Chapter 9

MUSIC

Since ancient times or at least 500 B.C. when Pythagorus was said to have discovered the mathematics of music, man has tried to tie in this intangible mathematically defined power that effects emotions and health and most other aspects of man's life with the higher realms that direct man's existence. The 'music of the spheres' was often alluded to as a psychic interpretation of the silent sounds the planets made in their orbits, and of course early number systems often related to seven and eight units. The seven days of the week repeat on the 8^{th} just like the musical octave of DO, RE, MI, FA, SOL, LA, TI, and DO again to start another cycle. The notes are commonly called C, D, E, F, G, A, B, and C again. In terms of simple numbers, if we use the note C as our base and make that the number '1' then we find the ratios of the other notes in succession to be approximately thus: 1, 9/8, 5/4, 4/3, 3/2, 5/3, 15/8, and 2/1 or in decimals: 1, 1.125, 1.25, 1.333, 1.50, 1.666, 1.875, and 2. These are just our simple 1/8 divisions we see all the time in the market with the exception of the 1.75 ratio being absent.

The scientific study of stringed instruments relates that the frequency of a string is *inversely proportional* to the *square root of its weight (length)*, which of course ties in frequency with gravity, and perhaps the music of the 'gravitational spheres'. The frequency is at the same time *directly proportional* to the *square root of its tension*. If we double the tension of a string, the frequency will increase by 1.4142 (the square root of 2). To double the pitch of a string one octave we need to multiply its tension by 4 not double it. In other words if our square root frequency tension is 1.4142 and we want to double that to make an octave, the question is 2 x 1.4142=2.8284 and we find that the **number 8** if taken the square root of, is that 2.8284 number. So we see that from 1 to 8 (the octave) the frequency doubles and the tension goes up by a factor of 4. Piano makers will tell you that other factors can affect string stiffness and frequency and instead of a scale octave being exactly a 2:1 ratio, practical considerations often make the preferred choice 1.875:1 or 1.9375:1. I point this out because I have observed innumerable times that stocks do not double in price as expected but often fall short and that amount is invariably either the number 1.875 or 1.9375. Apparently there is slippage in the stock market octave also.

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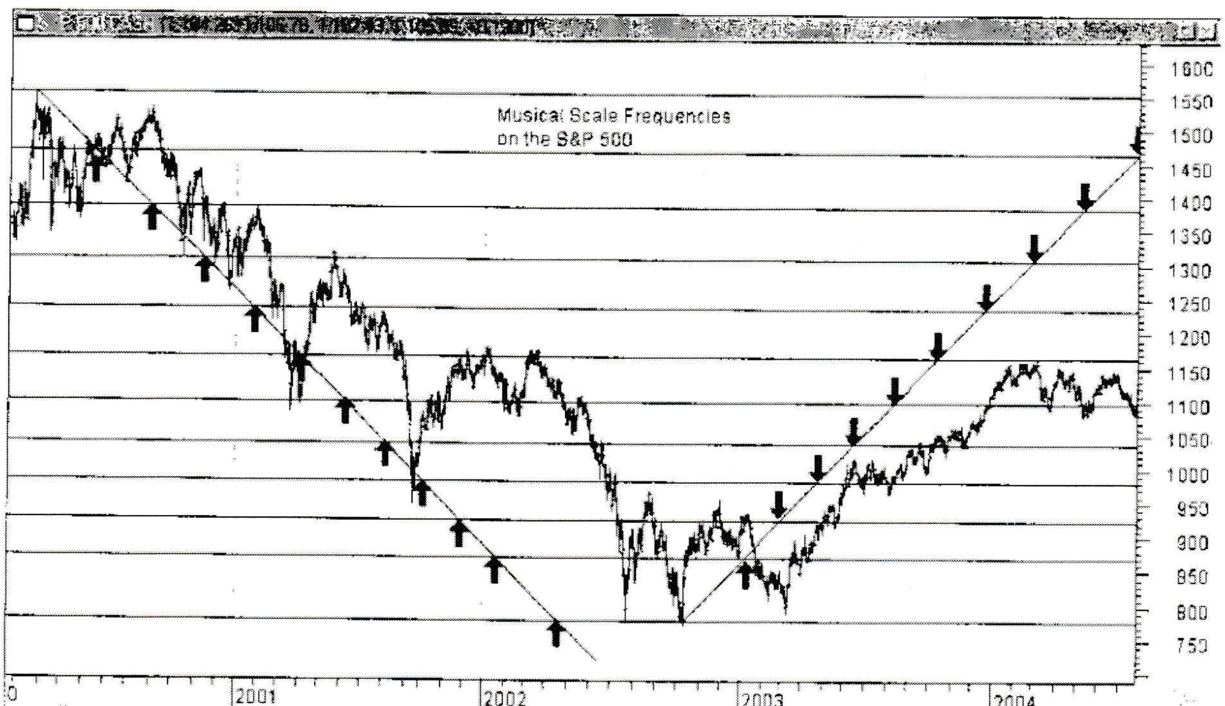
Actually the octave is more than eight notes because we have sharps and flats, so it really consists of 12 different pitches and the 13th starts the new octave. Although different cultures have adopted slightly different pitches in their scales, the practice in the West is to use 12 equal tempered tones to the octave. This number 12 also ties in with the 'music of the spheres' since there are 12 signs of the zodiac (along with 12 houses of Israel and 12 Disciples of Christ). The day and night are defined in the Bible as having 12 hours each.

The equal tempered scale is equally toned so each frequency is multiplied by the twelfth root of 2 (2 is the octave doubled so the twelfth root of 2 (2^.08333) is 1.05946, times each note to get the next). Keeping in mind the market, we would *use this primary tonal increment of 1.05946 to find ranges between major moves.* If the all time S&P high on March 24, 2000 was 1552.87, then we can step down the scale by these equal tones to see our octave: **1)**1552.87 / 1.05946=**1465.71, 2)** 1465.71 / 1.05946=**1383.45, 3)** 1383.45 / 1.05946=**1305.80, 4)** 1305.80 / 1.05946=**1232.51, 5)**1232.51 / 1.05946=**1163.33** (high March 5, 2004) **6)** 1163.33 / 1.05946=**1098.04, 7)** 1098.04 / 1.05946=**1036.42, 8)** 1036.42 / 1.05946=**978.25, 9)** 978.25 / 1.05946=**923.34** (October '98 low), **10)** 923.34 / 1.05946=**871.52, 11)**871.52 / 1.05946=**822.60, 12)** 822.60 / 1.05946=**776.44** (Final low October



2002, and March 2003).

This chart shows the 12 tone scale numbers down from the S&P final high with 45 degree "timing" angles intersecting those frequencies. Many good trades

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developed on the dates those arrows indicate. Note that because of sharps and flats in the scale the size of the various divisions can vary but the frequencies are all related by the 1.05946 multiplication ratio.

These numbers above should look quite familiar to S&P traders but the 1.05946 ratio is seen all the time in individual stocks and commodities and you should make it a habit to check swings for this percentage. So far in this book I have tried to emphasize the strange concept that time and price are the same thing and with musical scales it is no different. The 12 numbers listed above can also be considered calendar days, weeks and months. If we use calendar days and start with the smallest (12th) and start at the March 24, 2000 high, we get this series of dates: 5/09/02, 8/13/02, 10/03/02, 11/27/02, 01/24/03, 03/27/03, 05/31/03, 08/08/03, 10/21/03, 01/06/04, 03/28/04, 06/24/04. Not all these dates were perfect hits but most were +-3 days from major turns. Here too, you should remember the key principle that a big turn is expected when a harmonic price is hit on a date that is also harmonically related.

Various methods have been used to tune musical instruments but since the 1930's all pianos have used standard frequencies to tune them so all are as identical as can be manufactured. Actually the American Standard Pitch adopted in 1936 comes from mathematics developed in the late 1600's and used by Bach in the early 1700's. The first left side key on the piano is A and that standard pitch is 27.50 cycles per second, and the C above that is 32.703 cycles per second. The next C is often a starting point for much of music and that frequency is 65.406 cycles per second. Remember, to create the 12 tone octave just start here (at C) and multiply each note by 1.05946 i.e. C 65.406 x 1.05946= Dflat=69.29 x 1.05946=D=73.41 x 1.05946=E flat=77.78 x 1.05946=82.406=E, etc. Each next higher octave will be twice the frequency of the starting C. Those *standard octaves* in cycles per second frequency are from the lowest 'C' on the piano (note 4, 'C'): 32.703, 65.406, 130.813, 261.626, 523.251, 1046.502, 2093.005, 4186.009. In this series of "C's" note the 'Middle C' is 261.626 cycles per second. Middle C is the major note near the center of the piano's 88 keys that starts much of music and sounds "good". This is because this frequency is tied in with the Fibonacci golden ratio of 1.618. 1.618 squared, times 100 is 261.79 compared with Middle C at 261.63. This is a very advanced concept - that numbers can be "felt" - but many great classical composers designed music around these ratios and produced great works of art. Early Rock 'n Rollers were accused of doing the Devil's work because of musical inharmony and perhaps that criticism is a bit more valid on closer mathematical inspection.

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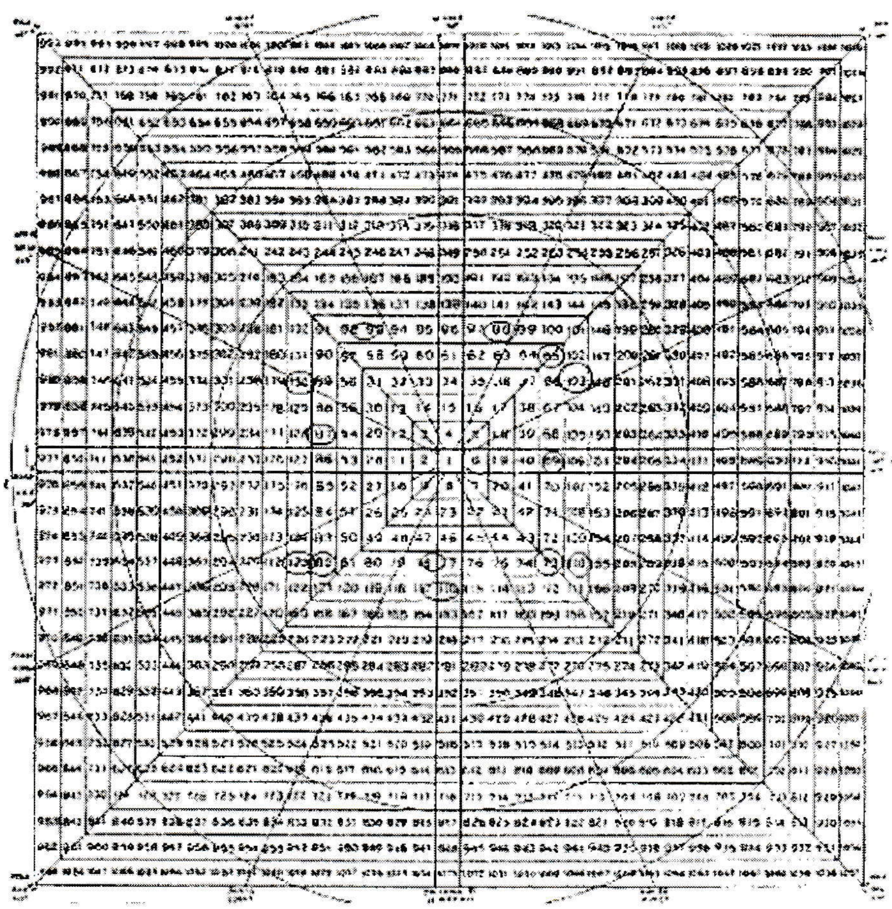
You can create any scale from these frequency starting points because as we saw they are all separated by the 1.05946 ratio and every 12 notes the frequency will double for an octave. Years ago I noted that the Dow Jones averages were hitting highs and lows around musical scale frequencies and I experimented with various number conversion tables. I had some success but dropped the practice after I discovered I was "re-inventing the wheel". Literally that is, the Gann Wheel.

Below is a copy of the Gann Square of Nine with the octave starting with the C at 65.406 cycles per second and those 13 tones (103.813 is the start of the next octave) circled on the wheel. All those numbers are very near hits on the angles and show a connecting structure with the wheel, 360 degrees, and the musical scale. It's also interesting to note how this square so closely resembles the Great Pyramid and that structure is full of relationships relating to the Sun, the Moon, and the Earth. Perhaps there's more to Pythagoras' music of the spheres then modern day man realizes.



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The numbers circled above are the exact modern day frequencies used to tune pianos, but if we 'adjust' these numbers to refine our scales we can see the origin of common trading numbers. Instead of the C starting at 65.406 we could make it start at 68 and the correspondence would be even greater with this series of numbers each 1.05946 greater than the last: 68, 72.04, 76.32, 80.87, 85.67, 90.77, 96.17, 101.88, 107.94, 114.36, 121.16, 128.36, 136, 144.08, 152.65, 161.73, 171.34, 181.53, and 192.33, to name a few in the series. An equally attractive base number would be 8 x 8 or 64 as our primary starting point. Of course if you use Middle C starting at 261.626…you get the idea.

Those with musical skills may well discover that if we find a stock at a low and apply these 1/12th root intervals, or even just the eighth division ratios of 1.125, 1.25, 1.333, etc., the terminal high would be thought to be in sympathy and probably at a major octave interval.

Gann used a simple rule that said you took a range of high to low and divided it into 8ths and this was based on music theory. All 8ths are not created equal, however, and most notably absent is the ¾ ratio, .75 in decimal. This is more than made up mathematically by the musical ¾ ratio of 1.68179 which is ¾ to 12 on the equal toned scale and is 1.05946^9 or in base 2, 2^.75. This 1.68179 is always seen at important turns. Note especially the October 8, 1998 panic low of 923.32 which started the last run to the all time high in March 2000. Now, what was that all time high price? Oh yes, it was 923.32 times 1.68179=1552.83 give or take *a few pennies*!

Other ratios of importance in the market are the 3/8 and 5/8 ones of the range. These are near Fibonacci ratios and if you plotted on an 8 x 8 grid graph paper like Gann did you would get Fibonacci numbers or angles connecting those grids (3, 5, 8). If you were to look at the chart of a ball bouncing or any other impulsive thrust you would see that after an initial big swing, the vast majority of action would be confined to a range of 3/8 to 5/8, gravitating to the 50% level. Stocks act the same way and this has resulted in the Elliott Wave practitioners only buying or selling above and below the .618 retracements since once stocks get above the 5/8ths range they usually go all the way to the top, and if they break 3/8th level they go all the way to the bottom. The vast majority of good trades come when a stock or commodity is resting on a 3/8th or 5/8th support level AND is also at an eighth TIME zone from the origin. If you recall the prior exhibit of the Stock AFL with the 1/24th natural time and price grids you would want to do the same with an 1/8th grid. If you do this you will see these major reversals at the 3/8th and 5/8th divisions. Of course if you are a perfectionist - and why not if you are reading this

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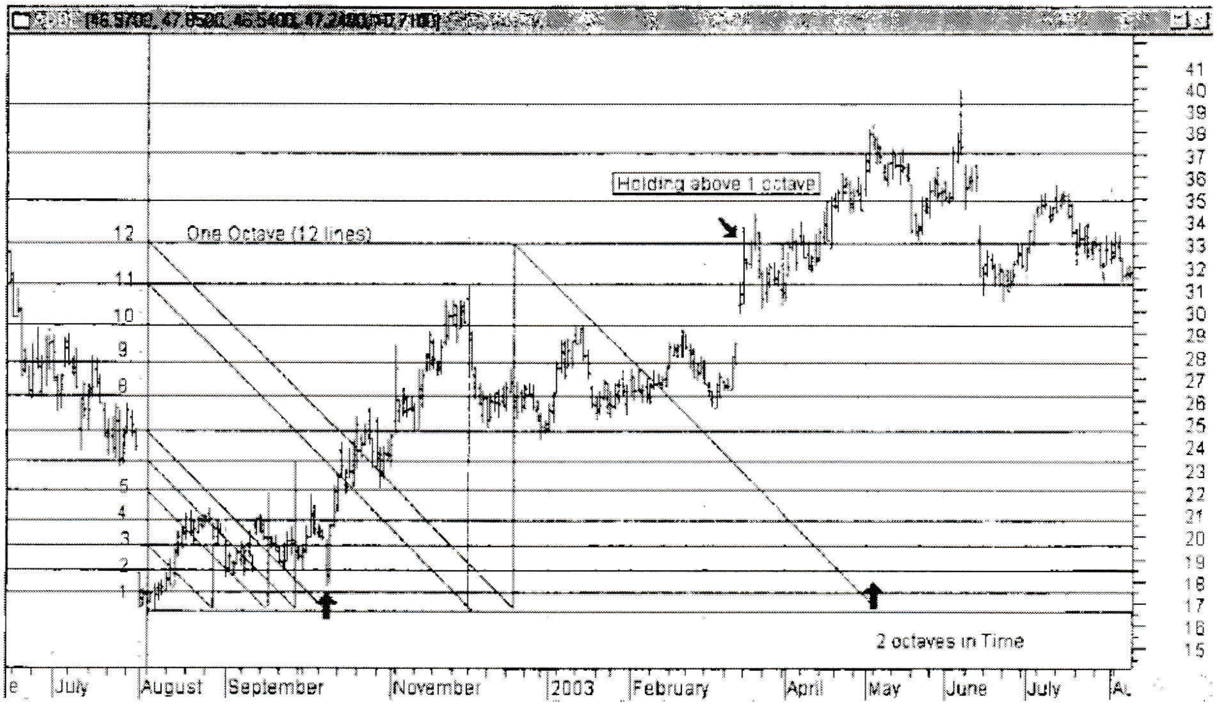
book- then I would suggest making a grid of the 12 equal tone octave by multiplying the low by 1.05946 twelve times and then converting those price levels to sideways time levels. If you did that you would get a chart like the one below. In this chart the low is stepped up by the 1.05946 ratios and the breakout above the first octave (line 12) and holding, indicated higher prices. Note, however, how the 2nd octave in Time caught the price high.



Noting the prior discussion about 3/8 and 5/8 retracements, note that 3/8th of 12 is 4.5, and 5/8th of 12 is 7.5. If you look at those levels on the chart above you will see the horizontal support and resistance (lines not drawn but note horizontally at the 4.5 and 7.5 line areas). Also note how the prices seem to bounce off these natural 12 'tones' and see how the frequencies go up as the stock's price increases. This also helps account for why expensive stocks seem more volatile than 'cheap' ones- the distance between notes is greater.

Finally we'll return to that first 15-degree fundamental principle of the 24th. Music can't be left without addressing the term 'harmonic' as in Harmonic Progression. This is just a mathematical series that converts a simple arithmetic progression like 1, 2, 3, 4, 5… and flips it over to fractions like ½, 1/3, ¼, 1/5…For years I have used the exact number of a high or low as the fraction to create the series but we'll demonstrate with the fundamental 24th so unity is 24/24=1. In the chart below the horizontal lines increase by the fractions 24/23,

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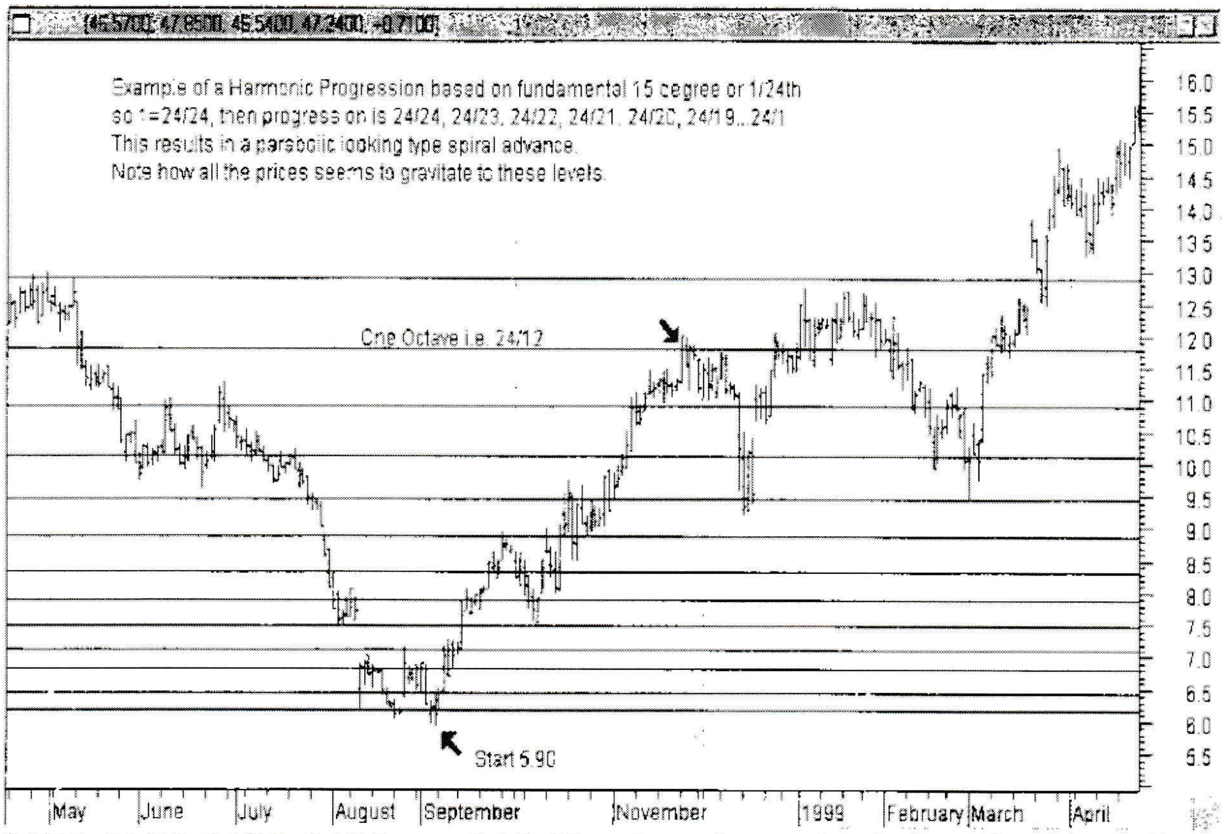

24/22, 24/20, 24/19, 24/18… to 24/1. The chart shows clearly how the prices cling to these harmonic levels and if you go back to the scale ratios and apply them you'll discover the big moves inherent in these charts.

Again, I urge you to think in terms of BOTH time and price. This chart shows the price levels. You can put on timing lines to get the time levels. Big turns only come when both time and price are in sync.

The below chart is one more example of the musical scale and the S&P 500. This one starts at the low in April 1994 and displays the first 7 frequencies above the low. Most of the arrows point out the place where the prices hit the horizontal "pitch" line and it's easy to see that they are truly mathematically precise. The round numbers going up a 45-degree timing angle show the intersection of that angle with these same pitches. The downward pointing arrows from those numbers show the time cycle change during that time. Remember we always want to look at both price level support and resistance, but also time to note when the change in trend will occur. I have also drawn in 45 degree declining lines from each frequency so you can see when they squared out the bottom and also to note the intersection of these grid lines to see the frequency change effect on the prices at the time of those intersections. It's clear to see that all these angles and intersecting points are connected to the price structure, but remember the main point - they

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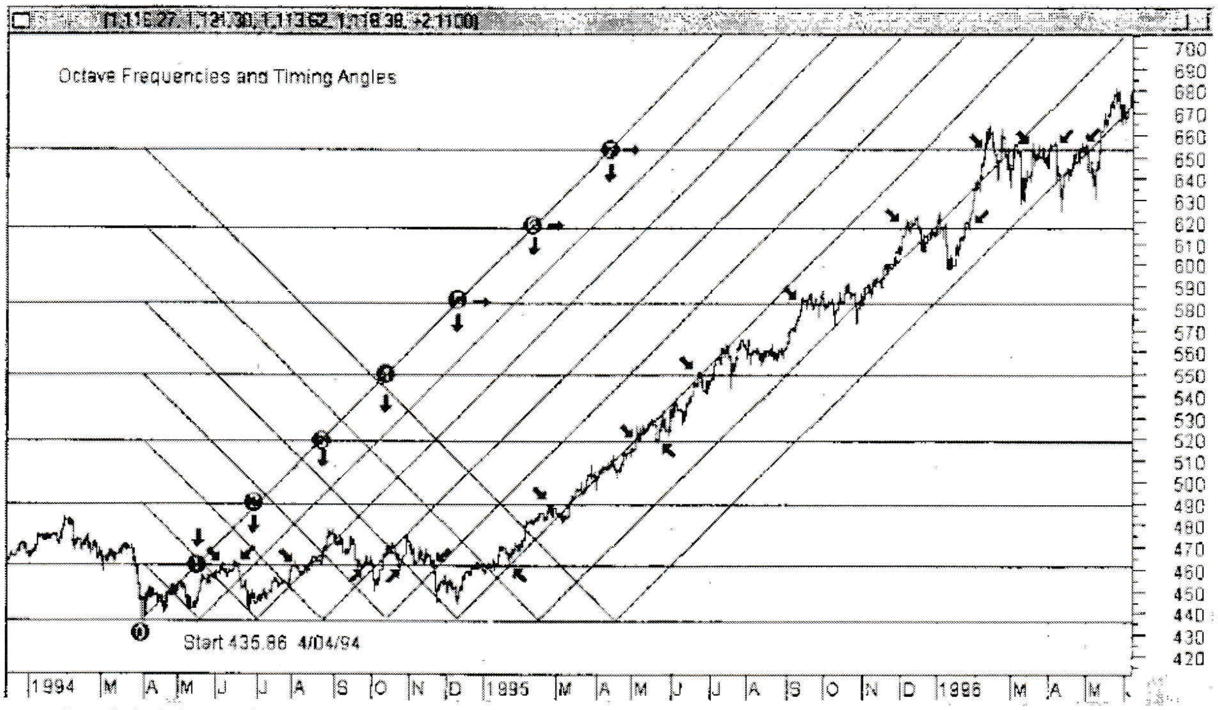
were all created from **just one point** in time and price at that origin. If this is so then it implies that stocks are controlled by something a lot different than what they want you to believe on Wall Street.



In thinking about music, the octave, and why we can divide a stock's range into 8^{th}'s and get support and resistance, one might think that the 12 equal tone scale of western music might have some notes or frequencies more important than others. Certainly we need all twelve notes since we have to multiply each one in succession to get the next and only through that one-twelfth frequency of 1.05946 can we do that. The piano tuners basic frequency guide starts with the first note on the piano, A, which has a frequency of 27.50 cycles per second (as compared with the tuning fork of 440 C.P.S. on A, note 49, on the keyboard- this is 4 octaves higher (4 doubles, so 27.50 x 16 =440)).

The following chart summarizes the whole tones and sharps and flats and their base frequency as a ratio. Note that in normal musical nomenclature a 'sharp' of one note is a 'flat' of the next higher note. Here I will just use all sharps (#).

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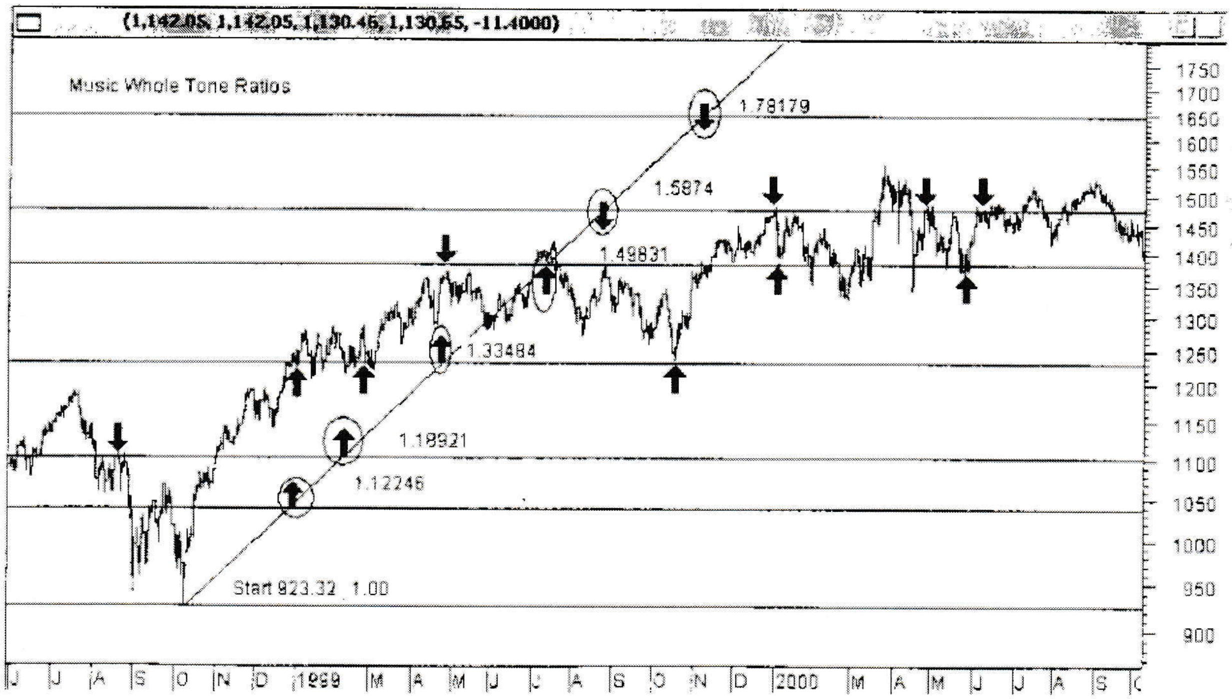
Note	C.P.S.	Whole Tones	Sharp/Flats
A	27.50	1.00	
A#	29.135		1.05946
B	30.868	1.12246	
C	32.703	1.1892	
C#	34.648		1.25992
D	36.708	1.3348	
D#	38.891		1.4142
E	41.203	1.4983	
F	43.654	1.5874	
F#	46.249		1.68179
G	48.999	1.78179	
G#	51.913		1.8877
A	55.000	2.00 next Octave	

You will want to make a copy of this page, as these ratios are quite handy when working with stocks. Remember, these are just 1.05946 times each note.

In looking at this table we once again notice very familiar numbers and perhaps 50% retracements or 25% were really .4983 and .2599 or that third as .3348. We'll take a closer look and see if we can find out.

You can use these ratios in all stock market work and major long term highs



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and lows can be set by these ratios. These two charts show how the various Sharp and Flat, or Whole Tone ratios show up in the S&P. Note how the 45 degree *timing angle intersects those ratios and gives market turns*, while the *ratios themselves gives rise to support and resistance numbers.*

I did not combine these two charts into one as that would make it much too confusing, but if you do that you will see that a very big percentage of trend change 'hits' are accounted for by these ratios. I might add that converting these price ratios to calendar time increments is a very good use of time.

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