MARKET SCIENCE

VOLUME I

SQUARE OF TWELVE

BRADLEY F. COWAN

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Voyaging through strange seas of thought, ...alone

. . . William Wordsworth (1770)

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ANDREYBBRV@GMAIL.COM SKYPE: ANDREYBBRV

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ADDITIONAL SUBJECTS TO STUDY

The subjects listed below are related to the topics presented in this volume and those to follow. These topics are listed for those who wish to develop a background of knowledge related to this subject material.

Book of Revelation

> The Book of Revelation contains the majority of the Biblical references to the "Square of Twelve". *Market Science* will prove that this number (144) is the definitive unit of measurement in the soybean market.

Isaac Newton's Laws Of Motion

Modern Physics

> Specifically, study Quantum Theory and the Bohr model of the atom.

W. D. Gann's *Master Course For Commodities*

Periodic Chart Of The Elements

Celestial Navigation

> Especially, study how to use a sextant. The techniques used to locate a ship's position at sea are similar to those used to locate a point of force on a price-time chart.

Analytic Geometry

Rotation of solids

Chaos Theory

PREFACE

One of the important concepts presented in *Four-Dimensional Stock Market Structures And Cycles* was that financial market analysts must not limit their perspective by focusing on a one-dimensional view of only price values or only time cycles. When traditional analysts make this mistake they miss the fact that price and time are intimately connected, the potential extent of each is dependent on the other.

When price and time are unified, through application of the PTV, a perfect order presents itself that is not visible within the limitations of a one-dimensional analysis.

The reader will notice throughout this book that no units are applied to PTVs. This was not an oversight by the author. Although the single dimension of price has "cents" as its unit of measurement; and time uses seconds, hours, days, weeks, months, or years; when these two are combined there is not yet a suitable system of units given to the combination. The only option is cent-weeks or cent-years or some similar hybrid. The author finds this system of units misrepresentative and therefore, has chosen to not include units on PTVs.

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INTRODUCTION

If you can measure that of which you speak, and can express it by a number, you know something of your subject; but if you cannot measure it, your knowledge is meager and unsatisfactory.

... Lord Kelvin (1824)

This material is the first volume of a series of books, titled *Market Science*. Although these books use the soybean market to present the tools in this analysis, the concepts are applicable to any market, providing additional proof that the natural laws governing human behavior and identified in the book *Four-Dimensional Stock Market Structures And Cycles*, are universally applicable to all financial markets, including agricultural.

As in *Four-Dimensional Stock Market Structures And Cycles*, the PTV[1] will be used as a tool to show how spatial relationships between points of force in the soybean market are consistent and predictable.

WITHOUT USE OF THE PTV, THE MAJORITY OF THE RELATIONSHIPS REVEALED IN THIS WORK REMAIN UNSEEN.

This book starts with Lesson XI because it is an extension of the material presented in *Four-Dimensional Stock Market Structures And Cycles*, which contained the first ten lessons of this series. This volume assumes the reader is very familiar with at least the first five lessons of that book.

Also provided in this series of books, is material relating to vectorial relationships, which was not revealed in *Four-Dimensional Stock Market Structures And Cycles*.

The quote provided at the beginning of Lesson III in *Four-Dimensional Stock Market Structures And Cycles* (Growth Patterns) was, "Here and elsewhere we shall not obtain the best insight into things until we actually see them growing from the beginning." That advice from Aristotle will be followed in this analysis as it starts at the beginning, i.e., the first recorded soybean data in 1913, and progresses from there.

The reader should carefully study the methodology used in this book, because it is the general technique used when approaching a market. The general rules are:

(1) Begin the analysis by choosing data that represents the market under study in its most elemental form. In this case, it is the cash price paid directly to farmers throughout the United States. Appendix B expands on this thought.

[1] The PTV is a registered trademark, described in the book *Four-Dimensional Stock Market Structures And Cycles.* A brief review of that tool is provided in Appendix A.

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(2) Go back to the beginning, i.e., find data as far back in time as possible. Beginning the analysis at the point where trading began is important because the vibration at that time identifies the foundation upon which all subsequent movements within that market are built.

MOVEMENTS WITHIN PRICE-TIME IMMEDIATELY AFTER TRADING BEGINS ESTABLISHES THE RATE OF VIBRATION OF THAT MARKET.

This book will demonstrate this fact in the soybean market where the first recorded price-time movements were defined by the square of twelve.

The author has noticed that it is common practice for market researchers to approach a market problem in the reverse order than is required by the scientific method. That is, an initial assumption is made based on little or no evidence, then the data is reviewed looking for any supporting evidence of that postulate. For example, an assumption is made regarding the Fibonacci relationship as the defining ratio of market movements. Then, the data is studied and the original postulate is assumed correct any time a ratio between 1.5 and 1.7 is observed.
In contrast, the following steps outline the correct way to approach any scientific problem, including market analysis.

(1) Gather correct and reliable data as far back in time as possible.

(2) Tabulate the relationships between the data in step 1.

(3) Form conclusions based on the relationships tabulated in step 2.

LESSON XI

SQUARE OF TWELVE

And I heard the number of them which were sealed: and there were sealed an hundred and forty and four thousand of all the tribes of the children of Israel.

Of the tribe of Judah were sealed twelve thousand. Of the tribe of Reuben were sealed twelve thousand. Of the tribe of Gad were sealed twelve thousand.

Of the tribe of Asher were sealed twelve thousand. Of the tribe of Napthtali were sealed twelve thousand. Of the tribe of Manasseh were sealed twelve thousand.

Of the tribe of Simeon were sealed twelve thousand. Of the tribe of Levi were sealed twelve thousand. Of the tribe of Issachar were sealed twelve thousand.

Of the tribe of Zebulun were sealed twelve thousand. Of the tribe of Joseph were sealed twelve thousand. Of the tribe of Benjamin were sealed twelve thousand.

... Revelation 7:4-8

INTRODUCTION

The above quote from the Book of Revelation shows one of the Biblical references to the square of twelve (144), where the twelve tribes of Israel were divided into four (square) groups of three. The referenced number in each tribe is twelve thousand. And since there were twelve tribes, the total number referenced in the first verse was 144,000.

After studying the following material, the reader is advised to read the Book of Revelation and form his own conclusions as to its value.

Most experienced financial market analysts are familiar with the number twelve. W.D. Gann described it as one of the two "Master Numbers" (the other is nine). This number is found in everything from the Platonic Solids to the relative periods in the solar system. In addition, *Four-Dimensional Stock Market Structures And Cycles* documented how stock market cycles divide into twelve strong harmonics of thirty degrees each.

The significance of the square of twelve, ranging from the structure of the atom to freely traded financial markets, will be proven in this and subsequent writings.

Although several financial markets are governed by the square of twelve, the soybean market was chosen for this analysis because of its popular appeal to contemporary traders. This book will show that the square of twelve is the definitive unit for determining the extent of price-time movements within that market.

Traders studying this material who trade markets other than soybeans should closely follow the methodology used in this book when looking for the rate of vibration in their market. Although the examples given in this book are for a specific market, the techniques are universal.

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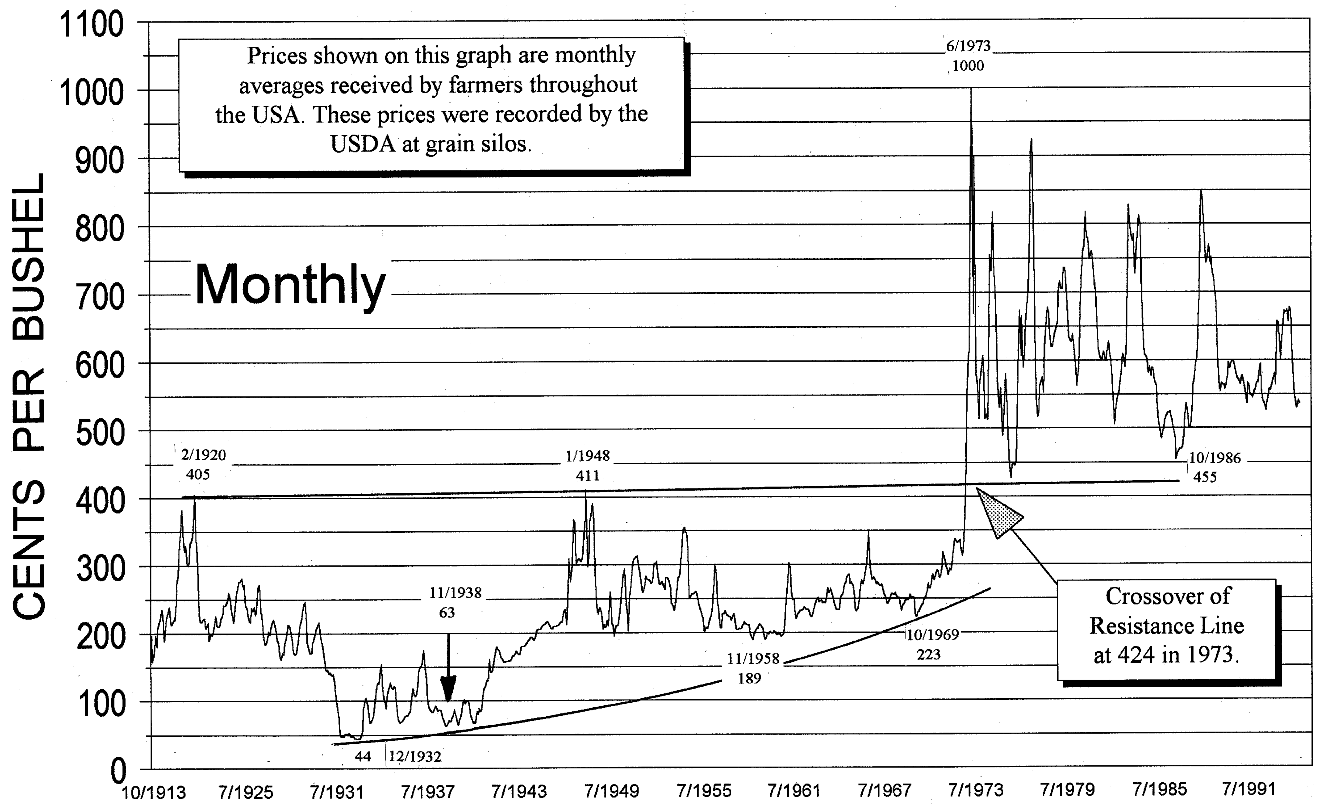
CHART XI.A
SOYBEANS 10/1913 - 10/1994



SQUARE OF TWELVE

One of the numbered squares identified and written about by W.D. Gann in the months immediately preceding his death was the "Square of Twelve", which he referred to in his Master Courses as the "Master Square". On the clear overlays provided by Gann, the square of twelve was represented with 0-144 on both the horizontal and vertical axes. This number is the first square of twelve ($12^2 \times 1 = 144$) and will be shown in this and future books to define the vectorial expansion within price-time in the soybean market.

W.D. Gann wrote in his Master Courses that the square of twelve:
"may be used and applied to anything - TIME, SPACE, PRICE, or VOLUME."[2]

This book proves the validity of that statement by verifying that the square of twelve defines the magnitude of price-time movements on weekly and daily charts of the soybean market and is, therefore, the foundation of spatial movements within that market. Not only are price changes and time cycles governed by this value, but also, their spatial orientation.

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[2] Reference W.D. Gann's *Master Course For Stocks* or *Master Course For Commodities* in the lesson titled *Master Charts* on page one.

THE SQUARE OF TWELVE GOVERNS SPATIAL MOVEMENTS IN PRICE-TIME (PTVs) WITHIN THE SOYBEAN MARKET.

Although both of W.D. Gann's master courses, the *Master Course For Stocks* and the *Master Course For Commodities,* described the square of twelve in the "Master Charts" lesson, it was in the commodities course that Gann spent most of his time describing this square and providing examples. Specifically, he focused on its relationship with the soybean market.[3] Gann's writings only directly applied this square to the one-dimensional analysis of price levels and/or time cycles. This work shows that even better results are obtained in applying this square when price and time are unified through application of the PTV.

The squares of twelve progress as shown in Table 11.1. These values are the most important for measuring relative locations of points of force in the soybean market.

EXAMPLES OF THE SQUARE OF TWELVE IN THE SOYBEAN MARKET

Chart XI.A shows a complete record of the cash soybean market beginning when data was first recorded in October, 1913 and continuing through December, 1994.[4] This chart identifies each of the major turning points until the low in October, 1969. The calculations in this section stop in 1969 because the 1913-1969 growth spiral completed at that time.

A closer view of the 1913-1969 period is shown on Chart XI.B, which will be used in the following analysis.

The data for the PTVs shown on this chart are contained in Table 11.2.

The PTVs contained in Table 11.2 and their relationship to the square of twelve are described below. Future writings will study how these PTVs fit together to define the spatial orientation within the growth spiral that unfolded during this time. Those PTVs that initially appear to not be related to the square of twelve are defined by simple mathematical relationships with other PTVs, which are themselves integral multiples of 144.

DESCRIPTION OF 11/1913 - 2/1920 PTV (AB on Chart XI.B)

The soybean plant was introduced into the United States in the later part of the 19th century, after which, it was quickly hybridized and produced by farmers. There were no records kept of prices between the time of introduction of the plant and the first recorded USDA data in 10/1913. Therefore, the first PTV shown on Chart XI.B (AB) may not represent an entire movement because its origin is uncertain. However, after the major top in 2/1920, the origin and terminus of subsequent PTVs were clearly defined.

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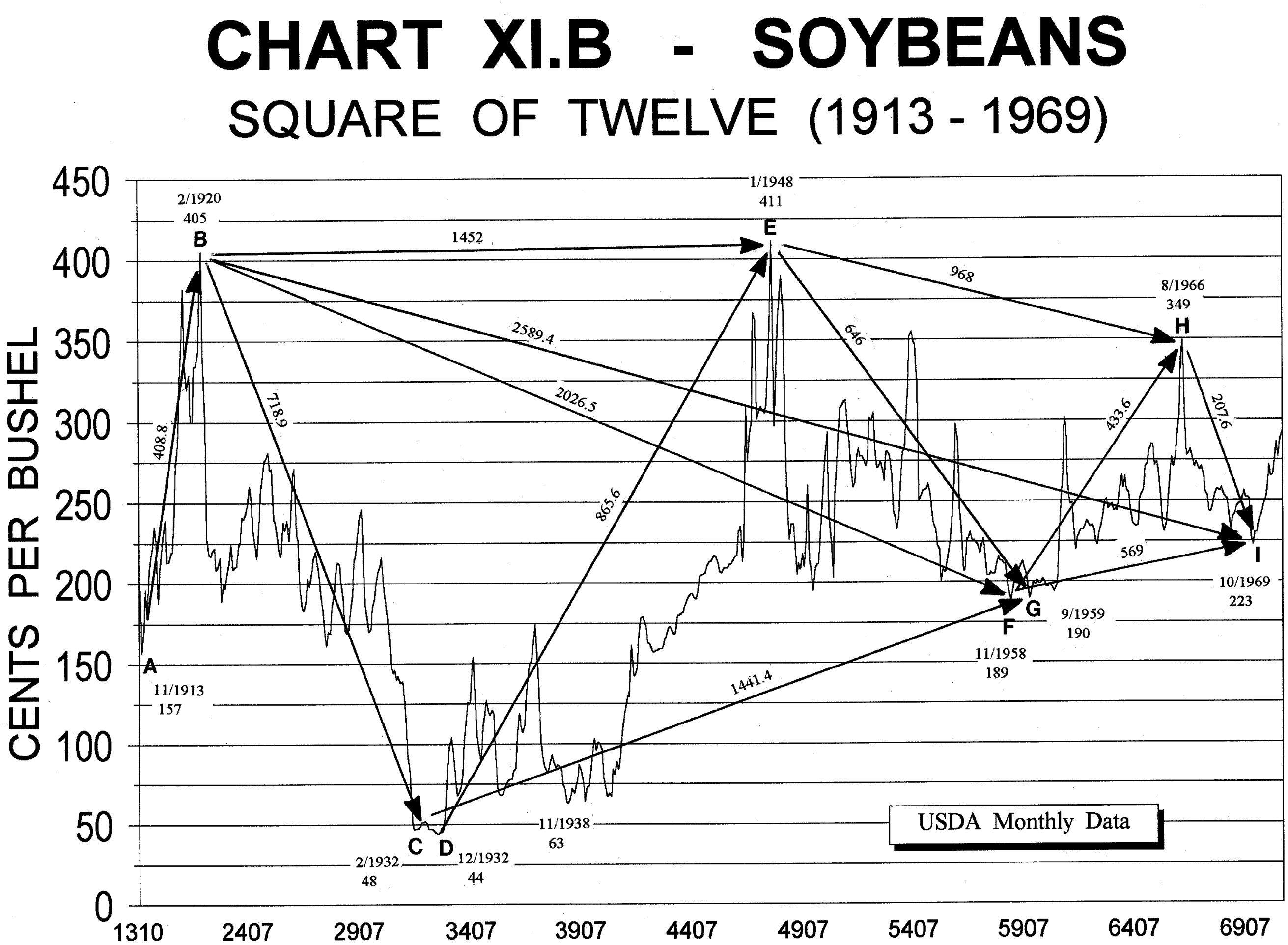
[3] It is recommended the reader carefully review the section in W.D. Gann's *Master Course For Commodities* describing the square of twelve.

[4] Appendix A describes the author's reasoning for the data set chosen for this analysis.

The first PTV shown on Chart XI.B is AB and measures **SPACE** in price-time between the low recorded in November, 1913 and the high in February, 1920. This PTV had a magnitude of 408.8. Note that the terminus of AB occurred at a price equal to the length of the vector, i.e., at 405 cents per bushel. In other words, if this PTV, which defined the first recorded spatial movement within this market, was rotated around point B until it pointed straight down in price, its base would be at zero.

Table 11.1
Squares of Twelve

NUMBER OF SQUARE	ENDING POINT FOR SQUARE
1	144 = 144 x 1
2	288 = 144 x 2
3	**432** = 144 x 3 (288 x 1.5)
4	576 = 144 x 4
5	720 = 144 x 5
6	**864** = 144 x 6 (288 x 3)
7	1008 = 144 x 7
8	1152 = 144 x 8
9	1296 = 144 x 9
10	**1440** = 144 x 10 (288 x 5)
11	1584 = 144 x 11
12	1728 = 144 x 12
13	1872 = 144 x 13
14	**2016** = 144 x 14 (288 x 7)
15	2160 = 144 x 15
16	2304 = 144 x 16
17	2448 = 144 x 17
18	**2592** = 144 x 18 (288 x 9)
19	2736 = 144 x 19



The magnitude of AB (408) is very important and will be shown to repeat 73 years later in 1986[5]. Because the market changed to a higher energy level after the bottom in 1969, the 408 PTV measured in 1986 was much more vertical than in 1913. While AB took seven years to work out, the 408 PTV in 1986 took only two years.

The magnitude of AB is related to the square of twelve by the square root of two:

Theoretical value of AB $= 288 \times \sqrt{2} = 407.3$

Table 11.1 showed that 288 is the second square of twelve. The theoretical value shown above differs from the measured data[6] by:

$408.8 - 407.3 = 1.5$

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[5] This 73 year interval is, approximately, half of the first square of twelve (144 years divided by 2 equals 72 years).

[6] Since this data set uses monthly averages, the point within the month where the actual high or low occurred can vary by as much as four weeks. Therefore, the difference shown above is well within the resolution of the recorded data. As this work progresses, daily data will be used to narrow down the window of tolerance.

Table 11.2
PTV Calculations for Chart XI.B (1913 - 1969)
Data Recorded By USDA

Price-Time Radius Vector	Date of Low	PTV Price Low	Date of High	PTV Price High	Time Change in Weeks	Price Change in Cents	Vector Value (PTV)
AB	11/1913	157	2/1920	405	325	248	408.8
BC	2/1932	48	2/1920	405	624	357	718.9
BD	12/1932	44	2/1920	405	665	361	756.7
BE	2/1920	405	1/1948	411	1452	6	1452.0
BF	11/1958	189	2/1920	405	2015	216	2026.5
BI	10/1969	223	2/1920	405	2583	182	2589.4
CG	2/1932	44	9/1959	190	1434	146	1441.4
DE	12/1932	44	1/1948	411	784	367	865.6
DI	12/1932	44	10/1969	223	1916	179	1924.3
EG	9/1959	190	1/1948	411	607	221	646.0
EH	8/1966	349	1/1948	411	966	62	968.0
FH	11/1958	189	8/1966	349	403	160	433.6
FI	11/1958	189	10/1969	223	568	34	569.0
HI	10/1969	223	8/1966	349	165	126	207.6

DESCRIPTION OF 2/1920 - 2/1932 PTV (BC on Chart XI.B)

Table 11.2 shows that the value of BC, which measured price-time space from the peak in February, 1920 to the bottom in February, 1932, was 718.9. This value is the fifth square of twelve. That is,

Theoretical value of BC = 144 x 5 = 720

This theoretical value differed from the actual data by: 720 - 718.9 = 1.1

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The origin of this PTV is extremely important for future cycle work because it measures the first major recorded point of force in the soybean market.[7] Future volumes of *Market Science* will study the quantum energy levels of freely traded markets and will prove the value of this point in price-time.

DESCRIPTION OF 2/1920 - 1/1948 PTV (BE on Chart XI.B)

The PTV that connected the two major tops in 2/1920 and 1/1948 is a good example of a vector pointing nearly parallel to the time axis. Table 11.2 shows that the time component for this PTV was 1452 weeks, which is equal to the magnitude of the vector. When a PTV points down the time axis it defines a vertical angle. This concept is expanded later in this book.

The magnitude of BE was 1452, which is the exact magnitude of the PTV connecting the top in 1/1948 to the major bottom in 12/1975. These three points touched the long-term support/resistance line that was in effect from 2/1920 to 12/1975. In other words, these three points were on a straight line. Also, the magnitude of the PTV connecting the top in 1/1948 to the top in 6/1973 was 1447.

The difference between the ideal square of twelve and the measured values of these PTVs was 12. That is,

Theoretical value of BE = 144 x 10 = 1440
Measured value of BE = 1452
For a difference of; 1452 - 1440 = 12

This amount of tolerance (12 weeks) is something that would have been anticipated if the analyst were aware of the relationships to expect between this and other PTVs within the growth spiral. All these PTVs fit together perfectly.

It should be noted that the 1947-1948 period represented a complex top, where several failed attempts were made to advance to new highs before the ultimate decline into the 11/1949 bottom. The exact square of twelve (1440) arrived before the top in 1/1948, but after the first top was reached in 3/1947.

DESCRIPTION OF 2/1932 - 9/1959 PTV (CG on Chart XI.B)

A nearly perfect square of twelve separated the major bottoms in 2/1932 and 9/1959. This PTV, CG, measured 1441 and also pointed nearly parallel to the time axis.

The origin of this PTV coincided with the terminus of the 2/1920 - 2/1932 PTV.

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[7] W.D. Gann wrote in his *Master Course For Commodities*,

> "The first time period starts February, 1920, high 405, and the next time period starts December 28, 1932, low 44 cents. These are two of the most important time periods to measure future time periods from."

DESCRIPTION OF 12/1932 - 1/1948 PTV (DE on Chart XI.B)

The PTV from the all-time low in December, 1932 at 44 to the top in January, 1948 is measured to be 865.6. Table 11.1 shows that the sixth square of twelve equals 864, i.e.,

Theoretical value of DE = 144 x 6 = 864

This theoretical value of DE, 864, differed from its actual measured value, 865.6, by 1.6.

At this point in time, 1/1948, two major PTVs had completed from the 1913 lows. Analysts aware of the internal workings of growth spirals would have been able to project every movement thereafter, for the next 22 years.

DESCRIPTION OF 11/1958 - 8/1966 PTV (FH on Chart XI.B)

Half of the PTV from 1932 to 1948, 433, defined the price-time space between the low in November, 1958 and the high in August, 1966. This PTV, FH, is shown in Table 11.1 to equal the third square of twelve, i.e.,

Theoretical value of FH = 144 x 3 = 432

The actual length of this PTV was 433.6, for a difference of 1.6 from the theoretical value given above.

DESCRIPTION OF 1/1948 - 9/1959 PTV (EG on Chart XI.B)

The PTV measured from the high in January, 1948 to the low in September, 1959 is the arithmetic mean between the two PTVs on either side of it. The arithmetic mean is another way of saying the average between the two. That is,

$$\text{Theoretical value of EG} = \frac{DE + FH}{2} = \frac{865.6 + 433.6}{2} = \frac{1299.2}{2} = 649.6$$

The measured value of EG was 646, for a difference from the theoretical value of 3.6.

Since it has already been shown that both DE and FH were defined by the square of twelve (DE = 144 x 6; FH = 144 x 3), EG must also be defined by the square of twelve as follows:

$$\text{Theoretical value of EG} = \frac{DE + FH}{2} = \frac{(144 \times 6) + (144 \times 3)}{2}$$

$$= 144 \times (9/2) = 144 \times 4.5 = 648$$

The value of 9/2 used above is the arithmetic mean (average) between six and three.

This result, based on the square of twelve, differed from the measured value by 648 - 646 = 2.

DESCRIPTION OF 11/1958 - 10/1969 PTV (FI on Chart XI.B)

FI connected the two major bottoms in 11/1958 and 10/1969. Its value, 569, differed from the fourth square of twelve by 7. That is,

Difference between measured value and square of twelve = 576 - 569 = 7

DESCRIPTION OF 8/1966 - 10/1969 PTV (HI on Chart XI.B)

HI extended from the top in August, 1966 to the bottom in October, 1969. Its measured value was 207.6. Similar to AB, this value is related to the square of twelve by the square root of two, i.e.,

Theoretical value of HI = $288 / \sqrt{2} = 203.6$

The theoretical value was four from the measured data: 207.6 - 203.6 = 4

Analysts using a one-dimensional approach often see this value in price and/or time. This is because the PTV defines the horizontal and vertical angles, which establish price support/resistance levels and time cycles. For example, the initial price drops after the major tops in 2/1920 and 1/1948 were stopped by this horizontal angle. The concept of horizontal and vertical angles is explained later in this writing.

DESCRIPTION OF 2/1920 - 11/1958 PTV (BF on Chart XI.B)

BF connected the top in 2/1920 to the bottom in 11/1958. The magnitude of this PTV was 2026.5, which is related to the fourteenth square of twelve. That is,

144 x 14 = 2016

Notice that this PTV spanned a time period of 38 years. Within this same time frame four other PTVs: BD, DE, BE, and EF completed. Readers who are interested in independently continuing this analysis are encouraged to study the relationships between PTVs that are contained within larger PTVs. This subject will be studied in future writings.

DESCRIPTION OF 2/1920 - 10/1969 PTV (BI on Chart XI.B)

BI defined the entire span of the growth spiral from 2/1920 to the major bottom in 10/1969. Therefore, all PTVs described above were contained within this larger one.

This is another example of how a PTV angles progressively more parallel to the time axis as it grows further away from the base (2/1920).

W.D Gann noticed the square of twelve in his one-dimensional analysis of price and/or time because as the PTV flattens out along the axes of the chart it defines the horizontal and vertical angles of the square. However, the square of twelve is not limited to a one-dimensional analysis, thus proving the unique value of the PTV. The square of twelve is identified by PTVs connecting major turning points that are not spaced in price and/or time by the square of twelve.

The magnitude of BI was 2589.4, which relates to the eighteenth square of twelve as follows:

$$144 \times 18 = 2592$$

The above theoretical value is 2.6 greater than the measured value. Note that this square of twelve covered a time period of nearly 50 years, yet was accurate within the resolution of the available data. Again, more information about the significance of this PTV will be provided in future writings.

DESCRIPTION OF 2/1920 - 12/1932 PTV (BD on Chart XI.B)

BD was included here for analysis because it demonstrates a very important concept concerning the arithmetic mean. This PTV defined the completion of the ten month flat bottom between February, 1932 and December, 1932. Just as EG was shown to be the arithmetic mean (average) between DE and FH, so is BD the arithmetic mean between DE and EG. That is,

$$BD = \frac{DE + EG}{2} = \frac{865.6 + 646.0}{2} = \frac{1511.6}{2} = 755.8$$

The actual value of BD was 756.7 for a difference of less than one (0.9) from the theoretical value calculated above.

Since it has already been shown that DE and EG were defined by the square of twelve, and that BD is the arithmetic mean between DE and EG, it follows that BD must also be defined by the square of twelve. If the appropriate multiples of 144 are substituted into the calculation of the arithmetic mean the result is;

$$BD = \frac{DE + EG}{2} = \frac{(144 \times 6) + (144 \times 4.5)}{2} = \frac{144 \times 10.5}{2} = \frac{1512}{2} = 756$$

Again, the measured value for BD was 756.7, producing a difference from the theoretical value calculated above of,

$$756.7 - 756 = 0.7$$

The value of 10.5/2, (6 + 4.5)/2, shown above, explains why market analysts often find this ratio in price-time charts when they arbitrarily apply the Fibonacci ratio[8]. The value of 10.5/2 is related to the golden ratio as follows:

[8] The Fibonacci ratio is 1.618 and is represented by the Greek symbol, Φ.

$10.5/2 = 5.25 = (\sqrt{5} + 1) \times F$

And since $(\sqrt{5} + 1) = 2F$, the above equation reduces to;

$$10.5/2 = 5.25 = (\sqrt{5} + 1) \times F = 2F \times F = 2F^2.$$

Using this Fibonacci value, along with the square of twelve, to determine the magnitude of BD produces the following result:

Theoretical value of BD $= 144 \times 2F^2 = 144 \times 2 \times 2.618 = 754$

This value differs from the measured data by: $756.6 - 754 = 2.6$.

SUMMARY OF 1913-1969 VECTORIAL DECOMPOSITION

The PTVs in the cash soybean market, which measure the direct spatial distance within a two-dimensional plane between two points of force, were shown to be related to each other and defined by the square of twelve. The length of each PTV was shown to be predictable, not only by using the square of twelve, but also, by measuring the length of the PTVs preceding it.

If the reader will take the time to perform basic algebra he will find that all the PTVs shown on Chart XI.B were defined when BD, from 1920 to 1932, completed. This includes the PTV from 1958 to 1966, FH, which began 26 years after BD completed. Although many people avoid even the simplest equations whenever possible, understanding the brief algebraic equations outlined below will be very helpful when the relationships between PTVs in growth spirals are used to project the magnitudes of PTVs into the future.

Algebra and the arithmetic mean define the relationship between BD (1920-1932) and FH (1958-1966) as follows:

$$BD = \frac{DE + EG}{2} \quad \text{(arithmetic mean)}$$

$$DE = 2 \times FH$$

$$EG = (3/2) \times FH$$

Substituting the above values for DE and EG into the first equation for BD produces the following result:

$$BD = \frac{(2 \times FH) + (1.5 \times FH)}{2} = \frac{(7/2) \times FH}{2} = (7/4) \times FH$$

This means that $FH = (4/7) \times BD$.

Substituting the value for BD, 756.7, yields the projected value for FH.

$$FH = BD \times (4/7) = 756.7 \times (4/7) = 432.4$$

And since the PTV from 1966 to 1969, HI, is simply FH subtracted from EG, the length of HI was also established as far back in time as the completion of BD, which occurred 34 years earlier in 1932.

The relationships between the PTVs shown on Chart XI.B and the square of twelve are summarized in Table 11.3.

Table 11.3
Summary of PTV Relationships to the Square of Twelve (1913-1969)
(See Chart XI.B for the Graph And Table 11.2 for the Corresponding Data)

Price-Time Vector (PTV)	Length of PTV (See Table 11.2)	Relationship of PTV to the Square of Twelve
AB (1913 - 1920)	408.8	12^2 x 2 x $\sqrt{2}$ = 407.3
BC (1920 - 2/1932)	718.9	12^2 x 5 = 720
BD (1920 - 12/1932)	756.7	12^2 x (10.5/2) = 756
BE (1920 - 1948)	1452.0	12^2 x 10 = 1440
BF (1920 - 1958)	2026.5	12^2 x 14 = 2016
BI (1920 - 1969)	2589.0	12^2 x 18 = 2592
CG (1932 - 1959)	1441.4	12^2 x 10 = 1440
DI (1932 - 1969)	1924.3	12^2 x 20/1.5 = 1920
DE (1932 - 1948)	865.6	12^2 x 6 = 864
EG (1948 - 1959)	646.0	12^2 x 4.5 = 648
EH (1948 - 1966)	968.3	12^2 x 10/1.5 = 960
FH (1958 - 1966)	433.6	12^2 x 3 = 432
FI (1958 - 1969)	569.0	12^2 x 4 = 576
HI (1966 - 1969)	207.6	12^2 x $\sqrt{2}$ = 203.6

PTV ANALYSIS 1973 - 1994

After the growth spiral completed in 1969, the energy placed into the market allowed it to break through the long-term trendline that had stopped the advances at the 1920 and 1948 tops. The market exploded on the upside with prices quadrupling in less than four years to the spike top of 10.00 dollars/bushel in 6/1973 from the low of 223 on 10/1969. Cash prices paid in central Illinois and futures contracts showed even more dramatic price increases. The cycle that caused this top is due again in the year 2001. Timing will be critical during this time because, as Chart XI.B shows, prices have quickly been cut in half after these cycle tops have been hit, i.e., in 1920, 1948, and 1973.[9]

[9] The next lesson, *Vectorial Partitioning,* will show that the market will also be outside the ellipse that has contained the action since 1978 when the year 2001 arrives. Future volumes of *Market Science* study the cycles in soybeans.

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Contained within Table 11.4 are the data for the PTVs shown on Chart XI.C. This chart will be used for the weekly analysis of the 1973 - 1994 period.

The two most striking relationships between the values in Table 11.4 are that PQ and QR are of equal magnitude, as are the values of KL, RS and ST. PQ measured 327.6 and QR measured 325.5. Therefore, if an arc is centered at point Q and swung from the top at point P in a clockwise direction it will hit the top at point R.

Similarly, the two PTVs centered at the low in 10/1986, RS and ST, measured 405.9 and 405.3, respectively. Notice that these two PTVs had significantly different time and price components. Only the PTV reveals that they are of equal magnitude.

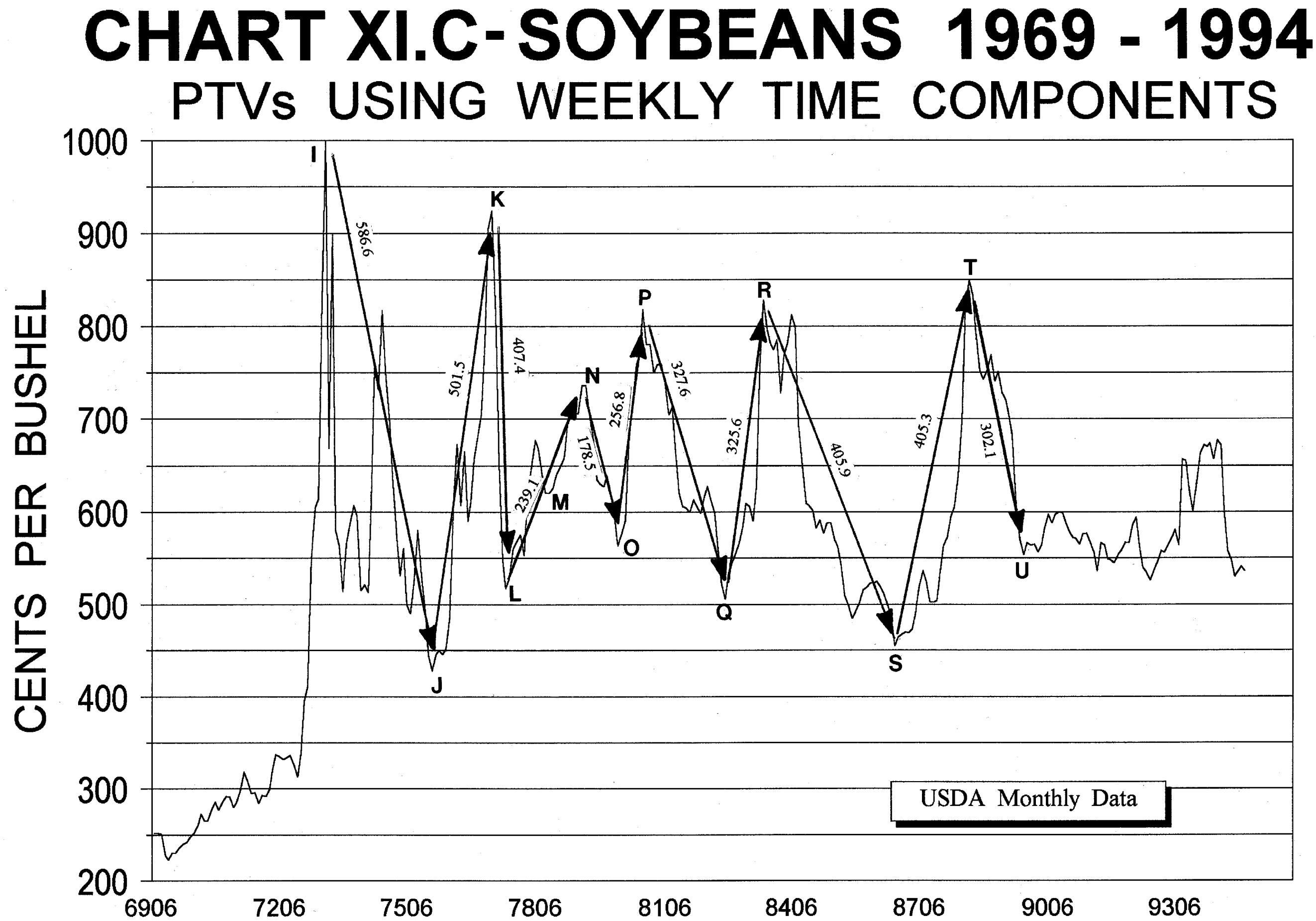
The same technique used above to define the location of point R by swinging the arc from point P to point R can be used to define the top at point T. That is, an arc centered at point S and swung from point R in a clockwise direction hits the top at point T.

The two pairs of PTVs; PQ, QR; and RS, ST were related by the simple integers, 4 and 5. That is,

RS = QR x (5/4) = 325.5 x (5/4) = 406.9

Table 11.4
PTV Calculations for Chart XI.C Using Weekly Data (1973 - 1994)
Data Recorded by USDA

Price-Time Radius Vector	Date of Low	PTV Price Low	Date of High	PTV Price High	Time Change in Weeks	Price Change in Cents	Vector Value (PTV)
IJ	12/1975	428	6/1973	1000	130	572	586.6
JK	12/1975	428	5/1977	924	74	496	501.5
KL	9/1977	517	5/1977	924	17	407	**407.4**
LN	9/1977	517	7/1979	736	96	219	239.1
MN	9/1978	620	6/1979	736	39	116	122.4
NO	4/1980	563	6/1979	736	44	173	178.5
OP	4/1980	563	11/1980	818	30	255	256.8
PQ	10/1982	506	11/1980	818	100	312	**327.6**
QR	10/1982	506	9/1983	828	48	322	**325.6**
RS	10/1986	455	9/1983	828	160	373	**405.9**
ST	10/1986	455	7/1988	850	91	395	**405.3**
TU	10/1989	555	7/1988	850	65	295	302.1
IS	10/1986	455	6/1973	1000	693	545	881.6



The previous section showed that 73 years before the 10/1986 bottom this value of 407 defined the PTV from 1913 to 1920. These PTVs are related to the square of twelve by the square root of two. That is,

$$288 \times \sqrt{2} = 407$$

The reader will notice that the price components of the data used in Table 11.4 are nearly equal to the calculated value for the corresponding PTV. This was caused by the energy level increase after the 1969 bottom, which resulted in much greater price swings within a given time interval than during the time prior to 1969. For this reason, daily data will be used for the analysis of the time period after the top in 1973. The weekly data shown in Table 11.4 was included to provide a continuity of analysis using the same data source (USDA) and the same weekly time component for the entire historical time frame from 1913 to 1994. This data will be more thoroughly reviewed in future writings when the topic is appropriate.

Because the USDA did not keep records of daily data corresponding to the weekly data used in this analysis, the daily cash data recorded at central Illinois will be used in the following analysis. Appendix A reviews this daily data set.

CHOOSING THE CORRECT TIME COMPONENT FOR A PTV

There are natural divisions of time with the units of years, months, weeks, days, hours, minutes, and seconds. The decision of which of these time divisions to use for PTV calculation is dependent upon which unit causes price to most closely balance with time. When time and price are perfectly balanced, with the correct units for time, the action follows the 45^0 angle. However, because price and time are rarely perfectly balanced, the general rule of thumb about which time unit to use is;

CHOOSE THE UNIT OF TIME FOR PTV CALCULATION THAT CAUSES THE PRICE-TIME ACTION TO STAY BETWEEN THE 1x2 AND 2x1 DIAGONAL ANGLES.

When the market moves above the 2x1 angle it is in the parabolic part of the curve and the unit for time must be increased to the next larger natural value. For example, the data in Table 11.2, which was used to measure the vectorial movements within the market between 1913 and 1969, showed that the majority of these movements stayed within the limits of the 1x2 and 2x1 diagonal angles[10]. Therefore, when a PTV is calculated using this data its length is not dominated by either the component of price or that of time, but rather, it represents the balance between them.

In the 1913-1969 period price balanced with time using a weekly time component. This contrasts with the action after 1969, which requires a daily time component for price and time to balance. The data in the sixth and seventh columns of Table 11.4 verifies this, where the price change is typically much larger than the time change. The increase in energy level after the 1969 bottom is the cause for this change in the magnitude of price swings relative to time after that date.[11]

When the length of the PTV is dominated by either price or time, it effectively eliminates the other component. For example, the magnitudes of the PTVs in Table 11.4 are nearly equal to the price change. This is because the PTV is pointing nearly parallel to the price axis when a weekly time component is used. When daily data is used, as in Table 11.5, the PTVs are not dominated by either the component of price or time and hence, their magnitudes are different than either the price or time components. During this time, price and time balanced within a daily time frame.

A graphical representation of this concept is shown in Figure 11.1 where two PTVs use different time units to measure the same time interval from the bottom in 10/1986 to the top in 6/1988. The PTV in Figure 11.1.a uses a daily time component, while Figure 11.1.b uses a weekly. Both these PTVs have the same price component of 395 cents per bushel. However, because of the different units used for the time component, the daily graph followed the 45^0 angle (price and time were balanced) and the weekly graph stayed above the 4x1. While the

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[10] The exceptions were the long-term PTVs that extended for many years.

[11] More on the concept of choosing the correct time unit for a PTV is included in the question/comments in Appendix C, Comment 2.

PTV in the daily graph showed the square of twelve (144 x 4 = 576), the PTV in the weekly graph was very close in value to its price component.

(a)
PTV Follows 45^0 Angle
Using Daily Time Component

(b)
PTV Is Above 4x1 Angle
Using Weekly Time Component

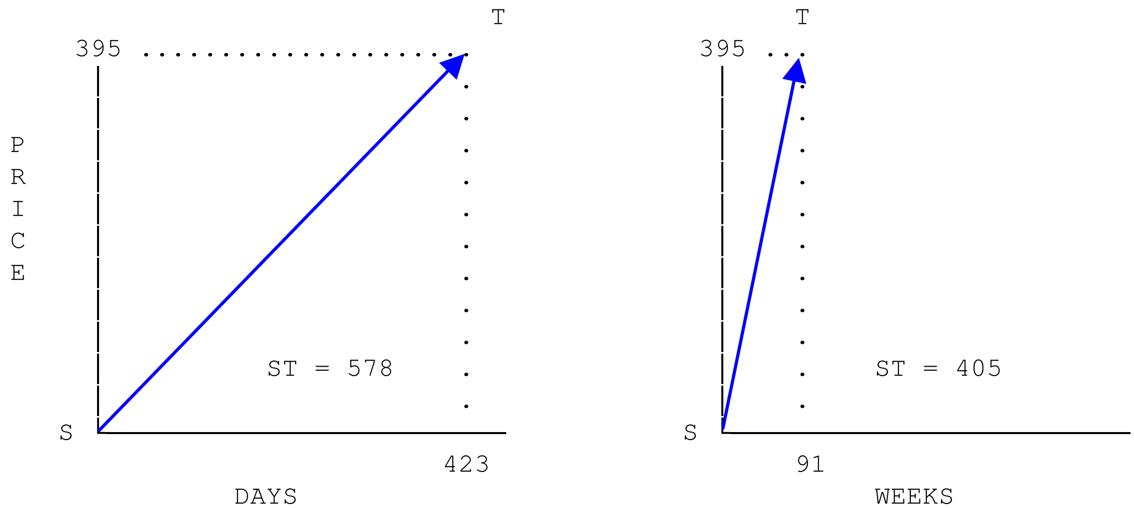

Figure 11.1
USING TWO DIFFERENT TIME UNITS FOR PTVs (10/1986 to 6/1988)

A change in energy level does not mean that the PTVs using the weekly or monthly time components should be abandoned. Rather, **BOTH** of these PTVs should be calculated, because certain relationships are seen using the weekly time component that are not seen using daily. Similarly, relationships are seen using daily data that are not seen using weekly. For example, Figure 11.1.b showed that the magnitude of ST was 405 (288 x $\sqrt{2}$) using a time component of 91 weeks and a price component of 395 cents. This value was shown on Chart XI.C to equal the PTV immediately preceding it. However, if this same price component is used with a daily time component of 423, ST is calculated to be 578, which is the fourth square of twelve.[12] That is,

$$395^2 + 423^2 = 578^2$$

In other words, it is useful to calculate PTVs using both daily and weekly time components. This is especially important when comparing a section of market to much earlier time periods, because the magnitude of PTVs at the lower energy level will define the approximate location of horizontal and vertical angles at higher energy levels. This concept is developed in following sections of this book.

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[12] Note that the prices used in this analysis are those from the USDA and not the data recorded at Decatur, Illinois.

PTV ANALYSIS OF DAILY DATA FROM 1973 TO 1994

Chart XI.D shows the daily cash prices recorded at Decatur, Illinois between 1973 and 1994. The data for this chart are contained in Table 11.5.

The most obvious relationships between the data in Table 11.5 and the square of twelve are those that are integral multiples. For example, the PTV, IH', that measured the decline from the spike top in 6/5/1973 to the bottom in 12/15/1975 was 1009.2. Notice that this value is close to the price high on 6/22/1988. The value of IH' relates to the seventh square of twelve as follows:

Seventh square of twelve = 144 x 7 = 1008

Which differs from the measured value by:

Measured value (1009.2) - seventh square of twelve (1008) =

1009.2 - 1008 = 1.2

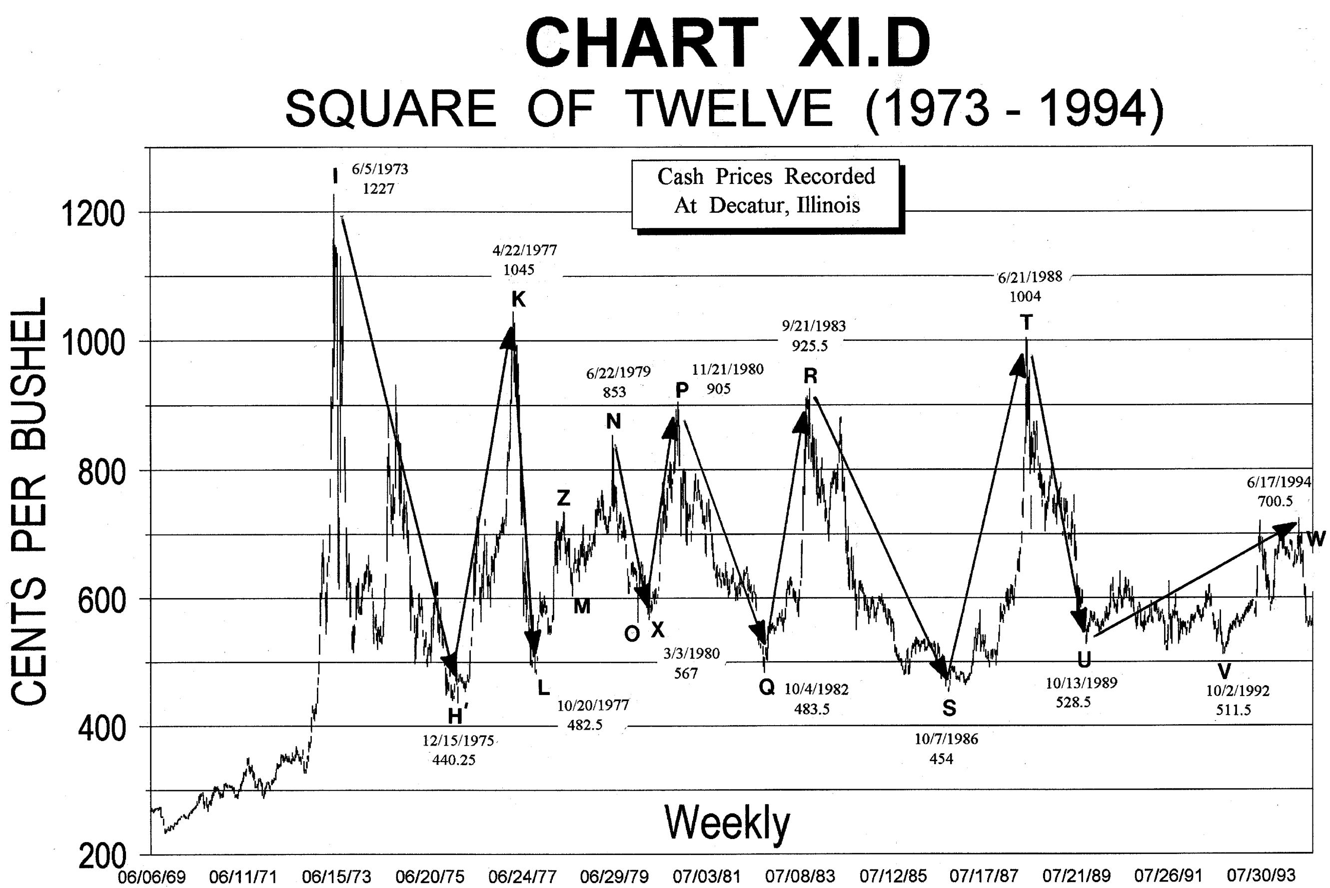


Table 11.5
PTV Calculations for Chart XI.D Using Daily Data (1973 - 1994)
(These Prices Were Recorded at Decatur, Illinois)

Price-Time Radius Vector	Date of Low	PTV Price Low	Date of High	PTV Price High	Time Change in Trading Days	Price Change in Cents	Vector Value (PTV)
IH'	12/15/1975	440.25	6/5/1973	1227	632 Days	786.75	1009.2
H'K	12/15/1975	440.25	4/22/1977	1045	333 Days	604.75	690.4
GH	1/26/1976	436.75	10/4/1974	931	325 Days	494.25	591.5
GH'	12/15/1975	440.25	10/4/1974	931	299 Days	490.75	**574.7**
KL	10/20/1977	482.5	4/22/1977	1045	126 Days	562.5	**576.4**
LN	10/20/1977	482.5	6/22/1979	853	419 Days	370.5	559.3
LP	10/20/1977	482.5	11/21/1980	905	774 Days	422.5	881.8
LZ	10/20/1977	482.5	5/25/1978	734.5	149 Days	252	292.8
ZM	8/8/1978	604.25	5/25/1978	734.5	51 Days	130.25	139.9
MN	8/8/1978	604.25	6/22/1979	853	219 Days	248.75	331.4
NO	1/9/1980	563	6/22/1979	853	136 Days	290	320.3
NX	3/3/1980	567	6/22/1979	853	193 Days	286	345.0
XP	3/3/1980	567	11/21/1980	905	162 Days	338	374.8
OP	1/9/1980	563	11/21/1980	905	219 Days	342	406.1
PQ	10/4/1982	483.5	11/21/1980	905	464 Days	421.5	626.9
QR	10/4/1982	483.5	9/21/1983	925.5	242 Days	442	503.9
QY	10/4/1982	483.5	5/21/1984	881	408 Days	397.5	**569.6**
RS	10/7/1986	454	9/21/1983	925.5	757 Days	471.5	891.8
ST	10/7/1986	454	6/21/1988	1004	423 Days	550	693.9
TU	10/13/1989	528.5	6/21/1988	1004	330 Days	475.5	**578.8**
TV	10/2/1992	511.5	6/21/1988	1004	1073 Days	492.5	1180.6
TR	9/21/1983	925.5	6/21/1988	1004	1180 Days	78.75	1182.6
UW	10/13/1989	528.5	6/17/1994	700.5	1170 Days	172	1182.6

Also related to the square of twelve by a non-integral relationship is QR, which is 3.5 multiplied by the first square of twelve. That is,

QR = 503.9 = 144 x 3.5

The reader should note that the values of TV, TR, and UW are of equal magnitude, as are H'K and ST.[13] Therefore, if an arc is centered at point T and swung from point R, it would intersect the price-time action at point V.

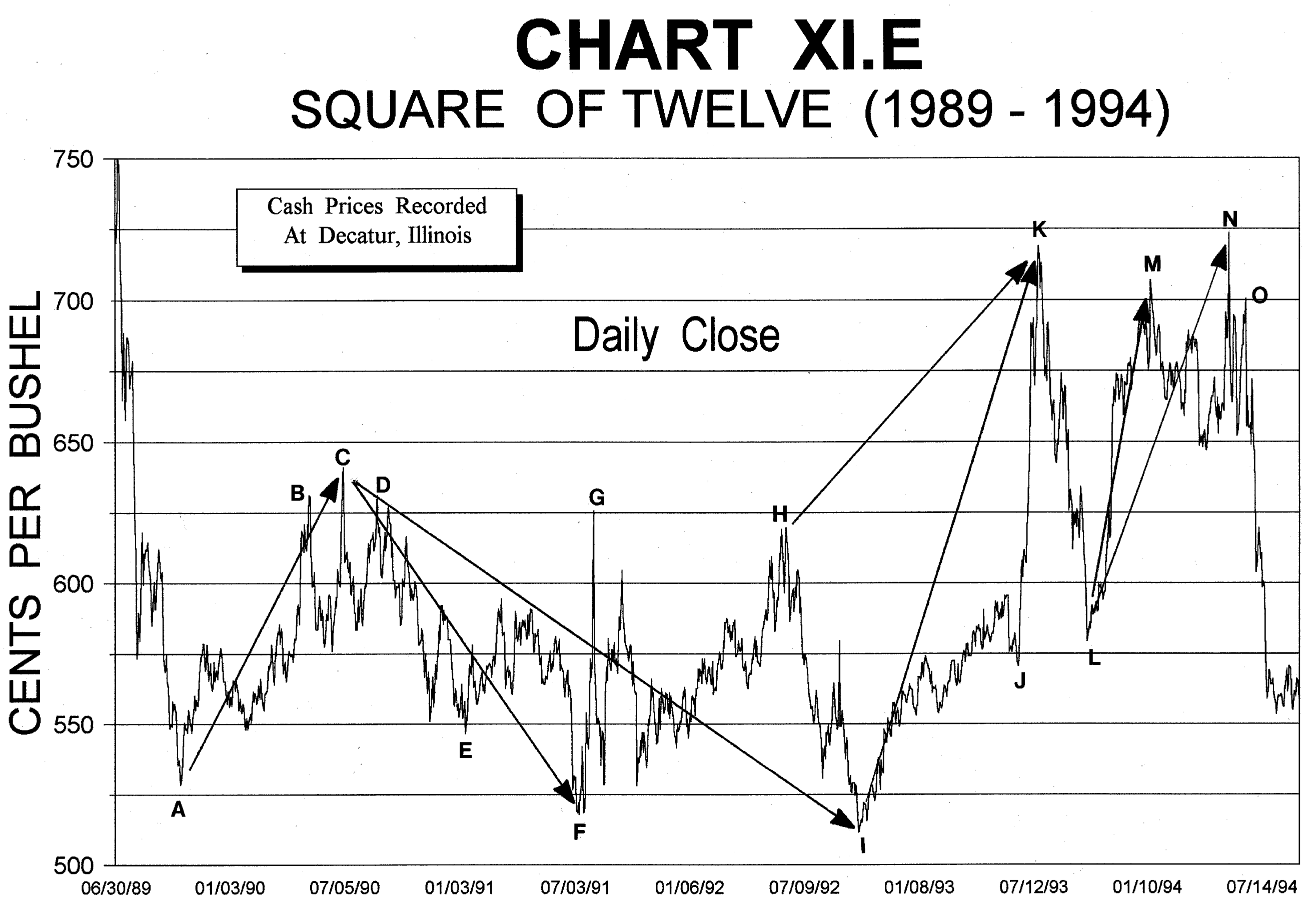
NX is a PTV that will be studied in the next lesson, *Vectorial Partitioning*. It is recommended that the reader make a mental note of its correlation with the square of twelve, as described below, because it will be helpful when understanding how these PTVs are all interrelated and defined by their location within the growth spiral.

The magnitude of NX was 345, which was defined by the square of twelve as follows:

NX = 345 = 576 x (3/5)

PTV ANALYSIS OF DAILY DATA BETWEEN 1989 AND 1994

A closer view of the market since 1989 is shown on Chart XI.E. The data for this chart are included in Table 11.6.



[13] The next lesson, *Vectorial Partitioning,* will explain the PTVs on Chart XI.D that are not integral multiples of 144.

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Table 11.6
PTV Calculations for Chart XI.E Using Daily Data (1989 - 1994)
(These Prices Were Recorded at Decatur, Illinois)

Price-Time Radius Vector	Date of Low	PTV Price Low	Date of High	PTV Price High	Time Change (Trading Days)	Price Change (Cents)	Vector Value (PTV)
AB	10/13/1989	528.5	5/9/1990	631	141	102.5	174.3
AC	10/13/1989	528.5	7/3/1990	641	179	112.5	**211.4**
AD	10/13/1989	528.5	8/24/1990	631	216	102.5	239.1
AN	10/13/1989	528.5	5/23/1994	723.5	1152	195	1168.4
AO	10/13/1989	528.5	6/17/1994	700.5	1170	172	1182.6
AK	10/13/1989	528.5	7/19/1993	719	941	190.5	960.1
CE	1/11/1991	546.5	7/3/1990	641	133	94.5	163.2
CF	7/11/1991	518	7/3/1990	641	257	123	**284.9**
CI	10/2/1992	511.5	7/3/1990	641	564	129.5	**578.7**
FG	7/11/1991	518	8/2/1991	625.5	16	107.5	108.7
FH	7/11/1991	518	6/9/1992	619.5	228	101.5	249.6
FN	7/11/1991	518	5/23/1994	723.5	716	205.5	744.9
HI	10/2/1992	511.5	6/9/1992	619.5	79	108	133.8
HK	6/9/1992	619.5	7/19/1993	719	277	99.5	**294.3**
IK	10/2/1992	511.5	7/19/1993	719	198	207.5	**286.8**
IO	10/2/1992	511.5	6/17/1994	700.5	427	189	467.0
JK	6/15/1993	570.5	7/19/1993	719	23	148.5	150.3
KL	10/4/1993	579.5	7/19/1993	719	54	139.5	149.6
LM	10/4/1993	579.5	1/13/1994	707	70	127.5	**145.5**
LN	10/4/1993	579.5	5/23/1994	723.5	157	144	**213.0**

A few of the square of twelve relationships on Chart XI.E are:

CF	= 284.9	= 144 x 2
IK	= 286.8	= 144 x 2
HK	= 294.3	= 144 x 2
LN	= 213	= 144 x 1.5
AC	= 211.4	= 144 x 1.5
CI	= 578.8	= 144 x 4
LM	= 145.5	= 144 x 1

The vectorial analysis performed above verifies the unique precision available with mastery of this technique. No other market analysis tool can make such a claim. Not only are the magnitudes of PTVs predictable decades into the future, but also, their relative locations are predictable when their spacing within the growth spiral is understood.

PTV DEFINES THE HORIZONTAL AND VERTICAL ANGLES

Figure 7.3.b in *Four-Dimensional Stock Market Structures And Cycles* showed how the extremes reached by the PTV in time define the vertical angles and the extremes reached in price define the horizontal angles. This figure is shown below in Figure 11.2.

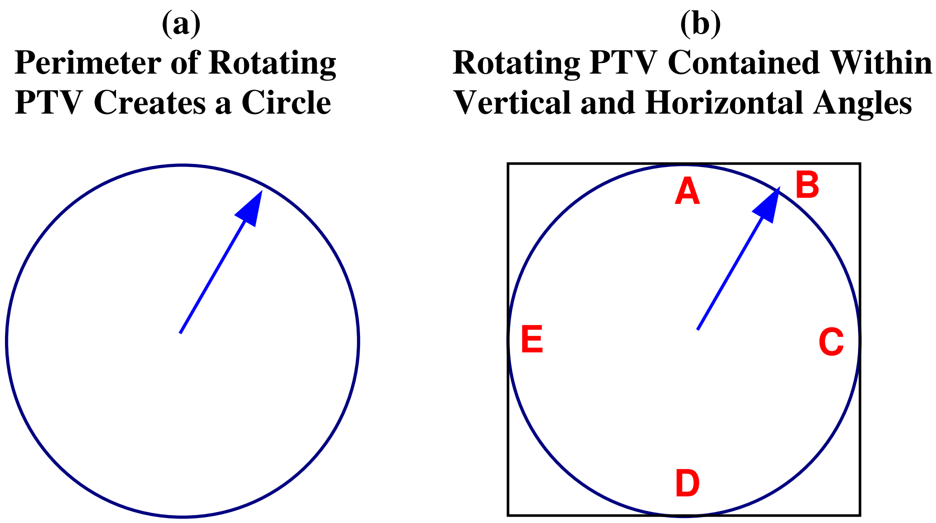


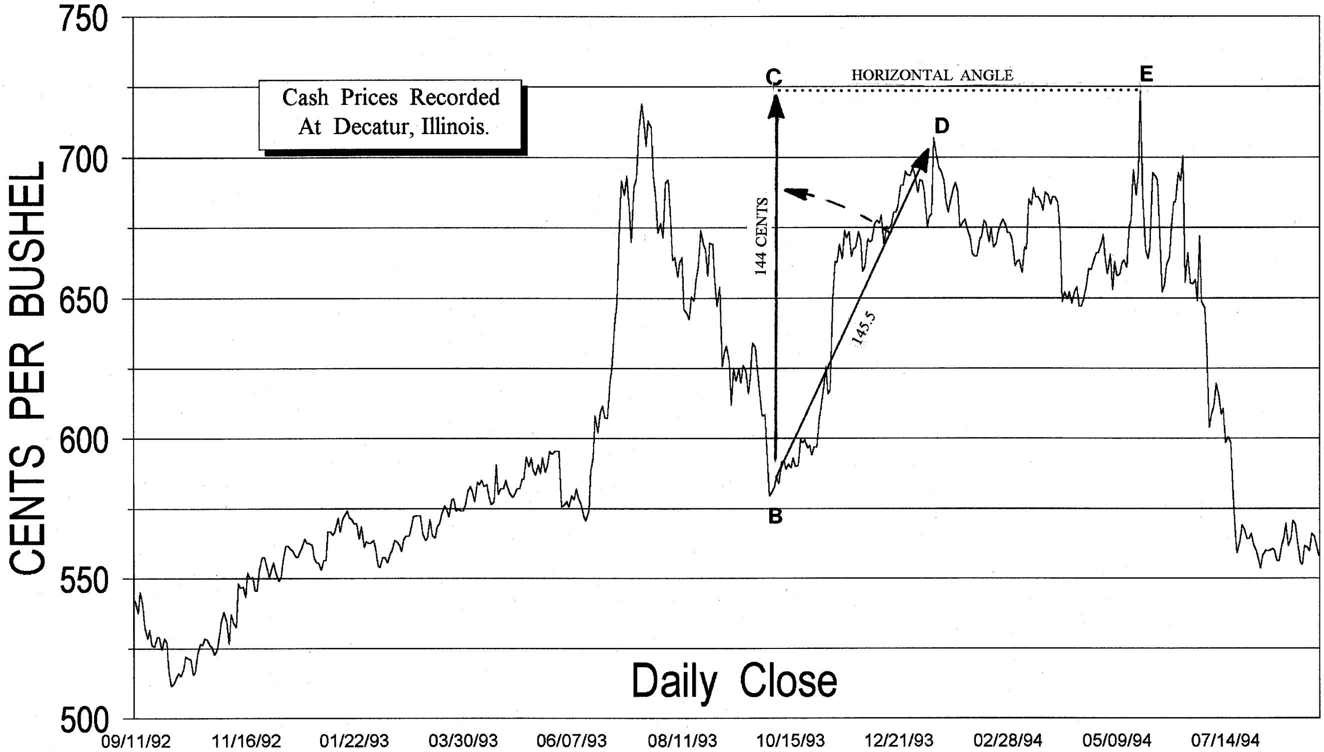
Figure 11.2
Extremes Reached By A Rotating PTV Define The Circle And The Square.

This topic is being reviewed because questions received after publication of *Four-Dimensional Stock Market Structures And Cycles* indicated that the importance of this concept was not entirely understood.[14]

W.D. Gann wrote about the value of the horizontal and vertical angles for time and price support/resistance. These angles define the sides of squares, as shown in Figure 11.2. For example, when the PTV is pointing straight up it is at point A and defines a horizontal angle. This angle manifests as price support and/or resistance. Similarly, at point D the PTV is at another extreme where it is pointing straight down, effectively defining the second horizontal angle. When the PTV is at point C it is at an extreme in time pointing straight down the time axis. This defines a vertical angle, as does point E. These pairs of horizontal and

[14] This issue was addressed on page 115 of *Four-Dimensional Stock Market Structures And Cycles*.

CHART XI.F
PTV DEFINING HORIZONTAL ANGLE



vertical angles define the square. In the case of the soybean market the side length of this square is typically some multiple of the square of twelve.

For example, Chart XI.F shows the soybean market from the major bottom in 10/1992 to 9/1994. The PTV connecting points B and D is 145.5 units in length. If this vector is rotated in a counterclockwise direction until it is pointing straight up in price its tip will be at point C. This price level defined the horizontal angle, which stopped the advance into the 5/23/1994 top at point E. The price change from point B to point E was exactly 144 cents, which is the length of BD.

Another example of a PTV defining a horizontal angle is seen on Chart XI.G between points B and E. If this vector, which has a length of 213 (144 x 1.5), is rotated in a counterclockwise direction, until it is pointing straight down in price, its tip will be at point F. This horizontal angle defined the price at the bottom at point A in 10/2/1992. The price difference between points A and E was 212 cents.

If BE is rotated around point E in a clockwise direction until it points directly down the time axis to the left, it defines the 211 day time interval between points G and E. This is an example of a PTV defining a vertical angle (time interval).

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ANDREYBBRV@GMAIL.COM SKYPE: ANDREYBBRV

SUCCESSIVE SQUARES DEFINE A STATIC CYCLE

When several squares are laid next to each other they create a series of vertical angles which are seen as a static time cycle.[15] This is demonstrated in Figure 11.3.

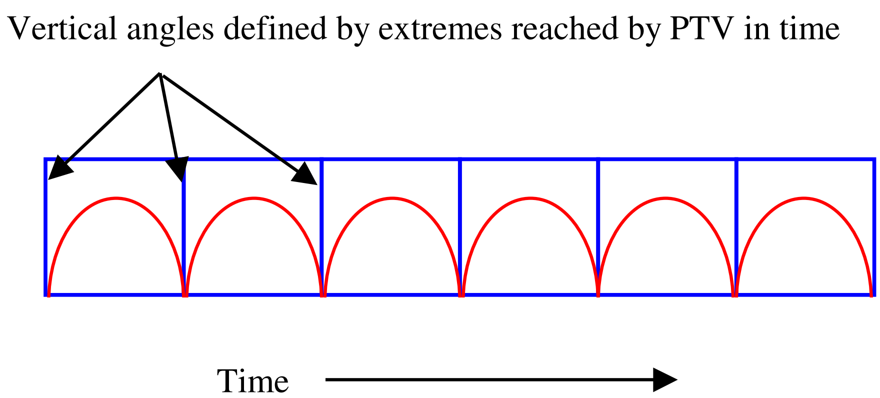

Figure 11.3
Series Of Squares Defining A Static Time Cycle

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[15] A static cycle has a constant periodicity, such as six weeks from bottom to bottom, or some other constant value. This is in contrast to a dynamic cycle, which has a varying interval between recurrences.

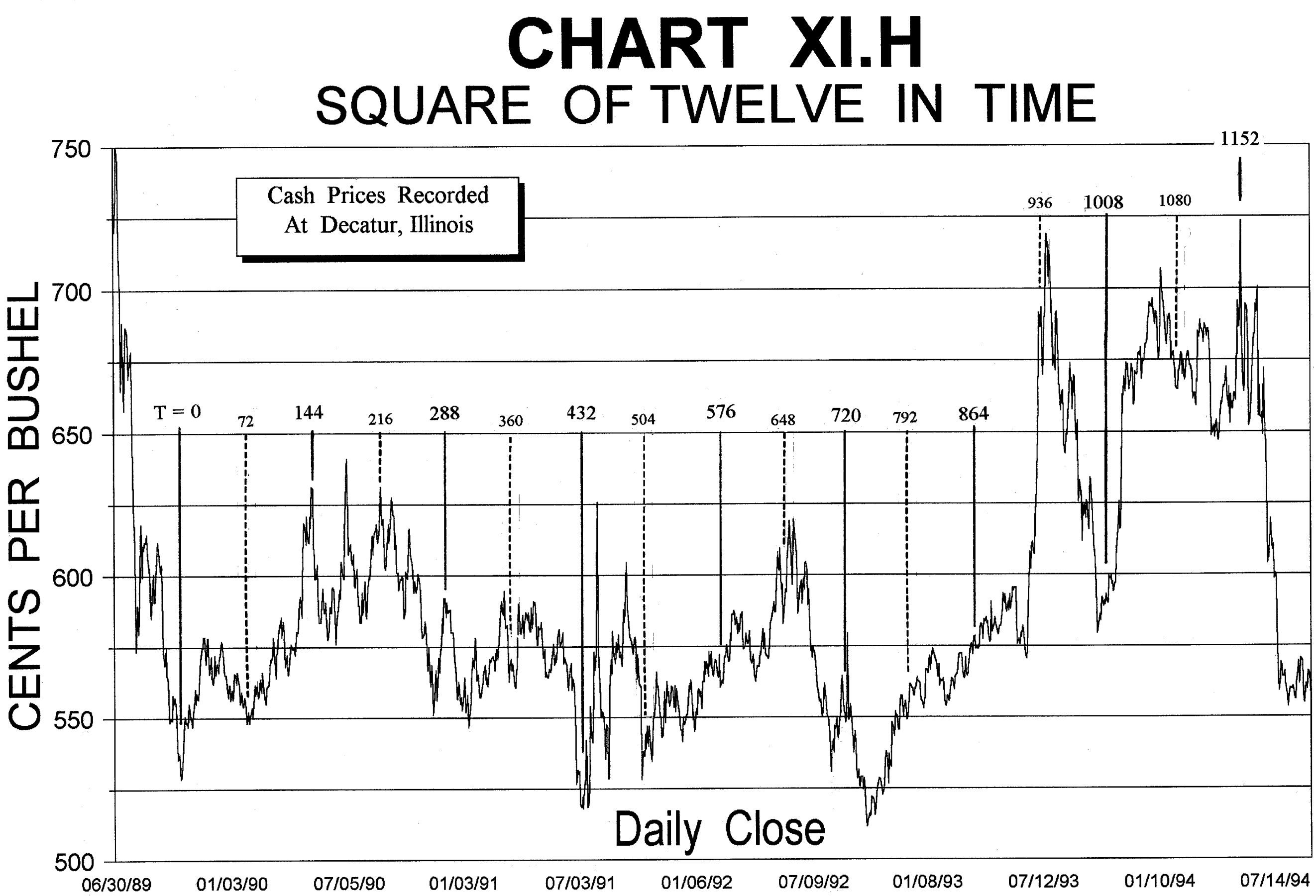
The only times traditional analysts are aware of the circle are at the four extremes reached by the PTV, (points A, C, D, and E in Figure 11.2.b). This is because they are performing a one-dimensional analysis when they only look at time values or price cycles.

THE CIRCLE IS ONLY SEEN IN PRICE AND/OR TIME AT THE FOUR POINTS WHERE IT TOUCHES THE SQUARE.

This one-dimensional analysis will occasionally work and analysts will see the square of twelve periodically present itself in price or time. For example, the square of twelve defined the difference in **PRICE** between the bottom in 11/1958 at 189 and the all-time low of 44 in 12/1932 (189 - 44 = 145). Similarly, the square of twelve defined the spacing in **TIME** between the top in 1/1948 and the major bottom in 10/1986. Between these two dates 2016 weeks elapsed, which is exactly equal to the square of twelve multiplied by fourteen, i.e., 144 x 14 = 2016. Also, the three points that touched the long-term trend line in 2/1920, 1/1948, and 12/1975 were evenly spaced 1452 weeks apart. The square of twelve multiplied by ten equals 1440.

The reader will notice that the square of twelve shows up in price and time analysis more times than mere chance allows. However, there are many price and/or time movements that are not immediately related to 144. This can be verified by studying the tables of PTVs in this lesson, which show the price and time changes between all major turning points.

Several recurrences of the square of twelve as a static time cycle can be seen on Chart XI.H.



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This chart of daily cash data shows the most recent market action, since 1989. With the bottom in 10/13/1989 taken as the beginning point (time count equal to zero on this chart), the square of twelve can be seen to coincide with most major tops and bottoms. The solid lines show even multiples of 144, while the dashed lines are the half-way points or 72 days. The most notable turning points are: the top in 5/14/1990 at 144 trading days, the bottom in 7/3/1991 at 432 days, the top in 5/15/1992 at 648 days, the top in 7/12/1993 at 938 days, the bottom in 10/21/1993 at 1008 days, and the top preceding the largest price drop in the last five years in 5/23/1994 at 1152 days.

The unique value of the PTV is evident when the concept of the square is advanced beyond the limits of the horizontal and vertical angles. In Figure 11.2.b the square of twelve is not visible in price or time analysis when the market is at any point on the circle that is not touching the square, (points A, C, D, and E in this figure). For example, when the market is at point B a one-dimensional analysis of price and/or time will not show the square of twelve. However, when the PTV is used as a tool to go beyond a one-dimensional analysis the square of twelve is seen in nearly every movement the market makes.

ONE CELESTIAL CORRELATION WITH THE SQUARE OF TWELVE

There are several precise astronomical correlations with the square of twelve, one of which defined the tops in 1920, 1948, 1973 and the bottoms in 1932, 1969, and 1986. This cycle is scheduled to coincide with a major top six years from now in the year 2001. This will be a "spike top" with prices advancing very rapidly then quickly collapsing when the point of force defining the top is hit. Traders must be ready for this highly energized period because a poorly timed trade during this time will be disastrous.[16]

This particular cycle will be studied in future volumes of *Market Science.*

In addition to the cycle described above, the synodic cycle of Saturn-Uranus is closely correlated with the square of twelve.

Four-Dimensional Stock Market Structures And Cycles provided definitive proof of the correlation between the fifteen degree axes of the Saturn-Uranus synodic cycle and rhythms in the stock market. Since this celestial cycle has a period of 45 years, one-fourth of this amount (square) averages 11.25 years[17]. Of course, this quarter-cycle period varies as these two planets move around the sun in their elliptical orbits.

The ninety degree axes of this forty-five year time period are correlated with the square of twelve. In forty-five years Saturn-Uranus completes a 360^0 synodic cycle and one-quarter

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[16] To understand how quickly prices drop after the top associated with this cycle is hit, compare the tops in 2/1920, 1/1948, and 6/1973. Prices typically were cut in half in a matter of months after the high.

[17] The complete sunspot cycle is twice this amount, averaging 22.2 years. Half of this time period (11 years) corresponds with the alternating concentration of sunspots between the northern and southern hemispheres of the sun.

of that cycle averages 576 weeks, which is the fourth square of twelve. Each square is a 90^0 angle, and four 90^0 angles complete the 360^0 cycle.

The square of twelve, using weeks, and the corresponding divisions of the Saturn-Uranus synodic cycle are shown in Table 11.7.

The ideal squares shown in Table 11.7 are slightly smaller than the **EXACT** divisions of the Saturn-Uranus cycle. For example, the last square of twelve is 2304 weeks, which equals 44.31 years. However, the complete Saturn-Uranus cycle is 45 years. Although this difference is small, it should be studied because it explains why the square of twelve often is slightly larger than the ideal value. For example, 292 and 586 are very common intervals (the PTV from the top in June, 1973 to the low in December, 1975 is 586).

Table 11.7
Saturn-Uranus Synodic Cycle
And Corresponding Square of Twelve

Square of Twelve in Weeks	Corresponding Yearly Time Interval	Division of Saturn-Uranus Cycle
0	0	0
144	2.77	22.5^0
288	5.54	45^0
432	8.31	77.5^0
576	**11.08**	**90^0**
720	13.85	111.5^0
864	16.62	135^0
1008	19.39	157.5^0
1152	**22.16**	**180^0**
1296	24.93	202.5^0
1440	27.7	225^0
1584	30.47	247.5^0
1728	**33.24**	**270^0**
1872	36.01	292.5^0
2016	38.78	315^0
2160	41.55	337.5^0
2304	**44.31**	**360^0**

SUMMARY

This lesson showed the square of twelve in price, time, and price-time in the cash soybean market. This historical analysis first studied the time period before the 1969 bottom using weekly data. The time period after 1969 was studied using daily data because the market has traded at a higher energy level since that date.

When the dimension of time was studied it was shown that the square of twelve often presents itself on a daily chart. The square of twelve is strong in the daily time frame because it coincides with natural harmonics in the weekly time frame. There are, approximately, 250 trading days per year, and 52 weeks per year. Therefore, there are, on average, 4.81 trading days per week. That is,

$$\frac{250 \text{ trading days}}{52 \text{ weeks}} = 4.81 \text{ trading days/week}$$

This means that when 144 trading days have passed, 30 weeks have also passed. This is calculated as follows:

$$\frac{144 \text{ trading days}}{4.81 \text{ trading days/week}} = 30 \text{ weeks}$$

The unit of 30 was shown many times in *Four-Dimensional Stock Market Structures And Cycles* as a very important harmonic.

Many examples of this correlation can be seen on Chart XI.H. For example, from the bottom in 10/13/1989 to the top in 5/23/1994 there were 1152 trading days, which is exactly equal to the eighth square of twelve (144 x 8 = 1152). This time frame was 240 weeks, which is a very important harmonic that coincides with the trine.

This also explains why the third square of twelve is seen so often in soybeans, because 432 trading days equals 90 weeks, which is the square. For example, the bottoms in 10/13/1989 and 7/11/91 were separated by 90 weeks. This demonstrates the importance of maintaining a perspective in more than one time frame.

The square of twelve also defines the transition from the daily to hourly time frame. Lesson I in *Four-Dimensional Stock Market Structures And Cycles* showed the fundamental unit of measurement in the Dow Jones Industrial Average using hourly time components. This value divided by 6.5 trading hours/day gives the relationship to 144. Notice on Chart I.A the time difference in days between points A and F, and between points E and K (also count to the half-way points).

The next lesson, *Vectorial Partitioning,* will explain the concept necessary to understand the PTVs that were not integral multiples of 144.

LESSON XII

VECTORIAL PARTITIONING

Every body perseveres in its state of rest, or of uniform motion in a straight line, unless it is compelled to change that state by forces impressed on it.

Isaac Newton (1687) ... Philosophiae Naturalis Principia Mathematicia (Mathematical Principles Of Natural Philosophy)

INTRODUCTION

The general theme underlying the material presented in *Market Science* and *Four-Dimensional Stock Market Structures And Cycles* is that natural law is universal. This lesson will provide additional proof of that axiom by showing that applications of Isaac Newton's first law of motion, also known as "Galileo's Law of Inertia", are not limited to physical bodies, but also, extend to financial markets where price-time movements can be considered points of force in motion.

The Law of Inertia states that a body at rest or in uniform linear motion will remain in that state unless and until it is acted upon by an external force. For example, if a ball is sitting at rest on a table it will not move until some external force causes it to move. Also, once that ball is placed into motion it will continue to move in its original direction until some external force acts on it, such as friction between the table and ball or a mass in its path.

The Law of Inertia is applicable to financial markets because changes in price-time are subjected to the same natural laws of mechanics as are physical bodies in motion. This lesson will show that market movements continue along a trend until a force is encountered in price-time causing that trend to change.

BACKGROUND REVIEW

In order to understand Isaac Newton's first law of motion, the following description will use a ball as the physical body that is placed into motion and the inside of a tunnel will be the object obstructing the motion of that ball.

If someone stands at the opening of a tunnel and throws a ball down and into the tunnel it will bounce off the bottom. If the ball was thrown hard enough it will bounce to the top of the tunnel where it will bounce again and return to the bottom. This oscillation will continue until gravity, friction, and the kinetic energy imparted to the tunnel is sufficient to cause the ball to not rise to the top of the tunnel, after which, the heights reached by the ball's oscillations will become less and less, until it finally rests on the bottom with no motion.

The motion of this ball will take the path shown in Figure 12.1, where two different perspectives of the tunnel are shown.

(a)
Tunnel Extending Toward Observer Creates Appearance Of Expansion

(b)
Tunnel Extending Away From Observer Creates Appearance Of Contraction

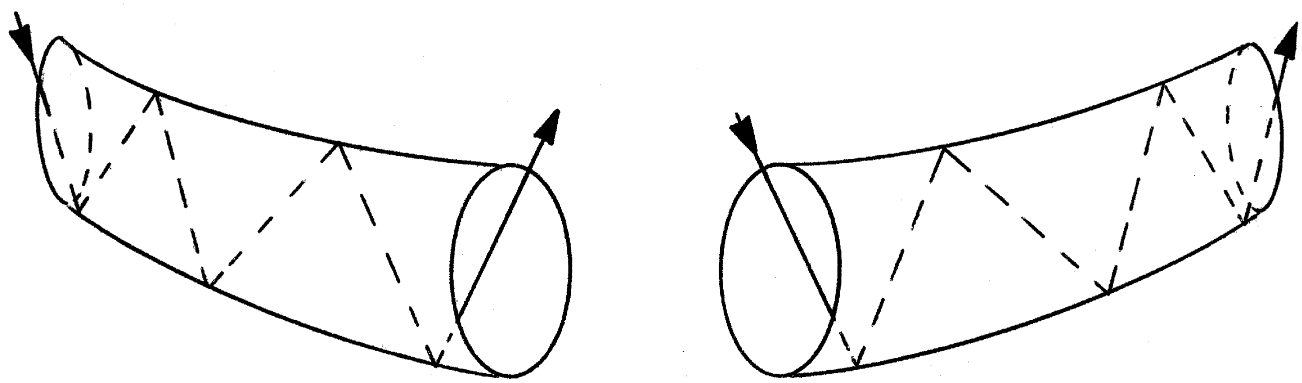

Figure 12.1
Motion Of A Bouncing Ball Inside A Tunnel

MOTION BETWEEN POINTS OF FORCE IN PRICE-TIME

The importance of the Law of Inertia to financial market analysis is that movements within price-time act like bodies in motion contained within the upper and lower limits of a growth spiral. When viewed on a two-dimensional price-time chart this spiral gives the appearance of an expanding or contracting tunnel, depending upon whether the spiral is in its expanding or contracting phase.

The bouncing ball analogy can be seen in the soybean market by comparing Figure 12.1 with Chart XII.A. Notice that the price-time action shown on this chart hit the top of the tunnel in 1920 and 1948 but did not reach the top in 1966. This is because the energy remaining in the system was not sufficient to allow prices to rise to the top of the tunnel before the movement was arrested by the limitations imposed by the square of twelve. The PTV that measured the movement into the 1966 top was 433, or the third square of twelve. Had this been a highly energized period and the third square of twelve was penetrated, the next resistance in price-time would have been the top of the tunnel. However, the third square of twelve was strong at this time, due to the relationship of that PTV to the others within the growth spiral.

The above discussion points out two important facts:

(1) Price-time movements can be reversed by the limitations imposed by the square of twelve. Or,

(2) Price-time movements can be reversed by the top or bottom of the tunnel.

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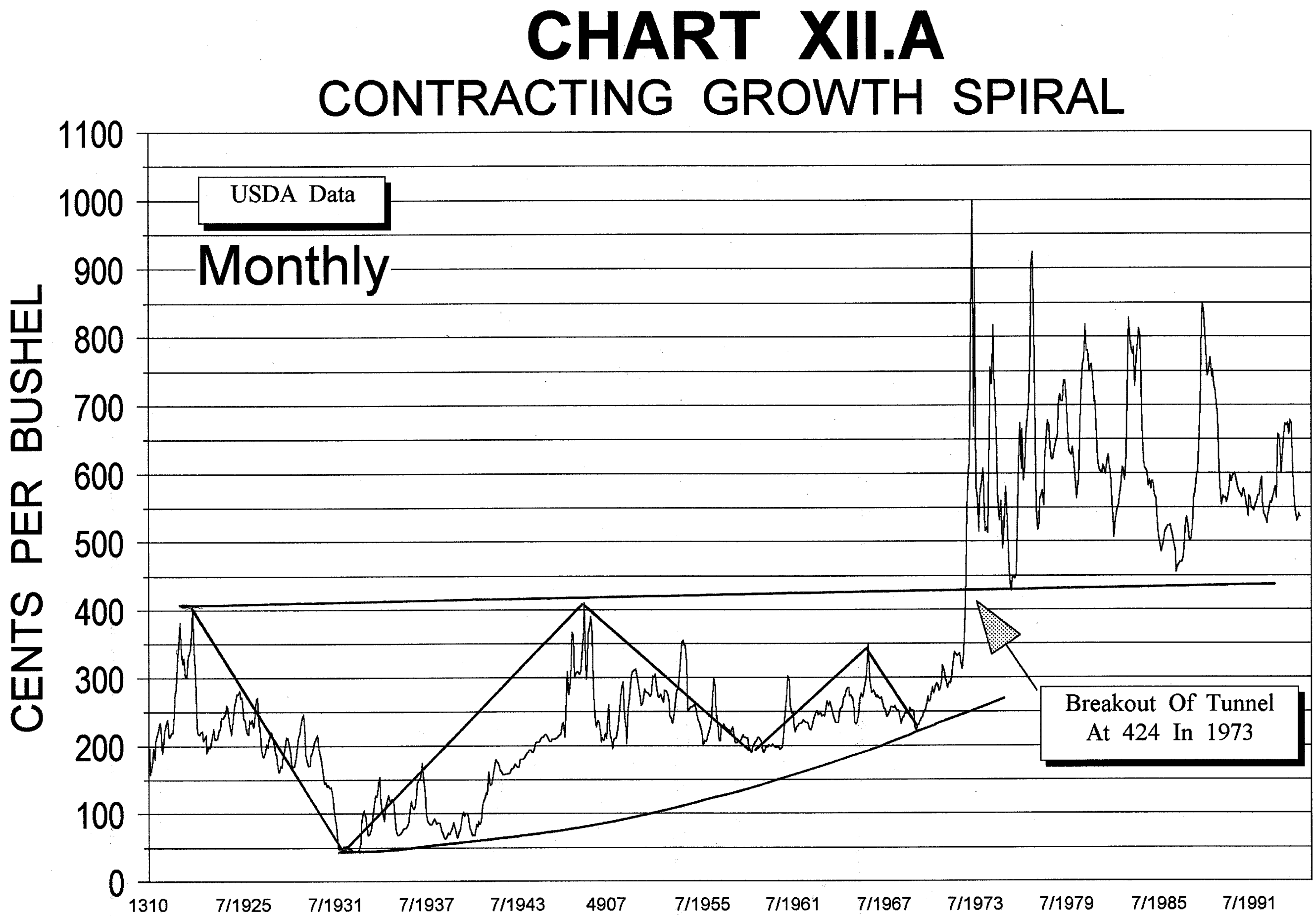

VECTORIAL PARTITIONING

A good way to understand the concept of vectorial partitioning is to think of a string with knots tied in it every 144 millimeters. In this analogy, the string represents a continuous linear motion of price-time and the knots represent an even spacing of points of force. If this string is laid horizontally on a price-time chart the knots will define the times that a point of force is due, i.e., vertical angles. If the string is laid vertically on a price-time chart the knots will define price levels of support and resistance, i.e., horizontal angles.

Since this book deals primarily with a combined price-time, instead of only price or time, the string will be at some angle between the horizontal and vertical. For example, if the string is placed at an angle of 45^0 and is contained within the limits of two horizontal angles where each of the knots alternately touch one of these horizontal angles, the shape of the string will be as shown in Figure 12.2. This pattern is a perfect triangle wave with a constant interval between tops and bottoms.

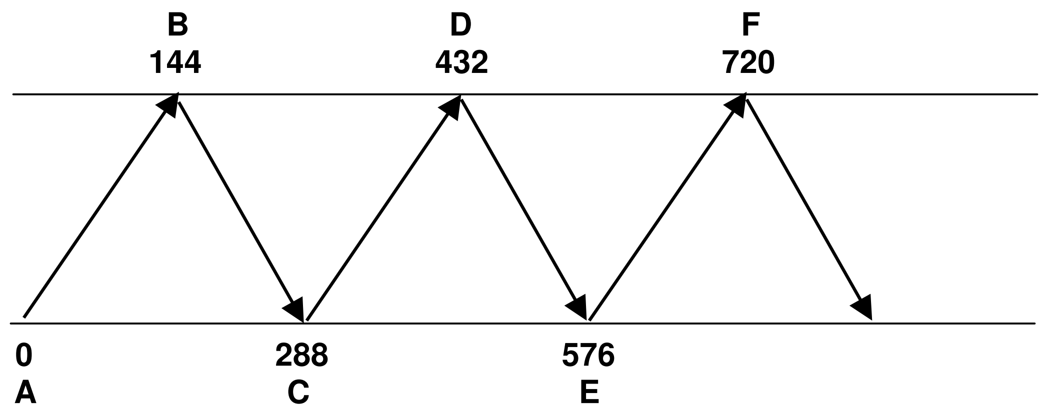

Figure 12.2
Square Of Twelve Contained Between Two Horizontal Angles

Similarly, the string can be placed within the two horizontal angles with the second or third knots touching the top angle, as shown in Figure 12.3.

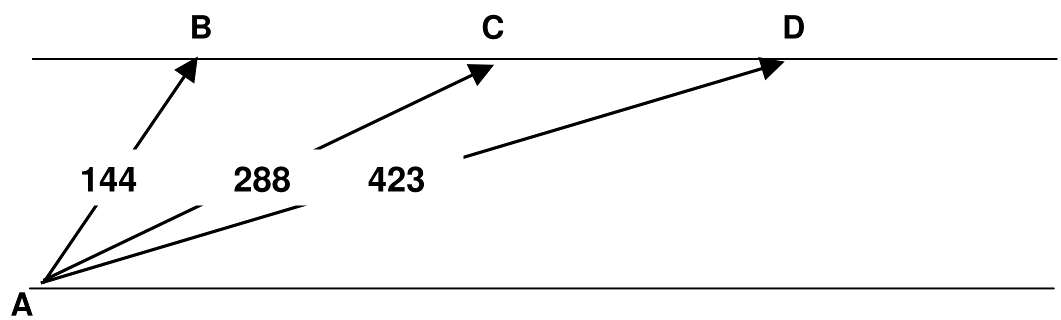

Figure 12.3
First Three Squares Of Twelve Contained Between Two Horizontal Angles

Both examples shown in Figures 12.2 and 12.3 have the string touching the horizontal angles of support and resistance at the knots, which are evenly spaced every 144 millimeters. However, if the two lines are further apart than is shown in Figure 12.2 and the angle of AB is the same as in Figure 12.2, the knot at 144 millimeters will not touch the upper horizontal angle. In this case, the string will fit between the two lines, as shown in Figure 12.4, with the turning point at B some value between 144 and 288. In effect, the distance between the knots at 144 and 288 has been **PARTITIONED**, with the first section lying before point B and the second section after it. Similarly, this figure shows the fifth square of twelve (after 576) partitioned at point D. However, the PTVs touch the lower line at a square of twelve, i.e., 432, 864, etc.

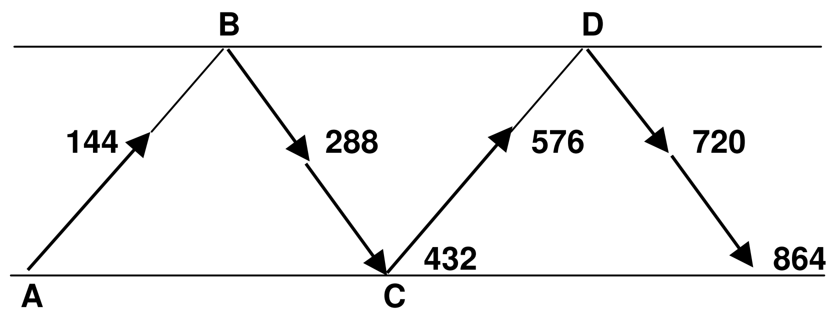

Figure 12.4
Partitioning Of Second And Fifth Squares Of Twelve Between Two Parallel Lines

VECTORIAL PARTITIONING OF PRICE-TIME

The previous lesson, *Square Of Twelve*, showed that the PTVs defining the price-time movements within the 1913-1969 growth spiral were defined by the square of twelve. These PTVs became progressively smaller because the growth spiral during this time was contracting and, as shown in Figure 12.1, it gave the appearance on a two-dimensional chart of a tunnel extending in a direction away from the observer. That is, the mouth of the tunnel was defined by the 1920 to 1932 movement and all subsequent movements were contained within that tunnel.

Because the 1913-1969 growth spiral was the first to occur after trading began, the vectorial movements within it were at a low energy level. Therefore, enough time elapsed during these movements to allow the turning points to align with the square of twelve without partitioning. Notice that most of these movements took several years to work out, resulting in PTV lengths that were nearly all integral multiples of 144. The only two PTVs during this time that were not integral multiples of 144 were near the end of the tunnel where contraction occurred (646 = 144 x 4.5; and 207 = 144 x $\sqrt{2}$). It must be noted that the sum of the last two PTVs within this growth spiral equaled 641 (433 + 208 = 641), which was the value of the PTV immediately preceding them.

If the market had been at a higher energy level during this time these movements would have been more vertical and vectorial partitioning may have occurred in order for the PTVs to fit within the boundaries of the tunnel.

Vectorial partitioning of the square of twelve typically occurs because of one or both of the following conditions:

(1) The energy placed into the movement is high enough to force the PTV to an angle more vertical than is necessary for it to fit within the lines of support and resistance an integral amount, even if these lines are parallel. Consequently, when the PTV encounters the upper containment line, its vectorial length can not fit evenly within one of the squares of twelve. This can be visualized in Figure 12.2 by seeing the angle of AB becoming more vertical, effectively shortening the length of AB.

(2) The upper and lower limits of the growth spiral cause the two lines of support and resistance to not be parallel, i.e., they are moving together or apart.

Examples of both of the above conditions will be provided in the following section.

EXAMPLES OF VECTORIAL PARTITIONING IN SOYBEANS

The two parallel lines containing the action do not necessarily have to be horizontal angles. That is, the two lines can define a trend channel. For example, Chart XII.B is a weekly chart of the soybean market between 3/1989 and 9/1994. This chart shows vectorial partitioning between two nearly parallel lines in a downward trend. The PTVs on this chart are contained within Table 12.1.

None of the PTVs on this chart are integral subdivisions of 144, i.e., 72, 36, 24, etc. However, when two successive PTVs are added together their sum is 144. That is,

AB + BC = 62.9 + 80.0 = 142.9

And,

CD + DE = 75.3 + 70.1 = 145.4

CHART XII.B

VECTORIAL PARTITIONING IN USDA DATA

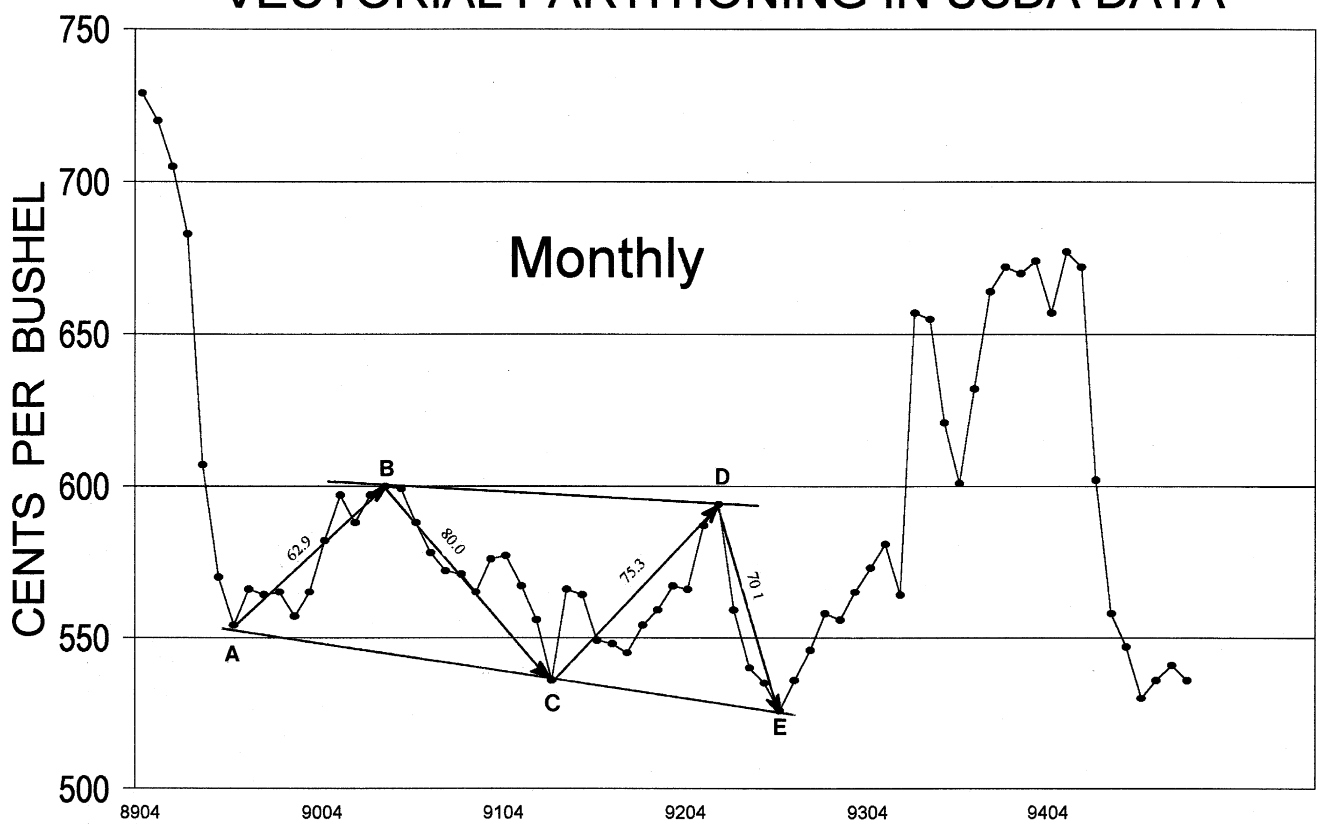

Table 12.1
PTV Calculations for Chart XII.B Using Weekly Data (3/1989 - 9/1994)
Data Recorded by USDA

Price-Time Radius Vector	Date of Low	PTV Price Low	Date of High	PTV Price High	Time Change in Weeks	Price Change in Cents	Vector Value (PTV)
AB	10/1989	555	8/1990	600	44 Weeks	45	62.9
BC	7/1991	536	8/1990	600	48 Weeks	64	80.0
CD	7/1991	536	6/1992	594	48 Weeks	58	75.3
DE	10/1992	526	6/1992	594	17 Weeks	68	70.1

Notice that as more of these PTVs are added together, their sums more closely approach integral multiples of the square of twelve. That is, if all four PTVs are added together their sum is 288.3:

AB + BC + CD + DE = 62.9 + 80.0 + 75.3 + 70.1 = 288.3

An example where vectorial partitioning occurred between two expanding lines can be seen within the ellipse shown on Chart XII.C. The PTVs on this chart were presented in the previous lesson, *Square Of Twelve*, and are contained in Table 11.4.

NO, whose value was 178.5, measured the drop from the upper perimeter of the ellipse in 6/1979 to the lower perimeter in 4/1980. The PTV immediately following NO was OP, whose value was 256.8. Neither of these PTVs were integral multiples of the square of twelve.

That is,

$$\frac{178.5}{144} = 1.24$$

And,

$$\frac{256.8}{144} = 1.78$$

However, when these two PTVs are added together their sum **IS** an integral multiple of 144. That is,

NO + OP = 178.5 + 256.8 = 435.3

The third square of twelve is 144 x 3 = 432, which differs from the above sum by,

435.3 - 432 = 3.3

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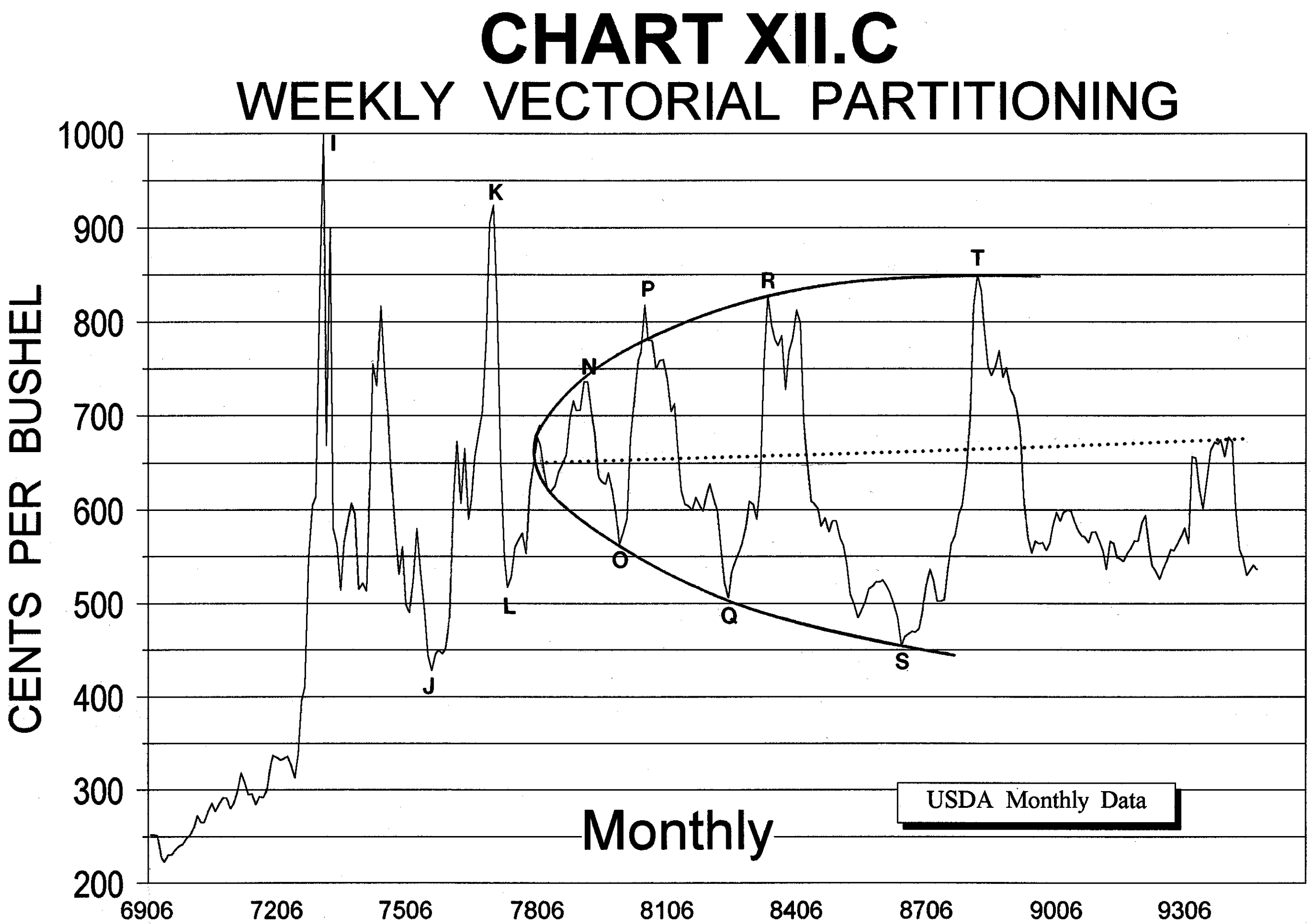

A very important fact to notice about the sum of NO and OP is that it equaled the length of a PTV from the earlier growth spiral. This PTV from the earlier time period extended from the bottom in 11/1958 to the top in 8/1966 and had a value of 433.6 (see Table 11.2 for calculation of this PTV). This similarity with PTVs in the earlier growth spiral is important because once the internal construct of the earlier spiral is understood, the spiral currently unfolding is also understood.

Another example of vectorial partitioning within this ellipse are the two PTVs, PQ and QR, whose values were 327.6 and 325.5, respectively. These two values are nearly equal and are related to the square of twelve by the geometric mean. The geometric mean is the n^{th} root of the product of n numbers. For example, the geometric mean between four and nine is the square root of thirty six, which is six.[18] That is,

$4 \times 9 = 36$

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[18] The relationship of the geometric mean is extremely important and will be shown in future writings to relate the PTVs to the growth spiral.

And,

$$\sqrt{36} = 6$$

When a succession of musical fifths is used as the number series defining the geometric mean (as was done by Pythagoras when he created his musical scale), the ratio between these numbers is 3:2. For example, the two numbers used above, 4 and 9, are both in the ratio of 3:2 to their geometric mean of 6. That is,

$$\frac{9}{6} = \frac{6}{4} = 1.5$$

Therefore, if a number is multiplied by 1.5 and that product is multiplied by 1.5 these three numbers will form a geometric progression with the middle number the geometric mean of the smaller and larger number. For example, if the first number is eight the sequence would progress as follows:

$$8 \times 1.5 = 12$$
$$12 \times 1.5 = 18$$

Meaning that the sequence 8, 12, 18 is geometric, with 12 the geometric mean between 8 and 18. When a geometric progression is developed with 144 as the first number in the sequence, the values of PQ and QR on Chart XII.C are defined. That is,

$$144 \times 1.5 = 216$$
$$216 \times 1.5 = 324$$

In other words; 144, 216, and 324 form a geometric progression with 216 the geometric mean between 144 and 324.

Not only were the magnitudes of PQ and QR equal, but also, their sum reveals that partitioning took place. The sum of PQ and QR is,

$$PQ + QR = 327.6 + 325.5 = 653.1$$

This sum was similar to a PTV from the 1913-1969 growth spiral. The value of the PTV from the top in 1/1948 to the bottom in 9/1959 equaled 646, and was shown to be the arithmetic mean between the two PTVs on either side of it (144 x 4.5 = 648).

Chart XII.C also shows how the sum of two successive PTVs is valuable for determining the magnitude of PTVs following that sum. The sum of IJ and JK is,

$$IJ + JK = 586.6 + 501.5 = 1088.1$$

This sum equals the sum of the first four PTVs within the ellipse on Chart XII.C. That is,

NO + OP + PQ + QR = 178.5 + 256.8 + 327.6 + 325.5 = 1088.4

This shows how precisely the magnitude of the final PTV in this sequence could have been determined in advance because the two sums only differed by 0.3.

Again, this sum equaled a sum from the 1913-1969 growth spiral. The two PTVs from the top in 1/1948 to the top in 8/1966 measured 646 and 433.6. The sum of these two values is,

646 + 433.6 = 1079.6[19]

The fact that the same values found in the 1913-1969 growth spiral were also present in the market after 1973 should make clear the importance of a complete historical review of growth spirals.

USE DAILY DATA FOR GREATER RESOLUTION

The following analysis uses daily data in order to provide resolution even greater than that calculated above, verifying that the square of twelve defines the extent of movements within the soybean market, regardless of the natural time units used. Traders and analysts who are interested in trading intraday swings are encouraged to study the methodology outlined below and shift to hourly or tick data for an accuracy and resolution unmatched by any other market timing technique. But remember,

> **ALWAYS START AN ANALYSIS WITH THE LONGER TIME FRAMES, THEN GRADUALLY NARROW THE WINDOW DOWN USING PROGRESSIVELY SMALLER NATURAL TIME DIVISIONS.**

Chart XII.D shows the weekly cash values recorded at Decatur, Illinois during the 1969-1994 time period. Although this data is printed on a weekly chart, the PTV calculations in the following analysis use the daily data contained within Table 11.5. By printing the data on a weekly chart a much larger time frame can be put on a single page than if daily bars were printed. This is the same technique used on Chart XII.C where a monthly chart was printed, but weekly data was used for PTV calculations. Similarly, *Four-Dimensional Stock Market Structures And Cycles* printed daily charts and used hourly data for PTVs.

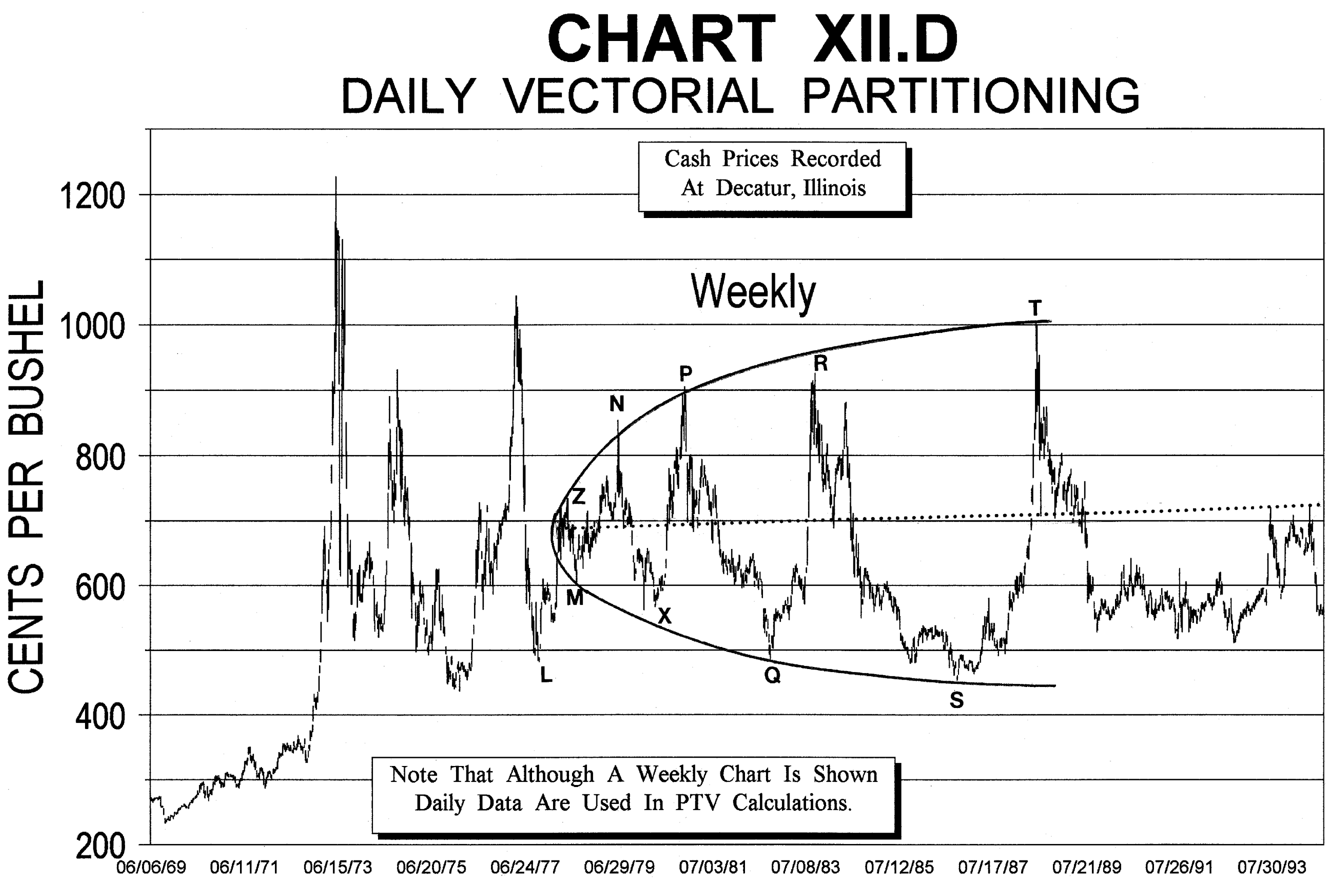
19 It is important to note that $360^0 \times 3 = 1080$.

Before using daily data to study the vectorial partitioning within the ellipse identified in the previous section, a brief review of its general form will be provided.[20]

From the beginning of this ellipse in 1978 until the minor axis was crossed, during the ST advance, the action was highly volatile, moving alternately between the upper and lower perimeters. However, after the minor axis was crossed the action became comparatively dull. Notice, how the swings after the bottom in 10/13/1989 have been much less dramatic than they were in the first half of the ellipse.[21]

The major axis of this ellipse typically divided the movements in half with a gap often occurring when the axis was crossed. This axis is near the fifth square of twelve (720 cents/bushel). For example, the price movement from point S to point T was,

ST = 1004 - 454 = 550 cents



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[20] *Four-Dimensional Stock Market Structures And Cycles* provided a detailed analysis of ellipses and their uses. Future volumes of *Market Science* will study in greater detail the proportions and symmetry within this ellipse. This volume focuses on the square of twelve and vectorial partitioning.

[21] A goal for the market analyst is to identify when the perimeter of this ellipse is penetrated, because this will define a highly energized period with greatly increased volatility. One technique is to note the symmetry around the minor axis.

The half-way point of this movement occurred 275 cents (550 / 2 = 275) above the low, or at 729 cents/bushel (454 + 275 = 729). This price defined the location within that movement where the velocity was the greatest, effectively creating the gap.[22]

Similarly, the advance from 1/9/1980 to 11/21/1980 was 342 cents. The midpoint of that advance occurred at 734, which is near the midpoint of ST, calculated above. It is important to note that this advance occurred at a <u>time</u> that was half-way between the 1969-1973 and the 1986-1988 advances.

More recently, the advances into the tops in 7/19/1993 and 5/23/1994 stopped when the major axis of the ellipse was encountered at 719 cents and 723.5 cents, respectively.[23]

The fifth square of twelve also defined the location of gaps or areas of support/resistance in movements prior to the beginning of this ellipse. For example, the largest movement in cash soybean history occurred between the major bottom in 10/2/1969 and the top in 6/5/1973. That price swing was,

1227 - 234.5 = 992.5 cents.

Half of this amount (496.25) occurred at the price of 730.75, which again defined the gap within this advance. This price was the same as the half-way point of the price movement from point S to T.

Similarly, the gap during the dramatic decline after the top in 6/1973 occurred at this same price.

The reader is encouraged to continue this analysis for the remaining swings shown on Chart XII.D. Note how often gaps and midpoints of movements occurred when the major axis of this ellipse was encountered.

The next section will use daily data to study the vectorial partitioning within this ellipse.

VECTORIAL PARTITIONING USING DAILY DATA

The PTV that defined the drop from the upper perimeter of the ellipse in 6/22/1979 to the lower perimeter in 3/3/1980 measured 345.0. When the bottom of the ellipse was hit in 3/3/1980 the market bounced quickly back to the upper perimeter in 11/21/1980. The magnitude of the PTV measuring this advance, XP, was 374.8. Neither of these PTVs show an obvious relationship to the square of twelve. However, their sum does.

XP + NX = 345.0 + 374.8 = 719.8

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[22] Future volumes of *Market Science* study market velocity and acceleration. Maximum velocity occurs at the center of gravity.

[23] Appendix D looks at these two tops in greater detail.

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This value differs from the fifth square of twelve (144 x 5 = 720) by:

720 - 719.8 = 0.2

Again, this sum equaled a value from the 1913-1969 growth spiral. The PTV from the top in 2/1920 to the bottom in 2/1932 measured 718.9. Remember, the calculations for the 1913-1969 spiral used a weekly time component and USDA data, while the sum calculated above used the daily data that was recorded at Decatur, Illinois sixty years later. This provides additional proof that the square of twelve is found in all accurate data sources and time frames.

The minor axis of this ellipse was crossed during the ST movement,[24] whose value at 693.9 had no integral relationship with the square of twelve. Similarly, the PTV immediately preceding ST was RS, which measured 891.8, and also had no integral relationship with the square of twelve. However, as with the sum of NX and XP, the sum of ST and RS is a square of twelve. That is,

RS + ST = 891.8 + 693.9 = 1585.7

This sum differs from the eleventh square of twelve (144 x 11 = 1584) by:

1585.7 - 1584 = 1.7

Remember, these two PTVs spanned a time interval of nearly five years, yet the square of twelve defined their magnitudes within 1.7 units of price-time, using daily time components.

Another example of partitioning of the square of twelve is with LZ and ZM. The sum of these two PTVs was 432.7, which differed from the third square of twelve (432) by 0.7. That is,

LZ + ZM = 292.8 + 139.9 = 432.7

USE BOTH WEEKLY AND DAILY DATA FOR VECTORIAL PARTITIONING

The measurements made above provide a good example of the value of using both weekly and daily data for PTV analysis. The previous lesson, *Square Of Twelve*, showed that when weekly data was used to calculate RS and ST, their values were equal (see Table 11.4).

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[24] This does not necessarily mean that ST was coincident with the minor axis. However, its magnitude is extremely important in defining the size of this ellipse in both price and time. Readers who wish to get a head start on future work should study the relationships of ST to other price-time values within this ellipse, including the ratio between the major and minor axes.

However, when the same time frame was studied using the daily data from Decatur, Illinois, their **SUM** was a nearly perfect multiple of the square of twelve.[25]

SIMULTANEOUS INDICATIONS OF A CHANGE IN TREND USING TWO DIFFERENT TIME UNITS IS A STRONG CONFIRMATION OF A COMPLETED MOVEMENT.

Using both daily and weekly units for the time components of PTVs is also helpful in identifying vectorial partitioning. It has already been shown that vectorial partitioning occurred when the data from the USDA was used with a weekly time component. Similarly, the previous section showed the partitioning within this same ellipse using the daily data from Decatur, Illinois. This is an important concept to understand because it says that the sum of two PTVs using weekly data may equal a square of twelve, and that the sum of two PTVs connecting the same three points using daily data is another square of twelve.

Table 12.2 provides examples of this within the ellipse previously studied. For example, the sum of the two PTVs, NX and XP, was 719.8 using the daily data from Decatur, which is the fifth square of twelve. At the same time, the USDA was recording monthly averages throughout the United States and the sum of the PTVs using that data was 435.3, which is the third square of twelve. This means that when point P was hit in 11/21/1980, the square of twelve was reached in two different data sources (USDA and Decatur) and using two different time frames (weekly and daily). Similarly, the following review section will show that the seventh square of twelve defined the top at this time in the May futures contract. When all three of these data sources simultaneously arrived at different squares of twelve it provided a strong indication of a trend change.

Table 12.2
Vectorial Partitioning of the Square of Twelve
Using Both Daily and Weekly Time Components
(See Chart XI.C for Weekly and XII.D for Daily)

PTVs Added Together	Sum Using Daily Units (Decatur Data)	Relationship of Daily Sum to the Square of Twelve	Sum Using Weekly Units (USDA Data)	Relationship of Weekly Sum to the Square of Twelve
NX + XP	719.8	144 x 5 = 720	435.3	144 x 3 = 432
RS + ST	1585.7	144 x 11 = 1584	811.2	576 x $\sqrt{2}$ = 814.6
XP + PO	1001.7	144 x 7 = 1008	584.4	144 x 4 = 576

[25] There is a significant concept revealed here about how the transition from one natural time frame (weeks) to another (days) is related by the square of twelve. This should provide food for thought for those who like the philosophical consequences of these applications.

CONCLUSION

The preceding work showed the vectorial relationships in price-time to the square of twelve and its multiples. Often times, strong lines (or arcs) of support and resistance cause this square to be partitioned, so that it is the sum of two successive PTVs that equals a multiple of 144. This partitioning is an application of Isaac Newton's First Law of Motion, which explains how the PTV is redirected when a force of support or resistance is impressed on it.

Although this work focused on the price-time applications of this square, the analyst should also carry across the time and price squares. A review of the data provided in this work shows that movements that were not defined by the square of twelve in price-time were often terminated by that square in the single dimensions of price or time. This is most commonly seen when this square works out with the action on one of the major diagonal angles, i.e., 2x1, 45^0, or 1x2.

It was shown that since the bottom in 10/1989, the soybean market has remained in the lower right quarter of a long-term ellipse. This particular quadrant is typically associated with reduced volatility.[26] When the cyclic conditions cause the market to break out of this ellipse, there will be a quick and dramatic increase in prices. The analyst needs to be prepared for this time because it will provide a rare opportunity for profits. The first major areas of resistance will be defined by the lines shown on Chart APPENDIX.A, and when the fifth square of twelve is reached again (720). When the market breaks above 720 it will occur in the form of a gap. This is the time that traders should pyramid and follow their orders up with tight stop-loss orders no more than five cents below the previous days close. During these times of high velocity there are rarely large reactions until large movements have been completed.

Future volumes of *Market Science* will study the cyclic forces that will allow the analyst to better prepare for this time.

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[26] Traditional market analysts call this "base-building". A similar condition occurred in the stock market after the bottom in 3/1978. It is suggested that the reader compare these two sections of market.

REVIEW QUESTIONS

The following questions refer to the May futures contract shown on Chart REVIEW.A. This chart covers the time period from 3/1978 to 9/1987. The answers to these questions will be provided in the next volume of *Market Science.*

PRICE ANALYSIS

(1) What is the change in price between the following points?

DE = ?
FG = ?
HJ = ?
KL = ?
BM = ?
IM = ?

(2) What is the change in price between the following points?

JK = ?

(3) What is the change in price between the following points?

AB = ?
PQ = ?

(4) What is the half-way point (maximum velocity) in price between points K and O? Between points H and I?

TIME ANALYSIS

(1) Measured from the 7/21/1978 low, find where 45, 90, 120, 180, 240, 270, 360, and 450 weeks worked out.

(2) Measured from the 7/21/1978 low, find where the squares of twelve worked out, using daily data.

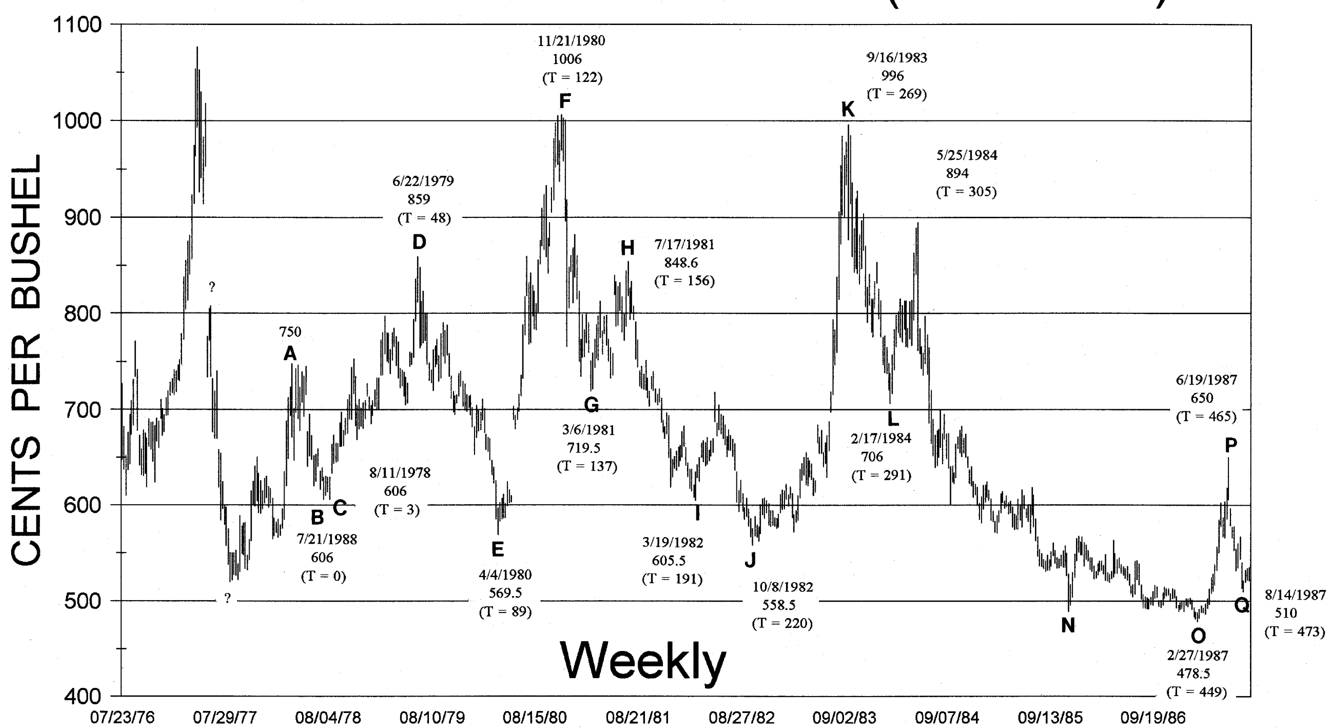
(3) At what points do the dates determined above in (1) and (2) coincide.

PTV ANALYSIS

(1) Calculate the PTVs between all successive lettered points on Chart REVIEW.A, i.e., from A to B, B to C, etc.
(2) What is the Fibonacci ratio?
(3) What is the length of the major axis of the ellipse from point K to O? And what happened when this axis (KO) was hit in 5/25/1984?
(4) What happened when the major axis of ellipse FJ was hit in 7/17/1981?
(5) Which PTVs are of equal magnitude?
(6) What is the relationship between the magnitudes of BD and JK?
(7) What is the relationship between BD + EF and JK?
(8) What is the sum of FJ and JK? How is this sum related to the eighth square of twelve?
(9) What is the sum of BD, DE, EF? How is this sum related to the eighth square of twelve?
(10) What is the sum of BD and DE? How is this sum related to the eighth square of twelve?
(11) What is the relationship between BD + DE and EF + FJ?
(12) What is the relationship between BD + FJ and JK?
(13) What is the relationship between BD + DE and the third square of twelve?
(14) What is the relationship between JK + KO and the fourth square of twelve?
(15) What is the correlation between the following five items: the horizontal angle that terminated the advance in 11/21/1980, the horizontal angle that terminated the advance in the Decatur data in 6/21/1988, IH' in the Decatur data, KO in the May futures contract, and the seventh square of twelve?

CHART REVIEW.A

MAY FUTURES CONTRACT (1976 - 1987)



APPENDIX A

DATA SET CHOSEN FOR THIS ANALYSIS

The monthly data used throughout this analysis was recorded by the United States Department of Agriculture (USDA) and reported in the "Situation and Outlook Report". These records were first compiled in October, 1913.[27]

This data was compiled by the "National Agricultural Statistical Service" and is the monthly average of prices paid directly to farmers at a variety of grain elevators throughout the United States (eighteen states were surveyed in October, 1994). No distinction was made as to grade when recording these prices. In other words, this data set represents the monthly average paid directly to farmers throughout the United States for all grades of soybeans.

The USDA reported this data on the fifteenth of every month. Therefore, when weekly time components are needed for PTV calculation, the number of weeks between the months reported by the USDA are used.

This particular data set was chosen for analysis because it represents this market in its most elemental form, i.e., a broad-based average of prices paid directly to the producer of the product, which is the first sale associated with the product. In contrast, "cash" prices printed in the Wall Street Journal is number 1 yellow and is recorded at Decatur, Illinois[28]. These prices are consistently higher than those recorded at remote grain elevators because they factor in a variety of elements that distort the original price paid to the farmer, such as transportation costs and the resale of the product after being previously purchased from the farmer. Therefore, when this analysis refers to monthly or weekly data, it is the cash price paid to the farmer at grain elevators and **NOT** the cash prices recorded at the central collection point in Illinois.

However, because daily data was not recorded at these grain elevators, when daily data is used in this analysis it will be that which was recorded at Decatur, Illinois. The time period after 1973 uses this daily data for analysis because the market changed to a higher energy level at that time and the movements became much sharper. Therefore, to achieve the balance between price and time (45^0 angle) daily time components for PTV calculations must be used.

Chart APPENDIX.A compares the data recorded by the USDA with the monthly close recorded at Decatur, Illinois. Although the prices of these two graphs are different, their form and turning points coincide. Therefore, if an analyst is able to project a turning point using the

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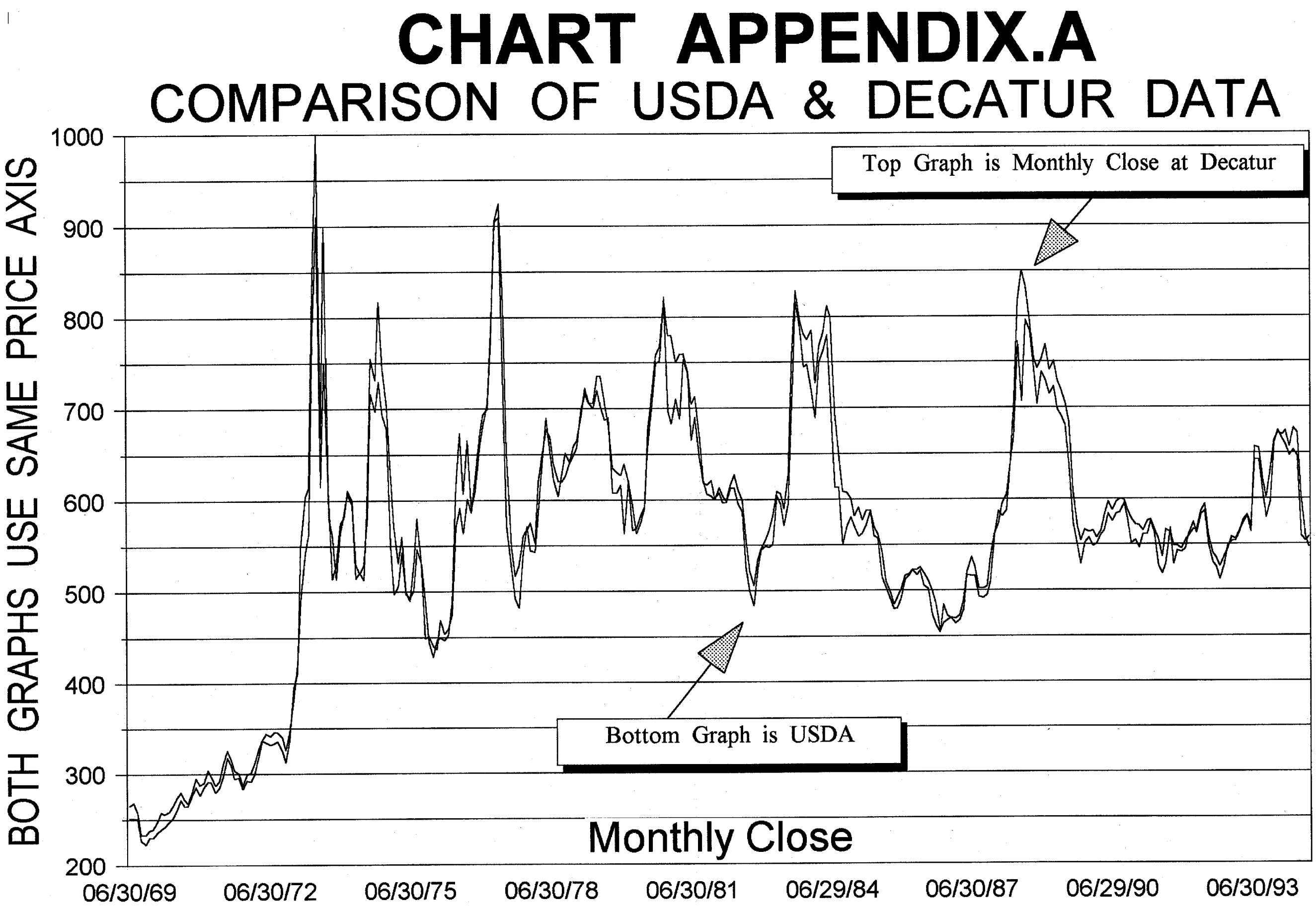
[27] It is very important to note that the records kept between 1913 and 1923 only included the five months between October and February. It was not until 1924 that data was recorded throughout the year. During these seven months when data was not recorded it is unknown what the prices actually were. Since the charts in this work are for trading months, there is no gap shown when data was not recorded.

[28] Decatur is located in central Illinois and is a major collection point for soybeans and other commodities, which are originally sold at grain elevators throughout the United States.

WWW.FOREX-WAREZ.COM
ANDREYBBRV@GMAIL.COM SKYPE: ANDREYBBRV

prices recorded by the USDA he can also project turning points for the "cash" prices paid at Decatur, Illinois.

It is understood that the majority of readers of this material approach markets from the speculative side and are ultimately interested in futures contracts. Each of these contracts have a unique personality, which may differ from that of the cash values. Again, the advise of W.D. Gann is applicable when he wrote in his *Master Course For Commodities*, " ... use cash prices to get future cycles."[29] A mastery of the basic (prices paid directly to the farmer) is necessary before advancing to financial market derivatives, such as futures contracts.



[29] W.D. Gann used the same monthly USDA data set used in this analysis for his time cycle work, which extended from 1913 to his death in 1955. Therefore, when he identified the square of twelve he was looking at the same data set used here. This can be verified by reading his book *How To Make Profits In Commodities*, specifically the soybean section, and noting the data contained within the tables.

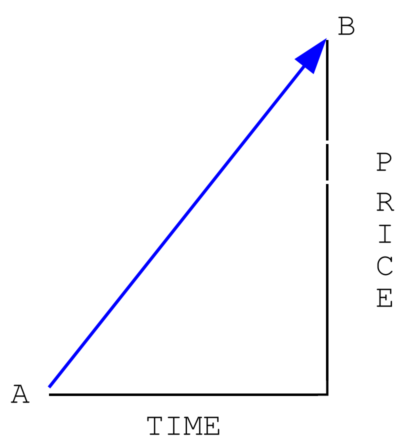
APPENDIX B

DEFINITION OF THE PRICE-TIME RADIUS VECTOR

The PTV is an application of the Pythagorean theorem taught in high school geometry classes, which states that the sum of the squares of the sides of a right triangle is equal to the square of the hypotenuse. In this case, the sides of the right triangle are time and price and the hypotenuse is the PTV.

One of the many significant insights gained when this technique is applied to price and time analysis is that it defines a single value achieved when price squares with time.[30]

This is shown below where the two sides of the triangle, which are price and time, are at right angles to each other. Note that this does not mean that the PTV is only applicable when price and time are on the forty-five degree angle. Rather, it means that the vector measuring the direct distance between two points of force in price-time is determined by placing price and time at right angles to each other.



The Price-Time Radius Vector, AB, is defined as:

$$AB = \sqrt{PRICE^2 + TIME^2}$$

Figure B.1
Definition Of The Price-Time Radius Vector (PTV)

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[30] This should not be confused with price balancing with time, which occurs on a two-dimensional chart on the 45^0 angle.

APPENDIX C

QUESTIONS AND COMMENTS

The following questions/comments were received by the author after publication of *Four-Dimensional Stock Market Structures And Cycles*. Unless stated otherwise, these questions relate to the material presented in that work. These questions have been included in this book because of their direct applicability to the subject material presented. The format of this material is informal because it is the desire to keep it in as original form as possible and most of these questions/comments were conducted via facsimile or personal mail.

In order to maintain privacy and confidentiality, the names of those submitting their thoughts have been omitted.

Question (1)

The logic of PTVs would be that the <u>origination</u> of a PTV should be a price that has existed as the market unfolds. My understanding of PTVs and ellipses is that the major axes of an ellipse is a PTV. This would indicate that the major axes of ellipses should originate at a particular price, but some examples on Chart II.A do not show that. Point K of ellipse KLMN seems to be in mid air. The origination of the major axes of ellipse HI also seems to be in mid air. What comments would you make?

Comment (1)

Yes, the major axis of a ellipse is defined by a PTV. There are several examples of the action within the ellipse not moving from one extreme to the other. The most common of these are:

(1)When the action is following the lower perimeter on the way down and the major axis is relatively flat with the time axis.

(2)When the action is following the upper perimeter on the way down and the major axis is nearly vertical.

If the motion of a PTV is influenced by another PTV the action will deviate from its original direction. Like Newton, said, a body in motion will remain in motion unless acted upon by an external force.

Question (1.a)

Throughout your book, one of the significant repeating lessons is that when the square is complete and the cube rotates, the alignment of cycles changes so that they synchronize with the face of the new cube.

Page 191 shows that you aligned the Saturn-Uranus 15^0 axes with the high on the Dow on April 26, 1983, and the other planetary axes that synchronize with the Saturn-Uranus 15^0 axes are synchronized to that time. The April date is not the same as the August low (which was the beginning of the new square).

Comment (1.a)

As you know, phasing is the most difficult part of planetary cycle analysis because once this factor is determined the rest is simply mechanical. The general rule is that none of these cycles exist without being affected by all other cycles. When you are looking for phasing at the beginning of the square notice the areas where the planets are simultaneously at key points of sensitivity. If you will look **CLOSER** at Chart VIII.I you will notice that the phasing for the Saturn-Uranus cycle was set on 4/1981. At this time the Saturn-Uranus cycle was at an axis (within a six degree orb of influence) **AND JUPITER-SATURN WERE CONJUNCT.**

Question (2)

You mentioned vectors on page 38 in the main book and Chart III.A with the 205 components, you also mention vectors that relate to growth and decomposition. How do all these vectors relate to daily, weekly, monthly, etc... data?

Comment (2)

The vector is simply the best tool for quantifying the rate of vibration at any particular energy level. Which time scale to use for the vector is determined by the energy level. Or in Gann terms, where price balances with time. A general rule of thumb is to identify the section of market under study, then find what time scale causes price and time to balance (45^0) within that time period. For example, during the 1966-1982 square price and time balanced with a weekly time component. However, if a section within this square is studied (such as the 73-74 decline) a weekly time component would not balance with price (i.e., not follow a 45^0 angle).

Question (3)

I have been having trouble finding equilateral triangles in the 1993 Dow, am I doing it correctly?

Comment (3)

With the stock market you will find equilateral triangles in a non-trending market. A strongly trending market will cause expansion or contraction of the base of the tetrahedron. For example, on Chart II.A the base of the tetrahedron between points F and P expanded as the market trended downward. You need to know your location within the growth process.[31]

The run from 10/1992 to 1/1994 was a strong upward trend. You will be hard pressed to find the equilateral triangles within that move. You will notice in a previous FAX-Forum mailing that I included a chart titled "Root Two Vectorial Decomposition". If you look closer at that chart you will notice that the rotational axis of the tunnel passed through the section of the market studied on Chart I.A. This defined a nodal line (in other words, a trendless market). As mentioned before, it was no coincidence that this time frame was chosen for preliminary study of equilateral triangles.

The general rules are:

(1) know your relative location within the growth process.
(2) determine if your location indicates a trend or a node.
(3) if a trend is expected define its maximum possible extent by observation of your current location within the tunnel with respect to the top of the tunnel (upward trend) or the bottom of the tunnel (decline).

This potential distance within the tunnel defines the construct to expect. Try visualizing a tunnel filled with balls. As the tunnel narrows (or expands), the balls rearrange themselves to fit into the given space. Down the middle of the tunnel is the rotational axis. This vector defines the price-time action as a spinning series of triangles. This is nothing new in natural 3-D growth spirals.

Question (4)

Do market movements occur only on the faces of the sacred solids? Or can they occur THROUGH the solid itself for example, from one cube corner through the cube to its diagonal opposite?

Comment (4)

First, market growth is not limited to the five sacred solids. This thought is expanded below in question 6.

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[31] The above description explains why people have been able to use the tetrahedral form as an indicator for termination of a move, i.e., they notice it at tops and/or bottoms. This is what W.D. Gann referred to as "Form Reading", which is studying the patterns formed at major turning points.

It has already been shown that common faces can exist between two tetrahedra (p76). As these solids combine to produce other larger solids, the planes of cleavage between them often define paths of price-time. Also, this must always be kept in the perspective that we are studying a system demonstrating **DYNAMIC** symmetry, not static.

Question (5)

What is the connection between the 47th Proposition of Euclid (or the 29th Theorem of Pythagoras) and market structures, specifically in the proportions of 3-4-5 as contrasted to any other right triangle?

Comment (5)

Background review: Euclid lived in approximately 300 B.C. and wrote what can be considered the foundation of geometry in a series of thirteen books now known as "Euclid's Elements", hence the name "Euclidean Geometry". Each of these books contain definitions, postulates, and propositions. The proposition referred to in this question is the 47th in Book One (As opposed to the 47th in Book 10). This is what Pythagoras discovered (in 600 B.C.) and is most commonly recognized today as the "Pythagorean Theorem" mentioned in Lesson I of my book. The original form of the theorem was that the sum of the areas of two squares set at right angles to each other equals the area of the square subtending the right angle. Today, it has been modified to find the lengths of the sides of these squares.

The entire foundation for the vectorial analysis used to identify the geometric structures is based upon this theorem. Calculating the vector uses time and price as the two smaller squares.[32] I hope people give some deep thought to this concept of price-time, rather than simply using the PTV as a mechanical tool. It is pretty mind-expanding when you think about what is really happening when you go through this process of calculating price-time vectors.

Now, back to the question. The right triangle is used throughout all geometry, including markets. One of the most important applications of this triangle is related to their rotation around the axis as the market spins down the tunnel. This material has not been released. Sorry, but background knowledge of growth spirals is needed to give this question the attention it deserves. Reference the following books for additional information:

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[32] I recently had a discussion about how my theory of a unified price-time relates to the "Heisenberg Uncertainty Principle". In short, this theory of modern physics (1927) states that the precise location of a particle can not be seen because the momentum imparted to that particle by the light quanta effectively moves the particle. In other words, by looking at it with light you have moved it. Similarly, the velocity of the particle can not be precisely determined. It is only when various characteristics of the particle's motion are combined that they can be isolated with a high probability. (Also, on page two I stated that musicians had a special aptitude for accurate market timing. Heisenberg was **BEST KNOWN** in Leipzig, where he taught, as an excellent pianist.)

Similarly, if price and/or time is treated as a single one-dimensional element moving in Euclidean space, neither of their locations can be independently determined with the highest degree of accuracy. Only when price and time are unified does the precise order present itself.

The Curves of Life - Theodore Andrea Cook - ISBN 0-486-23701-X
The Geometry of Art and Life - Matila Ghyka - ISBN 0-486-23542-4
Connections; The Geometric Bridge Between Art And Science - ISBN 0-07-034251-2

Question (6)

Is it your thought that all five of the sacred solids (tetrahedron, cube, octahedron, icosahedron, and dodecahedron) must be incorporated in some fashion, order, or sequence to account for all market movements within each commodity, precious metal, stock, or currency?

Comment (6)

Complex natural growth is not limited by the five Platonic solids, including financial markets. The construct of DNA shows the two purines, adenine (A) and guanine (G), to have a hexagonal-pentagonal bond. These two purines bond with the pyrimidines thymine (T) and cytosine (C), to form the double helix of DNA. Similarly, the bonding of these four bases onto the sugar-phosphate backbone is defined by either a hexagonal-pentagonal or pentagonal-pentagonal geometric construct.

Similarly, the geometrical patterns formed by growing life, ranging from a virus to the human body, take many shapes other than the five Platonic solids.

In other words, it is a mistake to limit perspective to the preconceived notion that any market must follow the Keplerian model of one perfect platonic solid within another.

Question (7)

Are there any ideas on spotting origin and terminus of PTVs? With all these gaps and overlaps that seem to intervene, it has been difficult for me. When do tetrahedrons begin and end and how do we account for the gaps in formations?

Comment (7)

... Gaps are the result of placing smaller structures within a larger structure. For example, on Chart I.D, the gap was necessary in order to place the tetrahedron within the limits of the 950 PTV from 10/11 to 3/6. On 1/14 the only way for the 950 PTV to reach completion and still be composed of 236 PTVs was for the gap to occur.

Question (8)

Is the work of W.D. Gann the basis for your geometrical method or does your method make the Gann techniques obsolete? Should we work from Gann charts or do your techniques make that unnecessary by the pure mathematical approach (vs. graphical)?

Comment (8)

The graphical approach will not work during periods when markets change energy levels, such as 1949 and 1982. For example, the movements during the 1899-1914 square were much smaller than the 1966-1982 square. If you used the graphical approach and had this entire section on the same chart the movements within the earlier square would be barely visible.

APPENDIX D

TIMING TIPS

One common tool used by market analysts to project areas of support and resistance is the half-way retracement and the one-fourth retracement. However, this technique is typically only applied to price levels. Better results are obtained if evenly spaced trendlines are used, rather than only horizontal price levels or vertical time divisions.

For example, Chart APPENDIX.D shows the cash data from Decatur after the major top in 6/21/1988. To find the lines of support and resistance on this chart, the following steps were performed:

(1) The bottoms in 10/13/1989, 7/11/1991, and 10/2/1992 were connected with a straight line.
(2) A line parallel to the line in step (1) was drawn touching the top in 6/21/1988.
(3) Three more lines were drawn equally spaced and parallel to the top and bottom lines.

These five lines divide the movements into four equal spaces. Notice how the support and resistance areas have been defined by these lines. Even the gap during the 1989 decline occurred when the action crossed the one-fourth line.

Recently, prices have stayed near the 540 area. This node is the one-eighth point, or half-way between the bottom two lines.

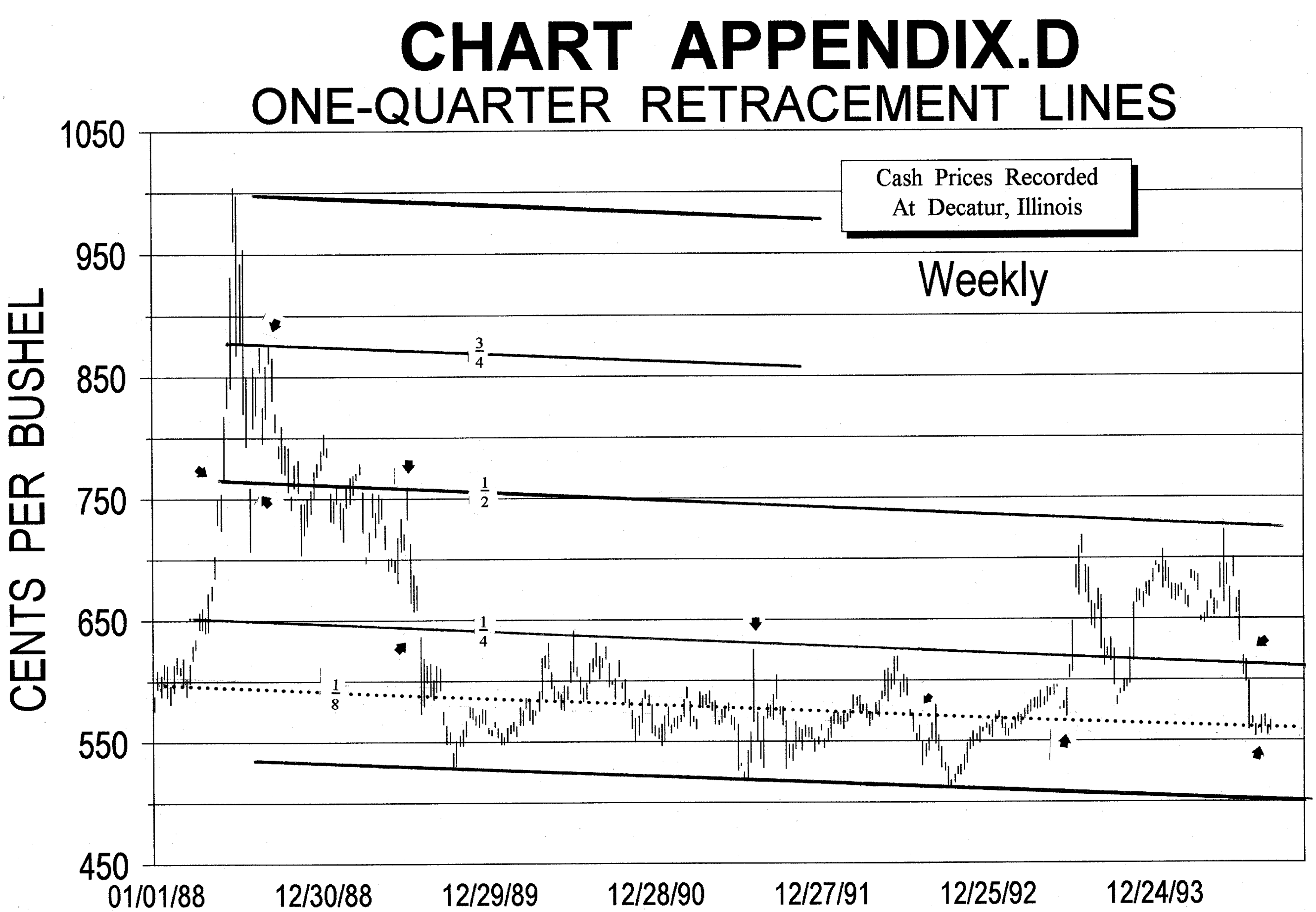
The two tops in 7/19/1993 and 5/23/1994 occurred on the half-way retracement line. However, neither of these tops were at the 50% price retracement from the 6/21/1988 top. It is only when parallel trendlines are used that the equal divisions are seen.

Just a few of the tools discussed in this book that could have been used to identify 5/23/1994 as a top include:

(1) The price level on this date was 723.5, which is the fifth square of twelve and twice the circle of 360^0.
(2) This price level was on the major axis of the ellipse, which began in 1978. This axis coincided with gaps or support/resistance for the sixteen years preceding 1994.
(3) The PTV from the bottom in 10/2/92 to the top in 5/23/1994 was 460, which is the PTV from the bottom in 10/1986 to the top in 6/1988 divided by 1.5 (sequence in the geometric mean).
(4) Parallel lines drawn between the top in 6/1988 and the bottom in 10/1989 divided this movement in half at the 5/1994 top.

(5) The price level was two squares of twelve from the top in 6/21/1988 (this top was 1004, which is the seventh square of twelve).
(6) This price level was 144 from the bottom immediately preceding it in 10/4/1993.
(7) This price level was 1.5 squares of twelve from the bottom in 10/2/1992.
(8) This price level was exactly 3.5 squares of twelve (504) from the all-time high of 1227 in 6/5/1973.
(9) This price level was two squares of twelve from the major bottom in 1/26/1976 at 436.5 (the third square of twelve).
(10) This price touched the 45^0 diagonal angle on the weekly chart from the 6/21/1988 top for the first time (other diagonal angles also hit at this point).

Notice from the above description how the majority of the price levels since 1973 have been defined by the square of twelve.



FUTURE VOLUMES OF MARKET SCIENCE

A few of the topics that will be addressed in future volumes of *Market Science* are:

Quantum Energy Levels Of Freely Traded Markets

> This lesson will show that the same principles of modern physics governing the structure of the atom also define the structure of the soybean market. Those wishing to get a head start on this material should review their chemistry books, specifically quantum theory.

Price-Time Triangulation

Cycles in Soybeans

Growth Spirals