

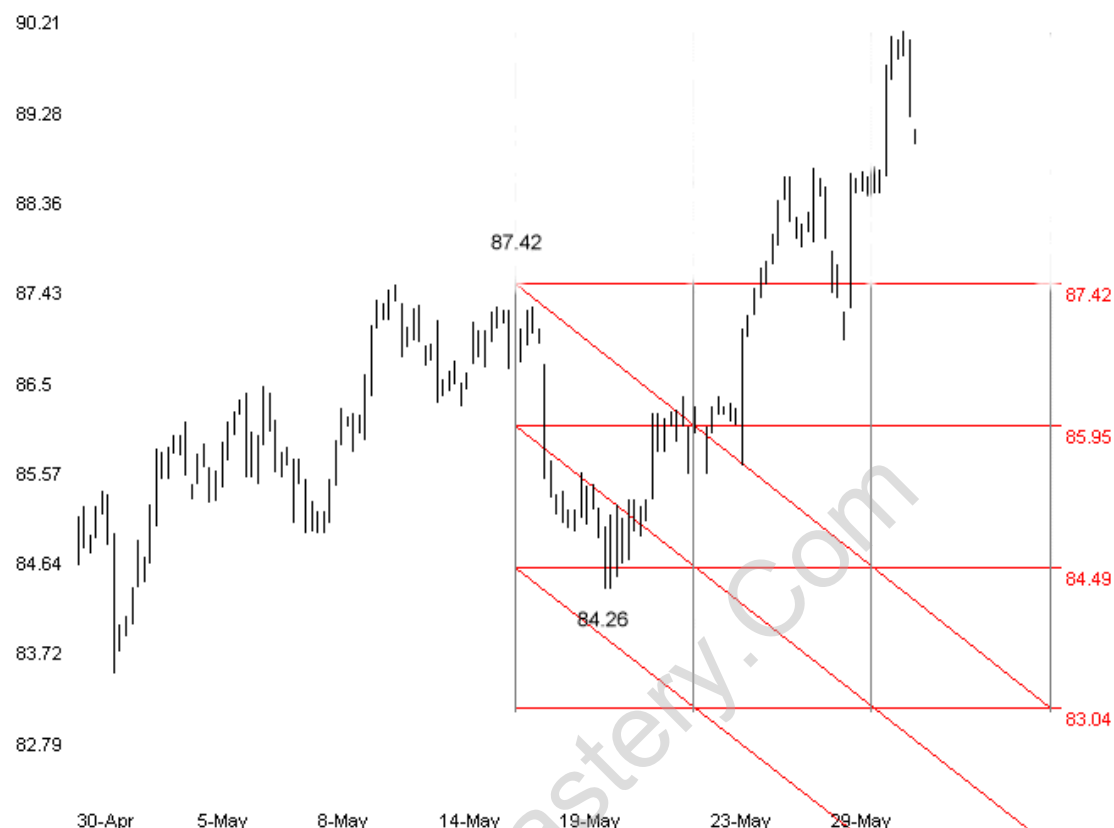


Chart 2

Creating Hourly Roadmap Charts

Chart 2 was originally constructed during the late morning on May 16, 2003. At that time all the price bars to the right of the left most vertical line (located directly under the 87.42 legend) were missing because they had not yet occurred. We had reason to believe at the time that this hourly pivot on the morning of May 16 could be a significant turning point. Price action over most of the next two trading days seemed to confirm our outlook. The bounce off the 84.49 horizontal line was not unusual and could have been expected for a couple reasons. One big reason was that 84.49 is 90 degrees down from the suspected pivot high at 87.42 and you should always expect some sort of reaction at 90 degree angles from a major or minor pivot. The second reason was that the bounce was occurring at the mid-point of a square. Not nearly as important as the expected reaction on a 90 degree line, countertrend moves have a tendency to start and end at the midpoints of the price and time squares. (Note: if you are doing the math jump to page 16.)

The tip-off that something was seriously amiss with the bearish outlook was the penetration of the upper channel. We call this style chart the Square of Nine Roadmap Chart because price stays within the upper and lower channel bounds for days, weeks or even months from a major turning point. Naturally, the shorter the time period of the data in the chart the more likely price is to exceed the outer channel bounds as trend and countertrend moves work themselves out within even bigger trends.

When the upper channel bound was penetrated on the close for two consecutive hours it was time to close shorts and construct a new 45 degree Roadmap chart from the suspected pivot low. Chart 3 below was started from the May 20 pivot low after it became clear that the suspected

down trend had busted. One practical advantage of the Roadmap chart is that it can be constructed, channels and all, the moment that a suspected pivot occurs. The Square of Nine Roadmap chart self-confirms the trend in progress by subsequent price movement remaining above the lowest channel bound in an uptrend and below the highest channel bound in a downtrend.

DJX SQUARE OF NINE



Chart 3

Chart 3 provides more useful information about the value of the Square of Nine Roadmap Chart as a legitimate trading tool. If you were long off the May 20 low you could stay comfortable with the fact that price was remaining well above the lower channel bound. Reactions were occurring, as is normal and expected, contained within the 45 degree squares. At the time this is being written we do not know if the 2nd rotation of the 90 degree level at 90.17 will stop the move or if it will hit the wall at a higher level.

The most reliable price target that will most likely turn back a rally or stop a down move is the outer diagonal channel line. The horizontal price lines often provide resistance or support in a continuing move. Very often price will "vibrate" within a square while it trends in the direction of the channel lines.

We believe that the Square of Nine Roadmap is a valuable trading tool in its own right, and that's before we even get into the meat and potatoes of actually squaring price with time, or using time to forecast price, or price to forecast time as we will in subsequent chapters.

All the examples we show in this book are daily or hourly charts. You can construct a Roadmap chart for any ticker with any time frame from minutes to years. The principles of construction are

exactly the same as for the daily or hourly charts you see here. You will have to do some experimenting to determine the *factor* that will produce channels that faithfully contain most of the price movement of the swing of interest over long periods relative to the time frame of the chart. Persistence will pay off here. You may also have to do some experimenting with a three digit conversion for the natural prices of your ticker. More on that in the next chapter.

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THE THREE DIGIT CONTROVERSY

The Three Digit Controversy

There are a couple things that we did not cover in the last section on constructing a Square of Nine Roadmap Chart. One of them is what we call the three digit controversy. When we constructed the SPX chart we calculated the spacing of the vertical time line by taking the square root of the starting pivot price. In that example, the starting pivot price was around 800 and the square root of 800 rounded out to a time dimension of 28 bars. The time dimension on the Square of Nine Roadmap Charts remains constant regardless of the actual duration of the price data. For example, the SPX chart is daily data and the time spacing is 28 trading days. The time spacing interval would remain 28 bars for Hourly or Weekly data that started from the pivot price level of 800 except, of course, the actual time elapsed would be 28 hours or 28 weeks.

But look again at the DJX Hourly in *Chart 3*. The square root of the base price of 84.26 is 9 rounded and there's no way the vertical time lines on that chart are separated by nine bars. Also, if you've done the math yourself for *Chart 3* you found out that 85.72 is not on a 45 degree angle up from the DJX natural trading price 84.26. The first 45 degree angle up from the natural trading price of 84.26, if we do the math with a .25 factor, is 88.91, so what gives?

As a general rule, when calculating price angles (the horizontal lines) and time spacing for the Square of Nine Roadmap Charts we want to calculate with a number that has three significant digits, or in other words, three digits to the left of the decimal point. Before doing the calculation for the 45 degree angles and for the time spacing on the DJX charts we converted the base price 84.26 to 842.6 before taking the square root. That provided us with a time spacing of 29 bars on the hourly Roadmap chart. The 45 degree angles we calculated for the horizontal price lines were based on a starting price of 842.6 (84.26×10) and then converted back to two digits for placement on the chart. For example, price on the first 45 degree angle up computed out to 857.2 before being converted back to the two digit 85.72 that appears on the chart. If you were using a spreadsheet program like Excel to draw the plain price charts you could do the conversion directly on the price data. If you print charts off the net or use a commercial charting program you may have no choice but to do the conversions before and after calculating the angles and the time spacing.

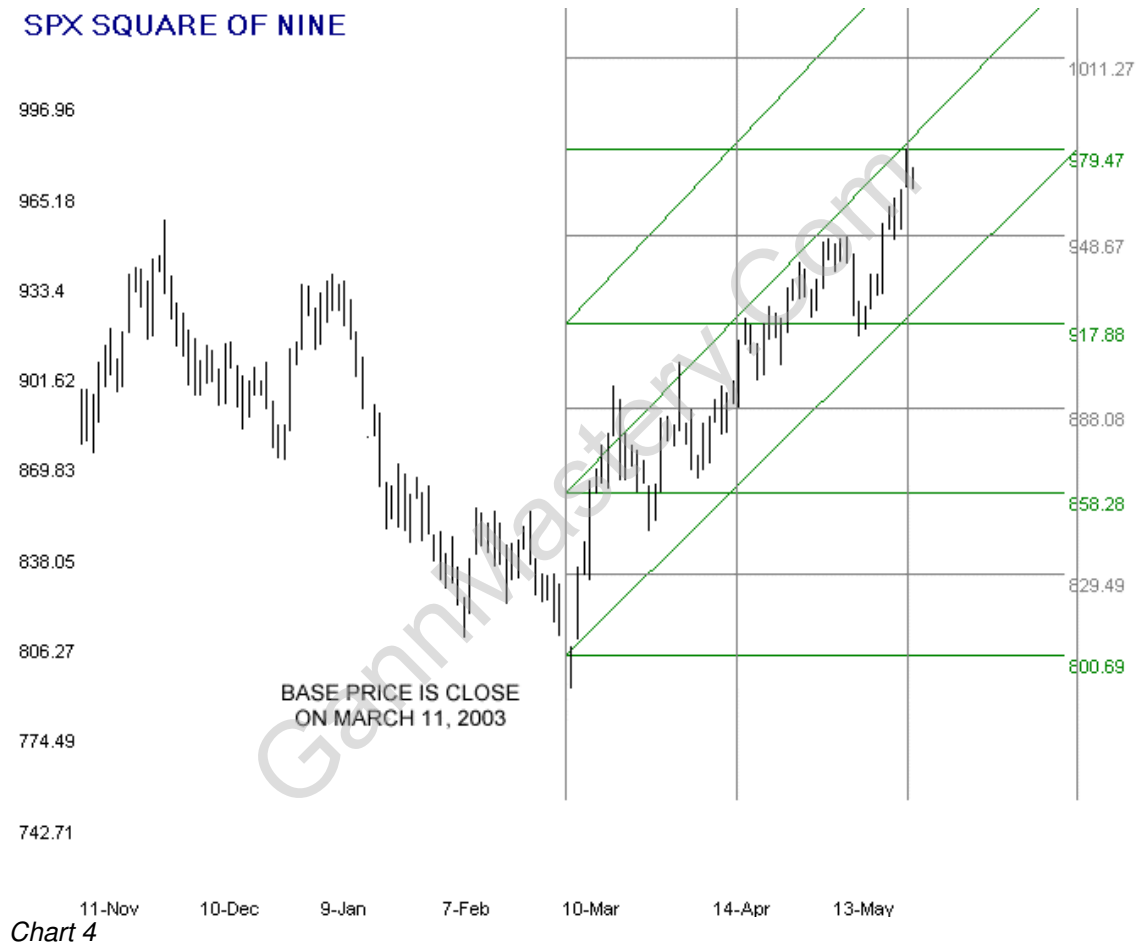
Using three digits for the calculations is a general rule and need not be followed religiously. If the SPX started trading over 1,000 next week we would not even consider converting the actual price levels to 100. Maybe if price climbed to 1,200 or 1,300 we would consider a conversion. The basic concept we want to emphasize is that the angle (*factor*) selected for the grid should produce channel lines that look like normal trend lines as much as possible. You know that you hit the right combination if the channels reasonably contain the swing and if price is reliably vibrating between the tops and bottoms of the individual squares. Converting natural prices to three digits by multiplying or dividing by factors of 10 before doing the Square of Nine calculations will change the size of the squares. Higher natural or converted prices and lower factor numbers provide smaller price slices and smaller squares suggesting that the duration of the data itself, hourly, daily, weekly, may be one of the most important determining conditions.

Which Price Do I Use?

When working with daily, weekly or monthly charts there can be an enormous difference between the high or low price of a bar and the closing price of the same bar, or the highest or lowest closing price that terminates a swing versus the most extreme price that terminates the same swing. Which price do you use for your Square of Nine calculations?

The best answer is to use both the highest or lowest close for a swing, and the extreme high or low for a swing as a base price to make two separate charts. If the new swing persists you can evaluate which base price choice is producing the most useful chart for you and discontinue the other. *Chart 4* is a remake of *Chart 1* of the SPX using the close on March 11 as the base price for the horizontal price lines in place of the intraday low on March 12 as we did with *Chart 1*.

One additional difference between *Chart 1* and *Chart 4* is that we added the 90 degree angle horizontal price lines to *Chart 4*. There is no universal rule that we can apply or pass on to you for constructing the perfect Roadmap chart for every ticker in every time frame. There is no substitute for experimentation and experience.



Variations on Time Spacing

There is a peculiarity with the Square of Nine Roadmap Charts in the way that the time spacing is calculated. This peculiarity is distinct from but related to the three digit controversy. In all our example charts we calculated the time spacing by taking the three digit square root of the pivot price and rounding it. The time spacing when calculated this way produces a perfectly vertical line on the chart. A more precise method of calculation, particularly for daily charts, is to find the square root for each 180 degree angle (assuming of course that the chart is based on 180 degrees or a *factor* of 1) and use that result as the time spacing on each separate horizontal line. For example, the time spacing on the SPX chart (*Chart 1*) is a constant 28 bars. If we used the variable time spacing method the bar spacing at the 720 degree angle at the price level of 1029

would be 32 bars. This will produce time spacing bars that slant slightly to the right from bottom to top on an uptrend but may produce better time related results, particularly at higher price levels on extended moves.

There is one more variation on time spacing for the Roadmap charts. The explanation will probably not make any sense to you right now, but it will when you have finished the book. As previously explained, we calculated the time spacing for *Chart 2* and *Chart 3* by converting the natural base price of 84.26 to three digits = 842.6 (84.26×10) and taking the square root. $842.6^{.5} = 29.02$. The variation is to use the natural price 84.26 and determine the first number on the 84.26 angle of the Square of Nine that comes closest to 29.02 and then use that number as the time spacing interval. That number in this case is 26.83, which rounds to 27 for hand drawing.

Gann Angles

Much has been written on Gann Squares and Gann Angles and Gann Fans. Almost all high end charting programs provide them as a user choice although the help files may seem deficient in explaining how to actually use them. We make absolutely no claims that the channel lines on the Square of Nine Roadmap charts accurately represent any particular so-called Gann Angle, 1x1, 1x2 or any other, or that the squares resulting from the vertical and horizontal lines are Gann Squares accurately drawn or otherwise. W.D. Gann made all his charts by hand on specially scaled charting paper to achieve a specific rise over run for the tickers he traded. This scaling is not easily duplicated on different sized computer screens or ink jet printers. The Roadmap charts stand on their own, and although their method of construction is also highly suited for hand drawing, there is no added value in defining them in terms they were never intended to match.

SQUARING PRICE WITH PRICE

The technique for squaring price with price is the same technique that we used to calculate the horizontal gridlines for the Square of Nine Roadmap Charts. By adding or subtracting specific divisions of the circle (review the Degrees to Factor Table) to the square root of the base price and then squaring the resulting sum or difference, we are in effect calculating support and resistance levels straight up or straight down from the base price without regard to time.

Support and Resistance from Major Pivots

Generally you want to do these static angle calculations from only the major pivot points. We would include in this category the all time high and low, the 10 year high and low, the 5 year high and low, the 52 week high and low, and also the contract high and low for most futures contracts. For thoroughness, you should do each of these calculations twice, one time with the extreme high or low price for the bars that began and ended the swing, and one time with the highest or lowest closing prices that began and ended the swing. As you can see, if you start to get even a tiny bit more liberal with your definition of what constitutes a major pivot point you are going to end up with an awful lot of numbers.

If you deal only with stock and stock related tickers, we also suggest using an angle no lower than 180 degrees (a *factor* of 1) in your calculations if you intend to place all these numbers on a chart. If you intend to keep them in an Excel spreadsheet or otherwise off the chart then go with 90 degrees for the financial markets and perhaps even 45 degrees if you are looking for additional evidence at a suspected major turning point.

A circle has 360 degrees and not all angles are of equal importance when doing Square of Nine calculations. Financial markets tend to respond to the 45 degree angle and to the multiples of 90 degrees (180, 270, 360) for major support and resistance. With all markets 360 degrees (a *factor* of 2) represents a full cycle and the location of the 360 degree price angles from the major pivots is always of interest when doing these static angle calculations. Bond traders tell us that 60 degrees and the multiples of 60 degrees (120, 180, 240, 300, 360) can sometimes be as important in their market as the 90 degree multiples. We do not trade any markets associated with anything that can be sliced, diced or stewed and can offer no opinion on whether angles other than the usual 90 degree multiples are considered important for those markets.

There is a danger here of having so much data that there is no discernible information so you want to be judicious in your selections. Also, we tend to use these static angle calculations from the major pivots mostly to provide additional evidence at a suspected major turning point. If our daily Roadmap chart were coming up to a 360 degree price level we would want to know if this same price level was, as an example, also 10 rotations of 360 degrees down from the all time high.

The three digit controversy raises its ugly head here too, as it does with all Square of Nine calculations. We deal mostly with the cash and futures stock indexes and generally do convert them to three significant digits before doing the math for these static angle calculations, and for actual squaring operations whenever a price range is called for. If the index price is "much" over 1,000 or less than 100. Because you do not have to deal with a time element for static angle calculations you would also probably want to have an off-chart table of natural, unconverted prices handy even if you have marked your chart with major support and resistance levels after doing the appropriate conversion to and from three digits.

Many stocks and indexes made all time highs in 1999 and 2000 and bear market lows in 2002 so there are dozens of recent examples where the value of this simple price on price calculation can be backtested to your own satisfaction. The technique is simple enough to apply without additional demonstration and it would be spiking the punch to show the most dramatic examples.

A Touch of Reality, Please

Many high flying stocks made bear market lows in the Summer and Fall months of 2002. In many cases these lows were 80% and 90% off all time highs made a scant two years or so earlier. During the many discussions going at the time about methods for finding a bottom in stocks this simple technique was brought up. Examples were cited where AOL, for example, was thought to have probably made a bear market low at the time very near the 21st 180 degree cycle down from its all time closing high of 94 (split-adjusted). On July 25, 2002 AOL made a daily, and bear market low of 8.70 and closed that day at 9.64. If you do the math the 21st 180 degree cycle down from the three digit adjusted closing high is 9.33. Should the technique be dismissed out of hand because 9.33 was not exactly the low or the close of the day that AOL made a bear market low?

We bring this up because since we're doing mathematical applications the expectation creeps in that the results must be accurate to within two decimal places to be useful. We hope the readers are less rigid. Gann himself did not expect this kind of accuracy and attributed near misses to "lost motion" or "pitch ahead or behind price." For any Square of Nine price application we apply the notion that any bar containing the target price is a valid hit. For time applications a near miss of one or perhaps sometimes even two bars is a valid hit. For price and time squaring applications within two or three degrees is certainly a hit and within four or five degrees is a near miss worth considering.

Let's review the math to see how we got from a closing high of 94 to a "price of interest" of 9.33. We converted 94 to three digits ($94 \times 10 = 940$) because in July, 2002 AOL was trading in single digits. Higher raw numbers produce smaller price slices. The square root of $940 = 30.66$. The *factor* for 180 degrees = 1. The square of $30.66 - 21 = 93.3$, which converted back from three digits ($93.3 \times 1/10 = 9.33$). How did we know that the 21st cycle of 180 degrees down from the all time closing high of AOL would be important? We didn't, at least not until July 25, 2002. The Square of Nine on many occasions will show definite predictive qualities, but you usually only learn that after the fact. The success of turning technique into a method you can trust is not simple and it's not easy. We can only propose that success may come to those who seek to harness the power of the Square of Nine not to predict the future but to know when it is here.

CONVERTING PRICE AND TIME TO DEGREES OF A CIRCLE

A Visualization of Spatial Relationships

Before moving ahead let's review the conceptual framework of what we have accomplished. We started everything off with the description of the paper version of the Square of Nine. You can view the form of the paper version in *Appendix 1* if you haven't already done so. We created the visualization of how you can turn the two dimensional Square of Nine table into a three dimensional pyramid by grabbing the center of the table and pulling it straight up until all the sides are perfectly shaped. Each block in the pyramid is a number in the table. This visualization enables us to see the spatial relationships between the numbers and how they relate to each other by angles and sides and position on the pyramid. When viewed looking down from directly above the numeral one at the apex of the pyramid we can see how the blocks can be stretched and pulled into the geometric shapes of a circle, a smaller triangle, and a square without losing their spatial relationships to each other.

A little heavy on the visualization? Maybe so, but before tackling the more esoteric applications of the Square of Nine where both price and time are interchangeable to and from degrees of a circle we want to reinforce an awareness that the axis boundaries and the price bars on our stock charts are really just the literal representations of the spatial relationship of price and time. And finally, that we can precisely determine the location of these spatial relationships, in some circumstances well into the future, by manipulating the square root of price and time's position on the Square of Nine with the decimal equivalents of the divisions of a circle.

Price or Time Converted to Degrees - the Formula

The formula for converting a price level or a number of bars or calendar days to degrees of a circle is straightforward and can be done on any calculator with a square root function key or a power function key.

The formula for Excel is: $\text{MOD}(\text{SQRT}(N) * 180) - 225, 360$ where N is the price, or price range, or time in days or bars that we want to convert.

Punching the formula into a \$10 calculator is more labor intensive because of the MOD 360 business. Here's the keystroke sequence for finding the degrees of circle for the number 74.

Keystrokes	
Step 1:	$\text{SQRT}(74) * 180 = 1548.42$
Step 2:	$1548.42 - 225 = 1323.42$
Step 3:	$1323.42 / 360 = 3.676$
Step 4:	$3.676 - 3 = .676$
Step 5:	$.676 * 360 = 243.42$

The only curveball is in Step 4 where you subtract 3 from 3.676. This step is necessary to accomplish the MOD 360 function which limits the final answer to a number between 1 and 360. For this example with N=74 you subtracted 3, the whole number to the left of the decimal point before multiplying by 360 in Step 5. If N=265 the whole number to the left of the decimal point would be 7 so you would subtract 7 from the intermediate result of Step 3, and so on.

The Excel table below shows the precompiled degrees for all the numerals between 1 and 225. The Excel formula above enables you to expand this Static Degrees table to any extent desired.

N	D	N	D	N	D	N	D	N	D
1	315	46	276	91	52	136	74	181	37
2	30	47	289	92	61	137	82	182	43
3	87	48	302	93	71	138	90	183	50
4	135	49	315	94	80	139	97	184	57
5	177	50	328	95	89	140	105	185	63
6	216	51	340	96	99	141	112	186	70
7	251	52	353	97	108	142	120	187	76
8	284	53	5	98	117	143	127	188	83
9	315	54	18	99	126	144	135	189	90
10	344	55	30	100	135	145	142	190	96
11	12	56	42	101	144	146	150	191	103
12	39	57	54	102	153	147	157	192	109
13	64	58	66	103	162	148	165	193	116
14	88	59	78	104	171	149	172	194	122
15	112	60	89	105	179	150	180	195	129
16	135	61	101	106	188	151	187	196	135
17	157	62	112	107	197	152	194	197	141
18	179	63	124	108	206	153	201	198	148
19	200	64	135	109	214	154	209	199	154
20	220	65	146	110	223	155	216	200	161
21	240	66	157	111	231	156	223	201	167
22	259	67	168	112	240	157	230	202	173
23	278	68	179	113	248	158	238	203	180
24	297	69	190	114	257	159	245	204	186
25	315	70	201	115	265	160	252	205	192
26	333	71	212	116	274	161	259	206	198
27	350	72	222	117	282	162	266	207	205
28	7	73	233	118	290	163	273	208	211
29	24	74	243	119	299	164	280	209	217
30	41	75	254	120	307	165	287	210	223
31	57	76	264	121	315	166	294	211	230
32	73	77	274	122	323	167	301	212	236
33	89	78	285	123	331	168	308	213	242
34	105	79	295	124	339	169	315	214	248
35	120	80	305	125	347	170	322	215	254
36	135	81	315	126	355	171	329	216	260
37	150	82	325	127	3	172	336	217	267
38	165	83	335	128	11	173	343	218	273
39	179	84	345	129	19	174	349	219	279
40	193	85	355	130	27	175	356	220	285
41	208	86	4	131	35	176	3	221	291
42	222	87	14	132	43	177	10	222	297
43	235	88	24	133	51	178	16	223	303
44	249	89	33	134	59	179	23	224	309
45	262	90	43	135	66	180	30	225	315

The degrees of a circle for the static numbers never change. The number 152 will always be on the 194 degrees angle, for example, and the number 9 will always be on the 315 degrees angle when applying the formulae, whether it's a trading range of 9 points, 9 calendar days, or the closing price on any bar.

For most of the applications going forward we will not be working directly in prices or days or bars but with the degrees of the circle that each of those items represents. As we now know the number of degrees will always be between 1 and 360, one complete rotation of the circle or the sum of the angles of a square.

This formula for converting price and time to degrees, so far as we know, is attributable to Carl Futia and has been previously published or otherwise made generally available without any reservations. There are other formulae for determining angles but this particular method is the least complicated and it can be implemented easily on a cheap calculator or in a spreadsheet.

The purpose of the MOD 360 function is to manipulate the result to a number between 1 and 360. In our example above we wanted to convert the intermediate result 1323.42. We could have done it this way. $3 \times 360 = 1080$ and $4 \times 360 = 1440$. The number 1323.42 is more than 3×360 and less than 4×360 so if we subtract out the 3×360 product ($1323.42 - 1080 = 243.42$) we are left with a desired number between 1 and 360.

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THE DEVIL IS IN THE DETAILS

The threshold question is what does the term squaring price and time mean? For all the applications in this book it means that price (or a price range) in degrees equals time units in degrees, or that price is 180 degrees or 90 degrees opposed to time. For example, a price range of 49 points squares with 81 time units because both price and time are on the 315 degree angle of the Square of Nine.

Suppose you have a situation where you have a base price of 935.05 and you want to determine if that price squares with 37 time units? Use the formula to calculate that $935.05 = 239$ degrees.

Find the 180 and 90 degree oppositions to 239 degrees:

$239 - 180 = 59$ degrees (this is the same as $239 + 180 = 419 - 360 = 59$)

$239 - 90 = 149$ degrees

$239 + 90 = 329$ degrees

Use the formula to calculate that $37 = 150$ degrees.

The base price of 935.05 squares with 37 time units at a 90 degree offset on the Square of Nine.

The 90 degree angle and its multiples at 180, 270, 360 are considered the most "important" angles for the financial markets and should always be considered when analyzing daily charts and longer time frames for squaring incidents. 45 degree oppositions also square price and time. We mentioned in a previous section that some bond traders look for 60 degree offsets in addition to the offsets that are multiples of 90 degrees.

You can be as creative as you want to spend the time being in determining what squaring angles are most important for the tickers you trade most frequently, or even how you can otherwise manipulate the numbers in ways other than the ways we show here. Day traders, in particular, seem to come up with the most creative variations which they claim to be effective for the time periods and markets they trade. There are no rules and you are limited only by your own imagination and the laws of mathematics.

Five Ways that Price Squares with Time

There are five primary ways that price squares with time:

- Current price squares with time elapsed from a prior change in trend.
- Time in a prior trend squares with the price range of the current trend.
- Price range in a prior trend squares with time in the current trend.
- Price ending prior trend squares with time in the current trend.
- Price range in the current trend squares with time in the current trend.

This list begs a response to a few questions.

What does *price* mean? If you're working with daily bars you can usually work with the closing price although it's often worthwhile to check results with the daily high if the prior change in trend (CIT) was from a low, or the daily low if the prior CIT was from a high.

The *price range* of a swing can mean the measurement from close-to-close, from high-to-low, or low-to-high, or close-to-high, or close-to-low. Our custom software displays price data by close

only line charts or by regular high-low bars, and measures swings by either bar high or bar low price or by closing price. Nothing unusual here except to say that it's OK to construct Roadmap charts where the channels are drawn from a bar high or low based on price levels computed from the close.

So far as we're concerned all these methods for determining a price range are equally valid. Maybe a little visualization will help. Gann hinted that stock and commodity prices were like units of energy that were constantly changing levels and direction, but that only got measured at arbitrary and artificial moments in time, a minute, a day, a year. A daily bar represents a very long time for something in constant motion at an immeasurable speed. Who's to say what precise moment on that bar should be used to confirm a key change in energy or direction?

Here's another curveball. We work most frequently with the DJX and although we usually do a three digit conversion when working with price range calculations in the DJX we often do not convert the natural two digit price to three digits when working with a base price squaring. Unfortunately we are not aware of any precise rule to follow to achieve consistent results, so the three digit controversy continues to dog us.

Time is the number of bars or trading days, or the number of calendar days from a previous bar. This is the only way we calculate time but there are means to turn the obvious into the complex for those so inclined. Some people convert days to the number of hours or minutes their market trades in a normal day. Others convert minutes to the number of degrees of earth rotation (1degree = 4 minutes) from a certain event.

A *trend* is more elusive to define because a meaningful definition to you depends greatly on the time frame in which you operate and the way you handle risk tolerance and money management. The Roadmap charts may provide a more objective definition. A long term trend ends when price breaks cleanly beyond the upper or lower outer channel boundary, and a short term trend ends when the same thing happens on the hourly Roadmap chart. We use the terms trend and swing interchangeably throughout this book.

Most trends end where the market has squared price and time but not every squaring of price and time will end a trend. You can usually expect a reaction of some kind to occur at every squaring although it could be a hesitation, a major but temporary pullback or even an acceleration in the same direction. Not every method of squaring price and time will apply in every situation and most times only one or two methods will show the square. Sometimes despite every combination there is no apparent square to be found. Gann said that every high and low was related mathematically to at least one other high or low and probably several. Then again, Gann used 100 year charts in his work. Not many computer traders will have the patience to do that kind of backbreaking research.

SQUARING CURRENT PRICE WITH TIME FROM A PRIOR CHANGE IN TREND

In this application we want to look at today's price to see if it "squares" with the number of trading days (bars) or calendar days that have elapsed since a prior change in trend. If you're working with daily bars you will usually use the closing price although if the closing price calculation is inconclusive it's often worthwhile to also check results with the daily high if the prior change in trend (CIT) was a low, or the daily low if the prior CIT was a high.

This a recent example of the application of this technique in the DJX cash, which made a low of 74.17 on March 12 after changing trend to down a few months earlier on January 13, '03. You needed four pieces of information on March 12 to check for a squaring: the closing price (75.52), the low price (74.17), the number of trading days (38), and the number of calendar days (58) from January 13, 2002. It was worthwhile checking for a squaring on March 12 because the market had put in a bullish reversal bar after making a new swing low and had closed at the high of the day. The daily bar was a bullish Hammer in candlestick parlance. *Chart 5* is what a plain chart of the DJX looked like on March 12, 2003.

DJX SQUARE OF NINE



Chart 5

The conversion of time to degrees is simple enough from the Static Degrees conversion table.

38 TD = 165 degrees
58 CD = 66 degrees

For the price side of things the first to check is the close on March 12. 75.52 = 259 degrees, 349 degrees, 79 degrees, **169** degrees (0, +90, +180, +270). 38 TD = **165** degrees. The close is within 4 degrees of square with the trading day count at a 90 degree offset.

Let's also check for squaring with the low price on March 12. 74.17 = 245 degrees, 335 degrees, **65** degrees, 155 degrees (0, +90, +180, +270). 58 CD = **66** degrees. The low is within 1 degree of square with the calendar day count at a 90 degree offset. You could reasonably conclude that the DJX squared price and time on March 12. Please notice that we did not convert the DJX to three digits before doing the calculation because we were working with a base price and not a price range.

For another example let's do the NYSE High Beta Index (NHB) at the October 10, 2002 low. The NHB is a cash only index. You cannot trade the index itself and there are no derivatives. Nevertheless, it's a great index to follow because the high beta stocks tend to lead the market. NHB Elliott Wave counts are often cleaner and always ignored at your peril.

NHB SQUARE OF NINE



For this example we're going to determine a squaring with the low price on October 10, 2002 with elapsed time from the swing that ended on August 22, 2002.

34 TD = 105 degrees
49 CD = 315 degrees

There was no three digit conversion so the low price at 1248.55 = 15.26 degrees, **105.26**, 195.26, 285.26. (0, +90, +180, +270).

34 TD = **105** degrees. The NHB low on October 10, 2002 squared with the 34 trading days elapsed since the prior change in trend on August 22, 2002.

This is a short chapter but we have covered, in all necessary detail, the critical information you need to square current price with time from a prior change in trend. For raw data you need the number of bars that have elapsed from the prior trend. If you're working with daily data you should also determine the number of calendar days that have elapsed since the prior change in trend. Price is the closing price or the bar high or bar low price. Sometimes you may want to do the calculations for both the high and the low price to determine if a squaring occurred somewhere within the bar even if it was not at one of the bar extremes or at the close.

We did not convert either the DJX or the NHB natural price to three digits because we were working with fixed prices and not price ranges. All this extra discussion is probably making the procedure seem more difficult than it really is. Once you've worked with a few particular tickers you will get a feel for what's required from the nuances to get consistent and reliable results.

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SQUARING TIME IN A PRIOR TREND WITH THE PRICE RANGE OF THE CURRENT TREND

The application of this technique requires three pieces of information if you are working with daily data: the number of trading days (TD) and the number of calendar days (CD) in the prior trend or swing, and the price range of the current swing. You can measure a price range from close-to-close, from high-to-low, or from close-to-high or low.

With the application of all the Square of Nine techniques, once you know how to convert price and time to degrees, the implementation of all the techniques is fairly simple. The devil is in the details of deciding how to establish a price or a price range and when to convert natural prices into three digits.

The period from July '02 through January '03 provides some easily distinguishable swings with sharp edges in many of the indexes so it's a good time period in which to do backtesting and some practice in applying this technique. It's also the very recent past so we do not have any of the "things are different now" issues to deal with that often come up in market analysis discussions.

Chart 7 shows the daily SPX cash for that period. The price and time ranges are from high to low for each swing. The number of points of travel for each swing show this as a period with tremendous opportunities for trading the major indexes.

SPX SQUARE OF NINE



Chart 7

The next two charts shows particular time periods of *Chart 7* in more detail.

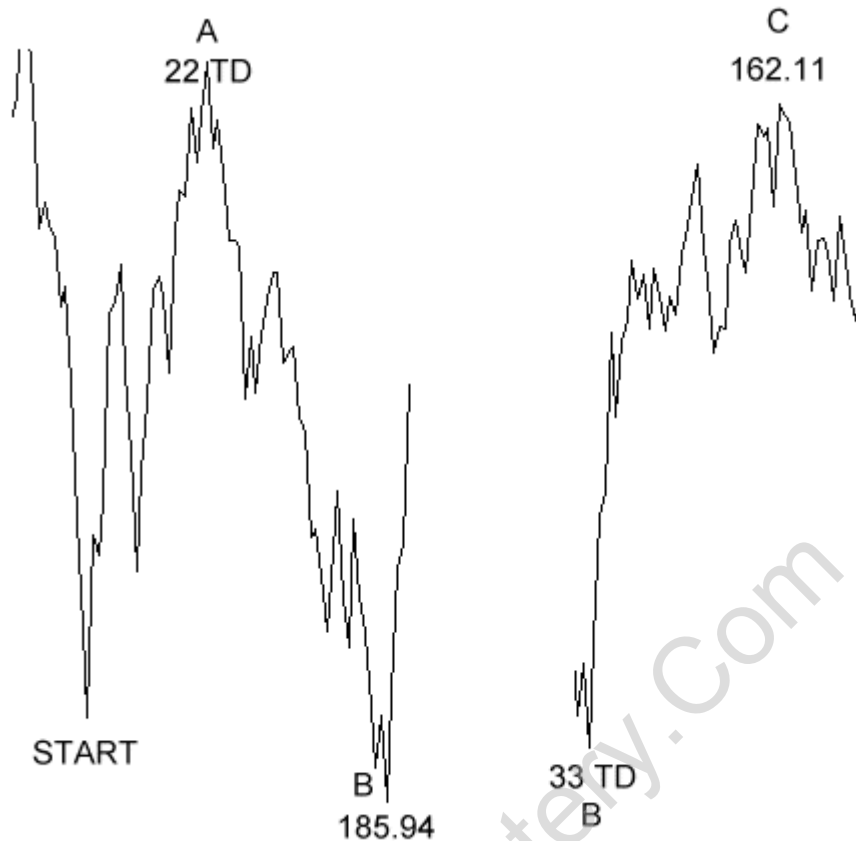


Chart 8

On a closing price basis, from START to A there was a swing of 22 TD. If you were doing your analysis at the close of trading at Point B you would determine if the market squared price and time that day by measuring the close-to-close price range of the swing from A to B, converting that price range into degrees ($185.94 = 70$ degrees), converting the 22 TD into degrees ($22 = 259$ degrees) and seeing if you got a hit. $259 - 70 = 189$. Nine degrees separation from a multiple of 90 degrees is too much separation to call it a squaring. Close-to-low numbers work out to a swing of 186.90 points = 76 degrees. $259 - 76 = 183$ degrees, which provides an acceptable 3 degrees of separation

Note that we're using rounded numbers for most of these examples. You can quickly get the degrees for any number up to 225 from the Static Numbers to Degrees Table. The whole process takes only seconds once the raw data is gathered together.

At Point C the price range of the swing on a closing basis is 162.11 points which is a tad more than **266** degrees. The duration of the prior swing was 33 TDs which converts to **89** degrees putting the price range at Point C and the time units of the prior swing within a few degrees of square at an offset of 180 degrees. $266 - 89 = 177$. If the multiple of 90 degrees happens to be 180 degrees that's even "better" and if it's 360 degrees that is the "best."

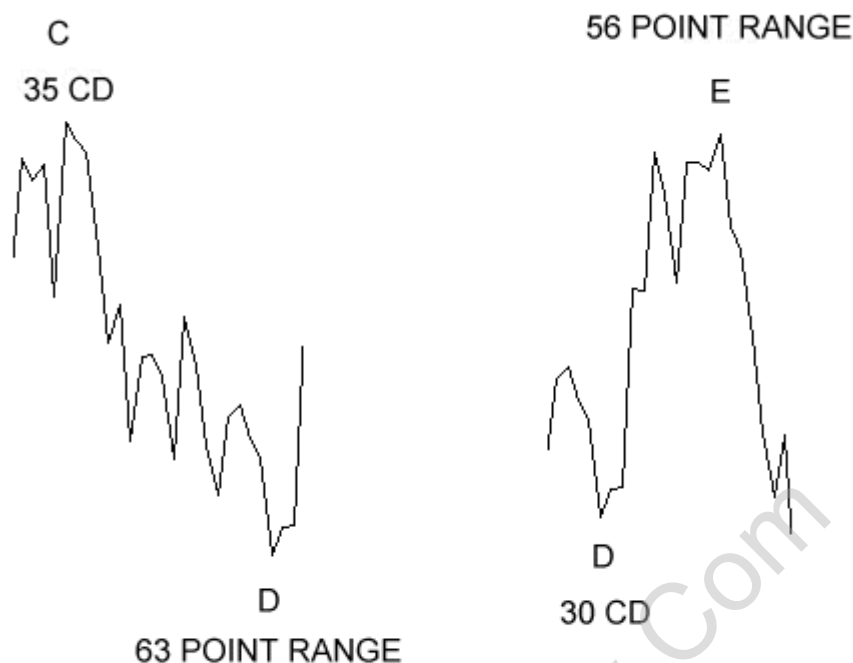


Chart 9

At Point D the prior swing was 35 CD on a closing basis and the price range on a closing basis was about 63 points. $35 = 120$ degrees and $63 = 124$ degrees squaring within about 4 degrees of unity or 360 degrees.

Point E is yet another squaring of price and time. $30 \text{ CD} = 41$ degrees and $56 \text{ points} = 42$ degrees, within about 1 degree of unity or 360 degrees.

If you're like the rest of us you probably have an entire library of books on trading and technical analysis (thank you for adding this one). In most of those books, which may be valuable in their own right, if there was any reference to W.D. Gann and the concept of squaring price and time it was probably something like this "if price travels 90 points in 90 days..." How far we've come!

Because one side of the price-time comparison is fixed, the number of TDs and CDs of the prior swing, we can use this application to examine the predictive qualities of the Square of Nine. This is easier done if you have a copy of the Static Numbers to Degrees Table in front of you. In the last example, the swing from D - E on *Chart 9*, we were working with 30 TDs. Since we already know that 30 TDs is 41 degrees on the Square of Nine we need only look at the Table of Numbers and Degrees to see which price ranges will square with 41 degrees. Staring in the first column and working through the table we can pick out price ranges of about 12, 30, 56, 90, 182, and 240 points that we know will square with 30 TDs at 360 degrees on the Square of Nine. And since we also already know the starting price of the current swing it's simple enough to figure out a list of future prices that will complete one of the required price ranges that will square with 30 TDs. From that point on you need only check today's bar to see if it contains a price that will complete the square.

It gets a little more complicated, but still manageable, when you add the 90 degree offsets that will also square the current range with time. In addition to the above list, a complete list of price ranges would include numbers that fell on the 131, 221, 311 degree angles as well. A shorter but still very good list would include only the numbers that fell on the 180 degree offset at 221 degrees. For the period from July '02 through January '03 that we covered in the examples all the squarings occurred at either 360 or 180 degrees although that will not be the case for every other ticker.

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SQUARING THE PRICE RANGE IN THE PRIOR TREND WITH TIME IN THE CURRENT TREND

For this application you need the following information: the price range of the prior trend and the number of TDs and CDs that have elapsed in the current trend. For this example of the SPX squaring the price range of a prior trend with TDs in the current trend, we used another example from the Fall of 2002 which provided many distinguishable swings. Because the SPX was a three digit price at the time no conversion was considered.

SPX SQUARE OF NINE



Chart 10

The high to low range of the August 22 - October 10 downswing was 196.37 points in the cash index. Rounding to 196 and reading directly from the Conversion Table we see that 196 points = **135** degrees. From the October 10 low to the high of the next swing was 36 TDs. From the Conversion Table we see that 36 also equals **135** degrees so the SPX has squared price and time at what turned out to be the beginning of a 146 point downswing in the cash index.

Here's another example with a \$20 stock. DELL made a swing low in September, '02 and a swing high in November, '02 with a closing price range of 6.64 points.

DELL SQUARE OF NINE



If you were following DELL in early February of 2003 could you have used the price range of the September - November upswing to get a handle on when the November-February down trend might end?

Let's do the math. 6.64 points converted to three digits is 66.4. Plugging 66.4 into the original formula we introduced provides a result that tells us that a price range of 6.64 points (converted because DELL trades at two digits) falls on the 161.75 angle on the Square of Nine. We could use the Table to determine what TDs or CDs would also fall on the 161.75 angle, or we can plug the angle of interest into a new formula and compute the result.

The Only Other Formula You'll Ever Need

The formula to determine the relationship of all the numbers that fall on a particular angle on the Square of Nine is:

$((2 * n) + ((2 * x)/360) + 1.25)^2$ Where "n" = number of the rotation and "x" = angle of interest. For almost every use of this formula you will start with n=1 or n=2 and repeat the calculation for each new "n" until you have completed as many rotations as you think will be useful for the particular application at hand.

The keystrokes for starting with n=1 and applying the formula with an angle of interest of 161.75 on a calculator with no parenthesis and a memory STO and memory RCL function key are:

$2 * 161.75 = 323.5 / 360 = .8986 + 1.25 = 2.1486$ STO
 $2 * 1 = 2 + RCL = 4.1486$

$$4.41486^2 = 17.2$$

2nd iteration:

$$2^2 = 4 + RCL = 6.1486$$

$$6.1486^2 = 37.8$$

3rd iteration:

$$2^3 = 6 + RCL = 8.1486$$

$$8.1486^2 = 66.39$$

The results of plugging the angle of 161.75 into the new formula and running through three iterations gave us the number of three possible TD or CD counts on which we would look for a change in trend (17, 37, 66).

Oh, oh. If you check the results you would find out that none of these TD/CD possibilities scored a hit on February 10, and if this is all you had done with this technique DELL would have reversed the down swing and launched into a 7 point rally without you.

What are we missing? Price and time "square" on the same angle on the Square of Nine, in this particular case an angle of 161.75 degrees. In the financial markets price and time also square at the three 90 degree offsets to the angle at interest. We should have done more work and used the new formula to go through the same three iterations with angles of interest of 251.75, 341.75, and 71.75, the 90 degree offsets to 161.75.

As it turned out the 3rd iteration of the 71.75 degree offset hit on the number at 58 TDs.

We used this DELL example for a couple reasons. One reason is to introduce the second and last formula that you will ever need to mathematically apply the Square of Nine in any market in any time frame. The first formula converts numbers to degrees (angles) and the second formula converts degrees to all the numbers that lie on that angle on the Square of Nine. It's easy enough to use the second formula to also do the calculations for the three 90 degree offsets of the primary angle, in effect, squaring the circle.

The second reason is to drive home the point that in most cases the spatial relationship between price and time that will stop a move cold or change a trend will not jump off the chart and tell you where it is. There is no substitute for doing the work.

SQUARING PRICE THAT ENDED A PRIOR TREND WITH TIME IN THE CURRENT TREND

This is an easy technique to apply. You need only convert the price (high, low or close) that ended a prior trend to degrees on the Square on Nine with the time in TDs or CDs (converted to degrees) of the current trend to see if the market is squaring price with time on the bar or day of interest. Because the base price is fixed you can easily use the new formula to forecast a grid of future TDs and CDs on which you will want to pay special attention to the market or to your particular ticker to get a sense of an ending trend.

Let's work the same DELL chart that we used for the last example and see if there was more than one way to get to the square of price and time on February 10, 2003.

DELL SQUARE OF NINE



Chart 12

The highest close of the swing ending on November 14, 2002 was 30.94. Converted first to 309.4 and plugged into the first formula we find that price lies on the 61 degree angle on the Square of Nine. Plugging 61 degrees and each of the 90 degree oppositions of 61 degrees into the new formula that tells us what numbers lie on the 61 degree angle shows TD and CD days of interest of 57, 65, 75, 83. Based on the closing price of the swing that ended in November, 2002, the TD calculation is within one day of square on February 10.

For completeness, let's do the calculation based on the highest price of the November swing. The highest high of the same swing was 31.06, converted to three digits = 310.6, converted to degrees = 67 degrees. Plugging 67 degrees into the new formula and jumping to the 3rd iteration shows 58 TD as a day of interest.

On February 10, 2003 you knew that DELL squared price and time in at least two different ways. In the previous chapter we determined that the price range of the swing that terminated in November squared with time of the current swing on February 10, 2003. Actually, by applying both formulae you could have known to a certainty at the close of trading on November 14, 2002, that DELL would square price and time in two ways on February 10, 2003. What you did not know to a certainty on February 10, 2003 was that DELL had changed trend that day and was beginning an almost uninterrupted 40% advance. There is no mathematical or magic formula for determining which squaring of price and time will result in a change in trend that produces a big move but with use and experience you will develop a trader's sense of which squarings are likely to be the most important.

We used both formulae for the DELL example in this chapter. You could have used only the first formula, the one that converts price or time into degrees, to determine that 58 TD converts to 65.8 degrees. What's the possible advantage to having the second formula? It's easier and more convenient to project ahead for times or prices of interest by using the second formula. If DELL had not made a reversal on February 10, the 58th TD, we would have known that we should be looking for that reversal on the 65th or 75th TD or CD because these numbers also lie on the 61 degree angle of the Square of Nine.

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SQUARING THE PRICE RANGE OF THE CURRENT TREND WITH TIME OF THE CURRENT TREND

This particular technique is best suited for adapting to the concept that a squaring price need not necessarily be defined only by what occurred at one absolute moment in time such as a high or a low or a close. A daily bar, or even an hourly bar, is a very long time for a wave of energy that is in constant motion at an immeasurable speed. Visualizing price as an energy wave can be a very useful construct sometimes. We should be interested in all the prices that occurred during the period it takes to complete one bar.

This technique is best suited for squaring a price range that has occurred after 100 or more bars or calendar days. Generally speaking, the more bars or calendar days between the start date and end date of the range the better. A very nonmathematical explanation can be illustrated with the chart below. The chart graphs the angles for the numerals 1 - 247 as they cycle from 0 to 360 degrees.

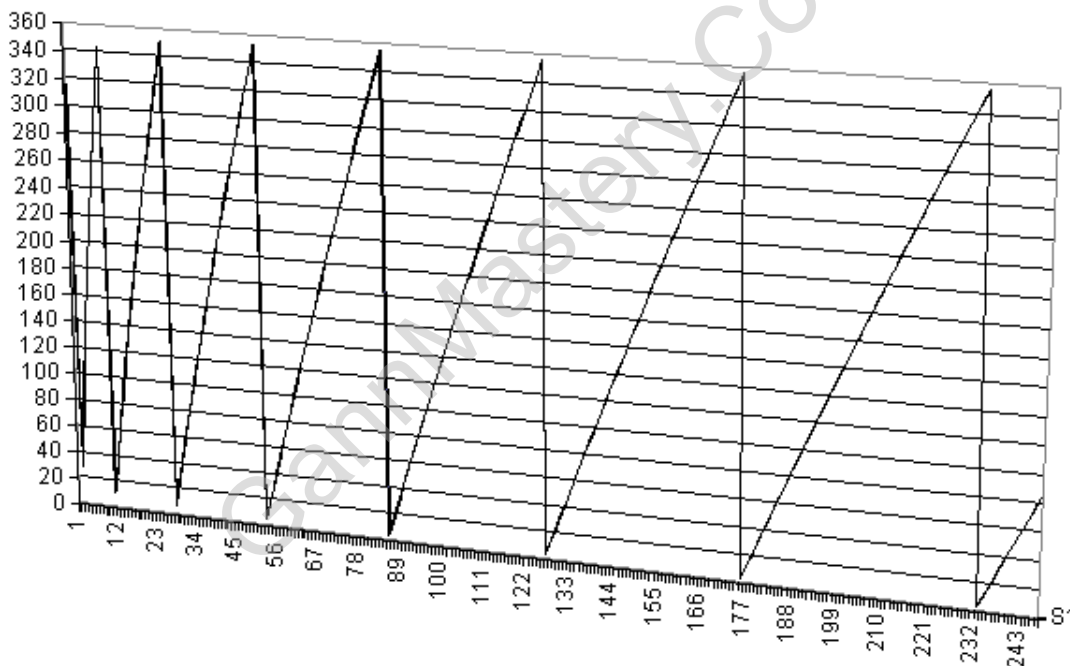
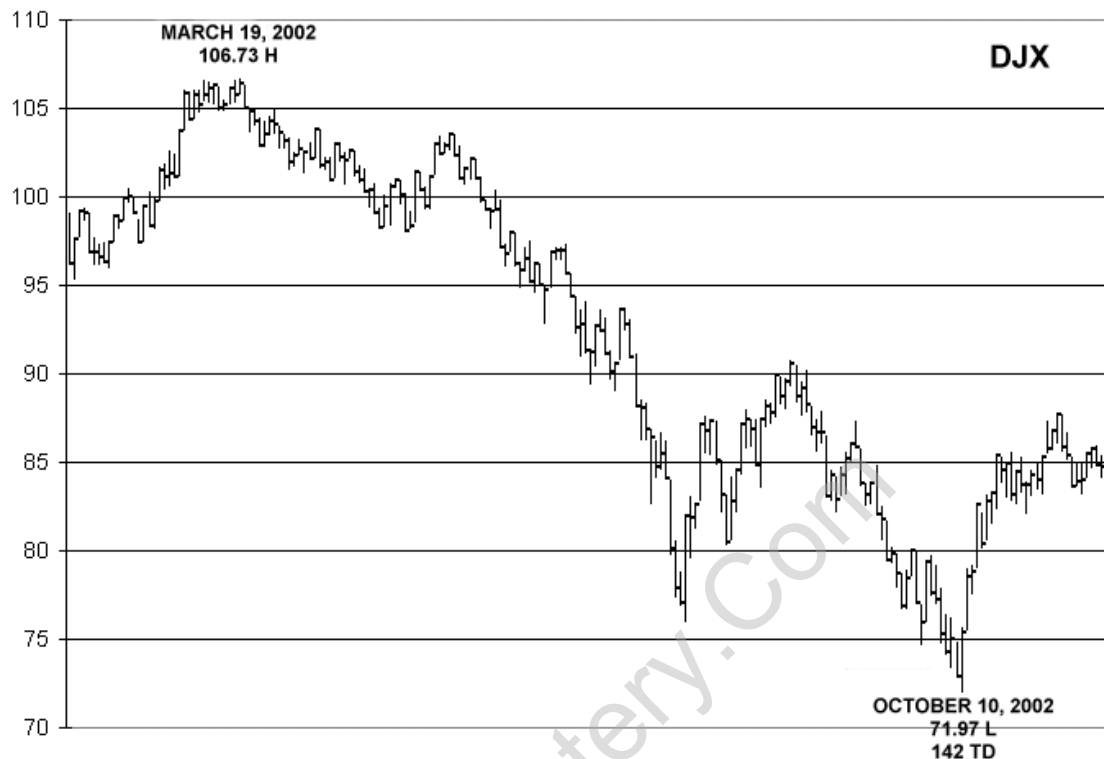


Chart 13

Although the magnitude and shape of the sawtooth pattern does not change as the number of bars or incidents increases, the slope of the change becomes flatter over time as the number of bars or days increases. In effect the "noise" is reduced as time increases.

You could do this squaring calculation on a daily chart for any ticker from the first day after you suspect that the trend has changed. You will score hits from time to time, particularly as the number of trading days or calendar days increases, but we find that the best results on daily charts occur with well defined trends that cover months of trading. This Excel chart of the DJX for the period from March, 2002 to October, 2002 shows the power of this technique.



There were 142 trading days from the peak of the Bear Market rally that ended in March, 2002 to the Bear Market Low (to date) that occurred on October 10, 2002. The trading range from peak to valley was 34.76 points which rounds to 35. The degree conversion for 142 trading days gives a result of **120** degrees. A price range of 35 converts to **120** degrees. The DJX squared price and time on October 10, 2002, the day of the Bear Market low to date, with the rally high on March 12. If you do the math to two decimal places from the precise high to the precise low the result will not come out a perfect 120 degrees, but at some undetermined moment within the two daily bars on March 19, 2002 and October 10, 2002 the DJX squared price and time exactly.

Using this technique we did not get a squaring with the March 19 high at the time of the previous Bear Market low in July. Was that a tip-off that the lower low was still to come?

CONCLUSION

The purpose of this work was to explain concisely and in adequate detail some mathematical and graphical techniques for applying the Square of Nine to real world trading situations. The formulae for converting price and time to degrees, and for finding all the conversions that lie on a particular angle on the Square of Nine, and the method for constructing Roadmap charts are a solid foundation for making the Square of Nine your own. The five ways that the markets will square price and time can provide you with knowledge that may not be obtainable by other means. We do not claim to have covered, or even to fully understand, the boundaries of all that can be known about the Square of Nine. We have not even touched on the work of the school that uses degrees of longitude of the celestial bodies for their conversions.

This is above all a book about technique. A golf instructor can show you the proper techniques that Tiger Woods uses to strike a ball, but if you want to play golf you must go out there and do it yourself. There is no other way to develop the feel and the touch that will promote confidence in a competitive situation. When learning and applying these techniques there is much to be said about getting off the keyboard and using your pencil and straight edge.

W.D. Gann may or may not have had any secrets but he knew the value of persistence and hard work. In one of his stock market courses Gann counseled that a person who wanted to make a success of stock trading should spend one hour a day for five years studying stock charts before making one trade. We hope that your journey has been shortened by this knowledge.

TRADINGFIVES
June 2, 2003