CYCLES TUTORIAL

by
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INTRODUCTION

The use of cycles is perhaps the most widely misunderstood aspect of technical analysis of the markets. This is due, in part, to a wide variety of disparate approaches ranging from astrology to wavelets being lumped into a cycles category. The purpose of this tutorial is to present a logical and consistent perspective on what cycles are and how they can be used to enhance technical analysis. I was originally attracted to the use of cycles because it is one parameter on the charts that can be scientifically measured. These measurements can be used to dynamically modify conventional indicators such as RSI, Stochastics, and Moving Averages. Better yet, our research has provided superior indicators derived directly from cycle theory. The successful application of cycles to technical analysis is proven by mechanical trading systems which we offer for both intraday and position trading are ranked #1 in their respective categories.

The following sections are more or less independent, but weave together to establish a basis for a scientific approach to trading. Some sections should be an easy read. Other sections might become too technical for many traders. If you feel uncomfortable in a section, just skip it for the time being and plan to return to it later. The punch line of this tutorial is in the final section, where we show how to correlate the indicators for a consistent analytical approach.

HISTORICAL PERSPECTIVE

Cyclic recurring processes observed in natural phenomena by humans since the earliest times have embedded the basic concepts used in modern spectral estimation. Ancient civilizations were able to design calendars and time measures from their observations of the periodicities in the length of the day, the length of the year, the seasonal changes, the phases of the moon, and the motion of the planets and stars. Pythagoras developed a relationship between the periodicity of musical notes produced by a fixed tension string and a number representing the length of the string in the sixth century BC. He believed that the essence of harmony was inherent in the numbers. Pythagoras extended the relationship to describe the harmonic motion of heavenly bodies, describing the motion as the “music of the spheres”.

Sir Isaac Newton provided the mathematical basis for modern spectral analysis. In the seventeenth century, he discovered that sunlight passing through a glass prism expanded into a band of many colors. He determined that each color represented a particular wavelength of light and that the white light of the sun contained all wavelengths. He invented the word *spectrum* as a scientific term to describe the band of light colors.

Daniel Bournoulli developed the solution to the wave equation for the vibrating musical string in 1738. Later, in 1822, the French engineer Jean Baptiste Joseph Fourier extend the wave equation results by asserting that any function could be represented as an infinite summation of sine and cosine terms. The mathematics of such representation has become known as harmonic analysis due to the harmonic relationship between the sine and cosine terms. *Fourier transforms*, the frequency description of time domain events (and vice versa) have been named in his honor.

Norbert Wiener provided the major turning point for the theory of spectral analysis in 1930, when he published his classic paper "Generalized Harmonic Analysis." Among his contributions were precise statistical definitions of *autocorrelation* and *power spectral density* for stationary random processes. The use of Fourier transforms, rather than the *Fourier series* of traditional harmonic analysis, enabled Wiener to define spectra in terms of a continuum of frequencies rather than as discrete harmonic frequencies.

John Tukey is the pioneer of modern empirical spectral analysis. In 1949 he provided the foundation for spectral estimation using correlation estimates produced from finite time sequences. Many of the terms of modern spectral estimation (such as aliasing, windowing, prewhitening, tapering, smoothing, and decimation) are attributed to Tukey. In 1965 he collaborated with Jim Cooley to describe an efficient algorithm for digital computation of the Fourier transform. This Fast Fourier Transform (FFT) unfortunately is not suitable for analysis of market data.

The work of John Burg was the prime impetus for the current interest in high-resolution spectral estimation from limited time sequences. He described his high-resolution spectral estimate in terms of a maximum entropy formalism in his 1975 doctoral thesis and has been instrumental in the development of modeling approaches to high-resolution spectral estimation. Burg's approach was initially applied to the geophysical exploration for oil and gas through the analysis of seismic waves. The approach is also applicable for technical market analysis because it produces high-resolution spectral estimates using minimal data. This is important because the short-term market cycles are always shifting. Another benefit of the approach is that it is maximally responsive to the selected data length and is not subject to distortions due to end effects at the ends of the data sample. The trading program, MESA, is an acronym for Maximum Entropy Spectral Analysis.

PHILOSOPHICAL FOUNDATION FOR MARKET CYCLES

It has been written that the market is truly efficient and follows the random walk principle. The fact that Paul Tudor Jones, Larry Williams, and a host of other notable traders consistently pull money from the market disproves the categorical assertion.

However, a more detailed analysis of the random walk theory could yield some interesting results.

Brownian motion is a random walk, where for example, it describes the path of a molecule of oxygen in a cubic foot of air. That molecule is free to move in three-dimensional space. The market is more constrained. Prices can only move up and down. Time can only go forward. There is a more constrained version of random walk, called the Drunkards Walk. In this version, the “Drunk” staggers from point A to point B. We want to examine two formulations of the problem.

In the first formulation, the “Drunk” flips a coin, and depending on whether the coin turns up heads or tails takes a step to the right or left with each step forward. That is, the random variable is direction. The solution to this formulation is a rather famous differential equation called the Diffusion Equation. The Diffusion Equation describes many kinds of physical phenomena, such as the heat traveling up the shaft of a silver spoon when it is placed in a hot cup of coffee or the path of smoke particles leaving a smokestack.

In the second formulation, the “Drunk” again flips the coin. This time, however, he asks himself whether he should take a step in the same direction as the last one or in the opposite direction, depending on the outcome of the coinflip. The solution to this formulation is an equally famous (among mathematicians) differential equation called the Telegrapher’s Equation. As the name implies, the Telegrapher’s equation describes the way waves travel on a telegraph line. Lo and Behold, we have a potentially cyclic solution to what started out to be a random walk problem!

A physical phenomena embodying both these formulations of the Drunkards Walk is the meandering of a river. Looking at the aerial photograph of any river in the world, you can see that there are places where the river path is more or less random and other places where the meanders have a distinctive wavelike pattern. The explanation for these patterns is that the river is attempting to maintain a constant slope on its path to the sea, following the path of least resistance for the conservation of energy. The river attempts to maintain the constant slope by weaving to and fro in a manner similar to a skier maintaining a constant speed as he comes down the mountain. Taken in aggregate, the meanders are not related to each other and are therefore random. However, if you are in a boat on any given meander it appears to be coherent and you can pretty well predict where the river is headed for a short distance.

So here is the leap of assumptions for application of theory to the market. The market charts are similar to the aerial photograph of a river. There are places where the chart movement appears random and other places where distinctive cyclic patterns can be observed. There are plenty of forces on the market, such as greed, fear, etc., which in aggregate force the market to follow the path of least resistance. In this sense the market is satisfying the conservation of energy. If this is true, then we can apply the Drunkard’s Walk analysis to the market. There are times when the market is in a Trend Mode. In this case the market path is similar to smoke coming from a smokestack being bent in a general direction by the breeze. In this case the best predictor of the random variable is the (moving) average. There are other times when the market is in a Cycle Mode. In this case the best predictor of a cyclic turning point is an “oscillator” that senses the change in momentum.

Think of it this way. Ask yourself if the composite group of traders ask:

Will the direction of the market change?

OR

Will the trend continue?

The significant point for our technical analysis is that the market can be divided into two different modes: the Trend Mode and the Cycle Mode. These two modes are traded in distinctly different, and often opposite, ways. Regardless, the market in the larger perspective is behaving randomly. Our goal as technical analysts is to exploit the short term behavior.

CYCLE MEASUREMENTS

There are three methods commonly used for measuring market cycles. These are:

1. Cycle Finders
2. FFTs (Fast Fourier Transforms)
3. MESA (Maximum Entropy Spectral Analysis)

Cycle Finders are ubiquitous, being found in every toolbox software. These cycle finders basically enable you to measure the distance between successive major bottoms or successive major tops. The resulting cycle length is just the number of bars between these maxima or minima. Cycle finders are perhaps the second best way to measure market cycles. They have immediate application to the current cycle. One disadvantage is that the measurement can only be made at discrete intervals, and is not continuous. A larger disadvantage is that there is a temptation to correlate a number of successive cycles. From our Drunkard’s Walk discussion we concluded that cycles can come and go in the market and it is not necessarily true that we can correlate a string of them.

Another tool in most toolbox software packages is the FFT (Fast Fourier Transform). Using FFTs for market analysis is analogous to using a chainsaw at a wood carving convention. It certainly is effective, but it is not the right tool for the job. FFTs are subject to several constraints. One of these constraints is there can be only an integer number of cycles in the data window. For example, if we have 64 data samples in our measurement window (a 64 point FFT) the longest cycle length we can measure is 64 bars. The next longest length has 2 cycles in the window, or 64/2 = 32 bar cycle. The next longest lengths are 64/3 = 21.3 bars, 64/4 = 16 bars, etc. Therefore, the integer constraint means that there is a lack of resolution, i.e. a large gap between the measured cycle lengths that can be produced, right in the length of cycle periods that we wish to work. We can’t tell if the real cycle is 14 bars or 19 bars in length.

The only way to increase the FFT resolution is to increase the length of the data window. If the data length is increased to 256 samples, then we reach a one bar resolution for cycle lengths in the vicinity of a 16 bar cycle. However, obtaining this resolution highlights another constraint. The cycle measurement is valid only if the data is stationary over the entire data window. That means that a 16 bar cycle must have the same amplitude and phase over a total of 16 full cycles. In other words, using daily data, a 16 day cycle must be consistently be present for over a full year for the measurement to be valid. Can this happen? I don't think so! By the time a 16 bar cycle occurs for more than several cycles it will be observed by every trader in the world and they will destroy that cycle by jumping all over it. Its potential long term existence is the very cause of its demise! The only way to obtain a high resolution cycle measurement that is valid is to select a technique where only a short amount of data is required. MESA fills this requirement.

Still not convinced? Perhaps we can demonstrate our point with some measurements. Figure 1 shows how we have converted the amplitude of a conventional bell-shaped spectrum display to colors according to the amplitude of the spectral components. Think of the colors ranging from white hot to ice cold. Colorizing the amplitude enables us to plot the spectrum contour below the price bars in time synchronization. A spectrum that is basically a yellow line has a sharp, well-defined cycle. A spectrum that has a wide yellow splotch means that the top of the bell-shaped curve is very broad and the measurement has poor resolution. Figure 2 is a 64 point FFT measurement of a theoretical 24 bar sinewave. Since this is a theoretical cycle with no noise, the measurement should be precise. But it is not! The spectral contour shows the measurement has very poor resolution. The measured length could as easily be 15 bars as 30 bars. Figure 3 is a 64 point FFT taken on real market data. Here, one can barely determine that the cycle is moving around but cannot definitively identify the cycle. We will revisit these data again using the MESA measurement technique.

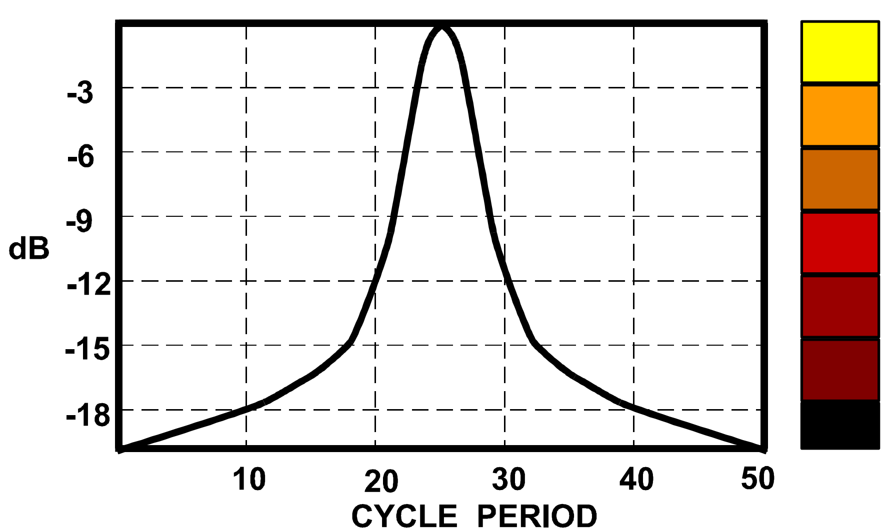

Figure 1. Spectrum Amplitude to Color Conversion

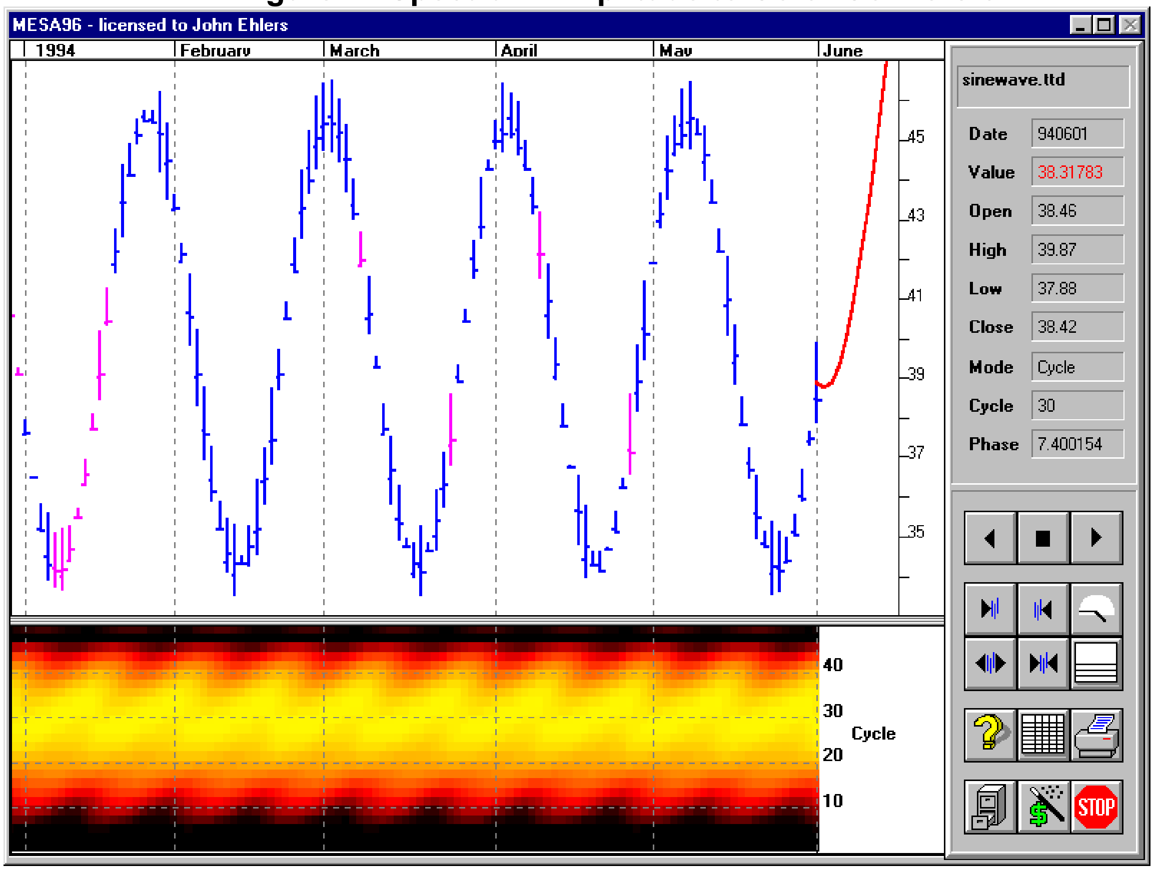

Figure 2. 64 Point FFT of a Theoretical 24 Bar Cycle

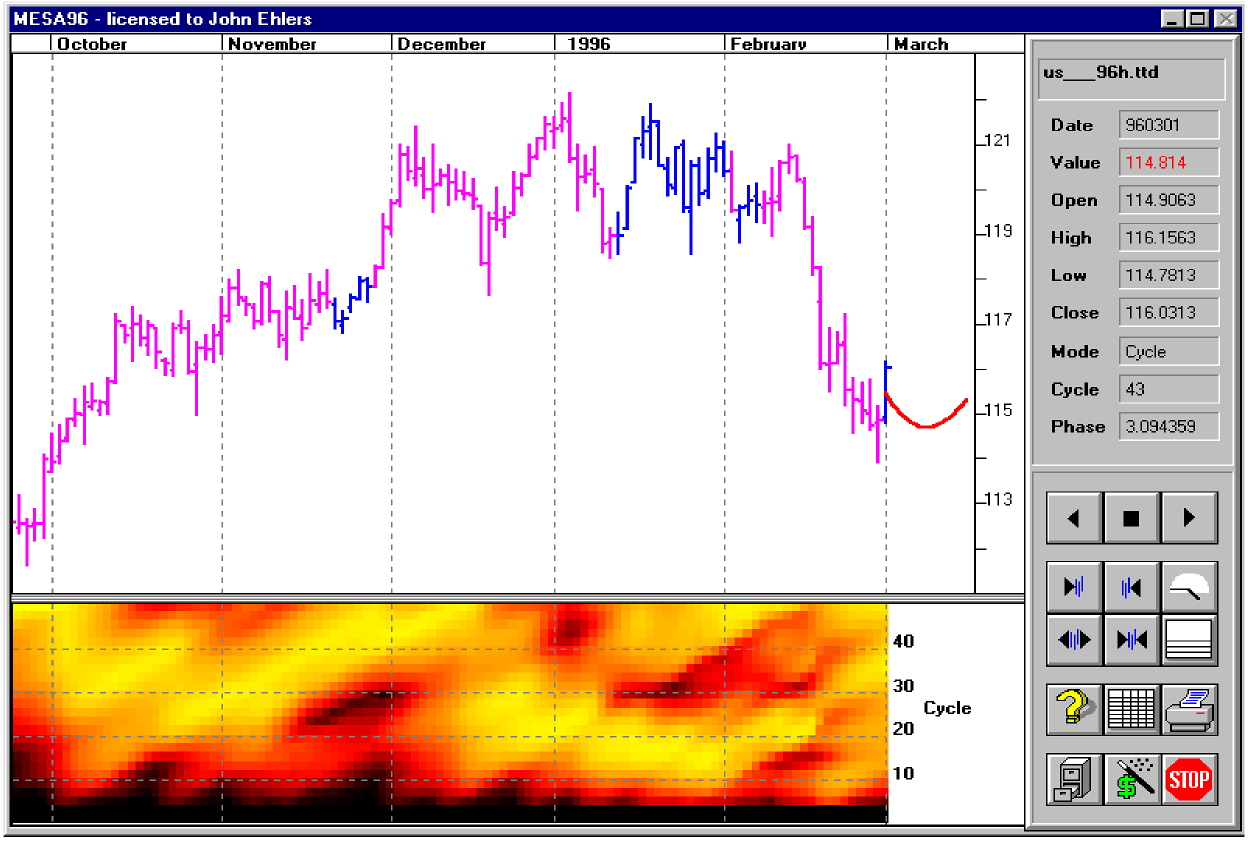

Figure 3. 64 Point FFT of March 96 Treasury Bonds

The notional schematic for the way MESA measures the spectrum is shown in Figure 4. The data sample is fed into one input of a comparitor. This data sample can be any length, even less than a single dominant cycle period. The other input into the comparitor comes from the output of a digital filter. The signal input to the digital filter is white noise (containing all frequencies and amplitudes). This digital filter is tuned by the output of the comparitor until the two inputs are as nearly alike as possible. In short, what we have done is pattern matching in the time domain. With some artistic license, what we have done is removed the signal components with the filter, leaving the residual with maximum entropy (maximum disarray). Once the filter has been set we can do several things with it. First, we can connect a sweep generator to the filter input and sense the relative amplitude of the output as the frequency band is swept. This produces the bell-shaped spectral estimate similar to the one shown in Figure 1. This spectral estimate is, in fact, the cycle content of the original data sample within the measurement capabilities of the digital filter. Secondly, because we have a digital filter on a clock, we can let the clock run into the future and predict futures prices on the assumption that the measured cycles will continue for a short time.

The MESA cycle measurement is notable in several regards. Most importantly, only a small amount of data is required to make a high quality measurement. This means that there is a higher probability of making a measurement using nearly stationary data because the data need remain stationary only over a short span. As previously indicated, cycle measurements are valid only if the data is stationary. Secondly, the short amount of data used enables us to exploit the short term coherency of the market. This is entirely consistent with the Telegrapher's Equation solution to the Drunkard's Walk problem. This means the measured cycle when the market is in the Cycle Mode has predictive capability. Thirdly, high resolution spectral estimates are made with the MESA approach. The high quality measurement of the theoretical 24 bar cycle is shown in Figure 5, where only one cycle's worth of data is used in the measurements. Here, the spectral contour is a single line, meaning that the bell-shaped curve is just a spike centered at the 24 bar cycle period. Figure 6 shows the ebb and flow of the measured cycle for the March 96 Treasury Bonds. This cycle characteristic was only inferred in the FFT measurement.

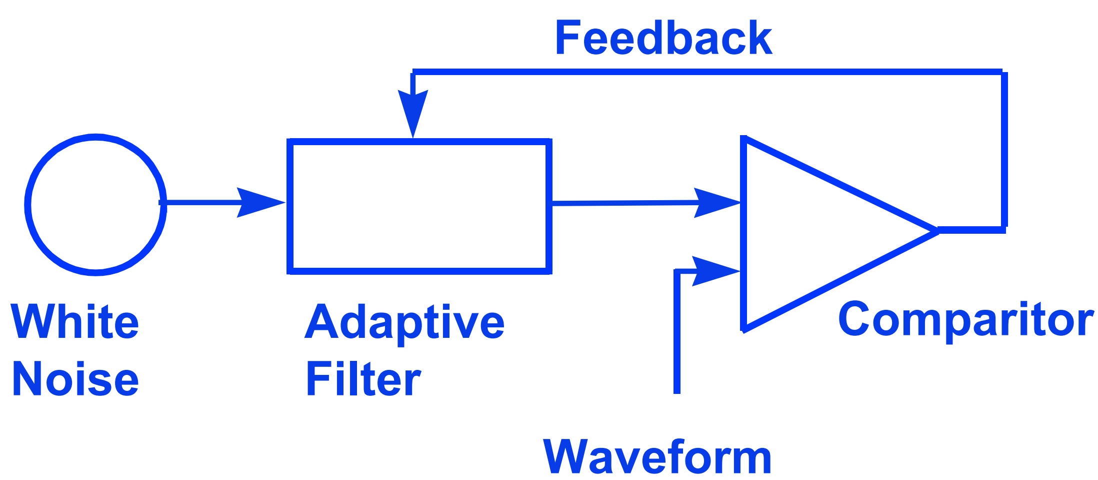

Figure 4. How MESA Measures the Cycle

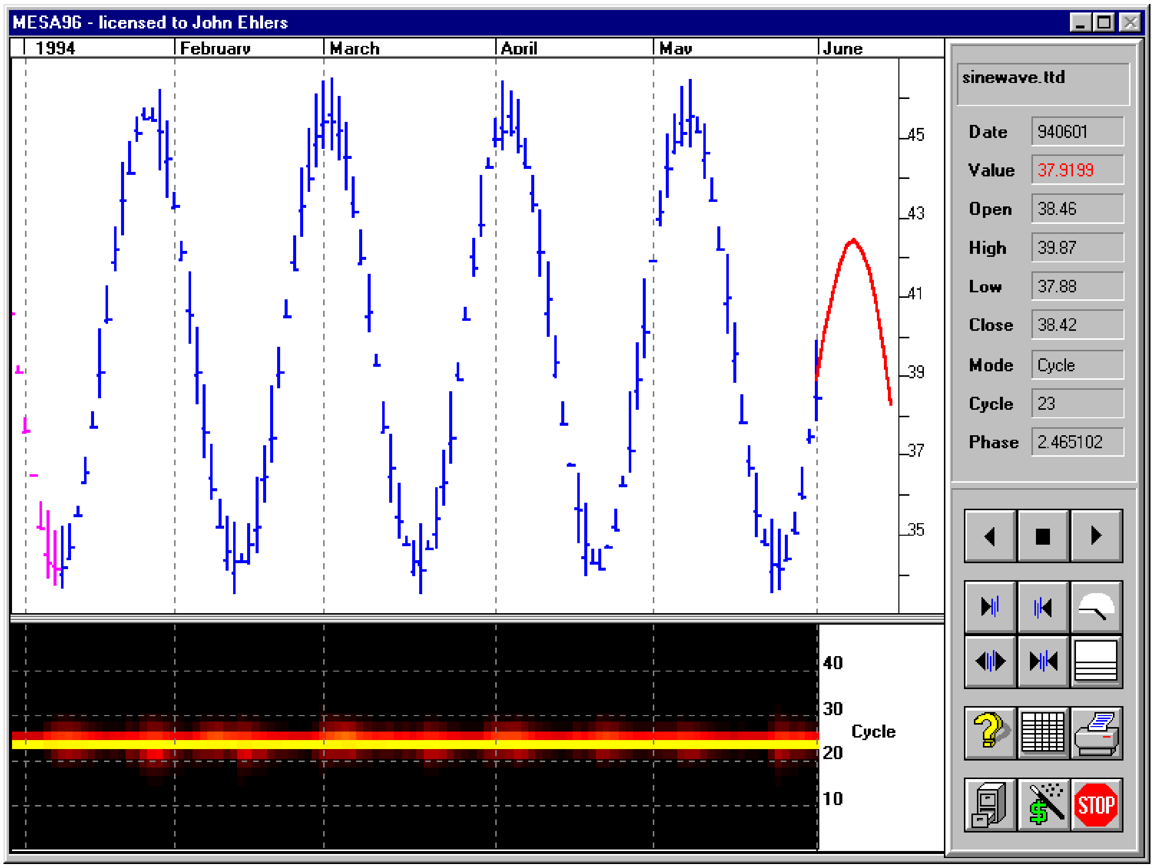

Figure 5. MESA Measurement of a Theoretical 24 Bar Cycle

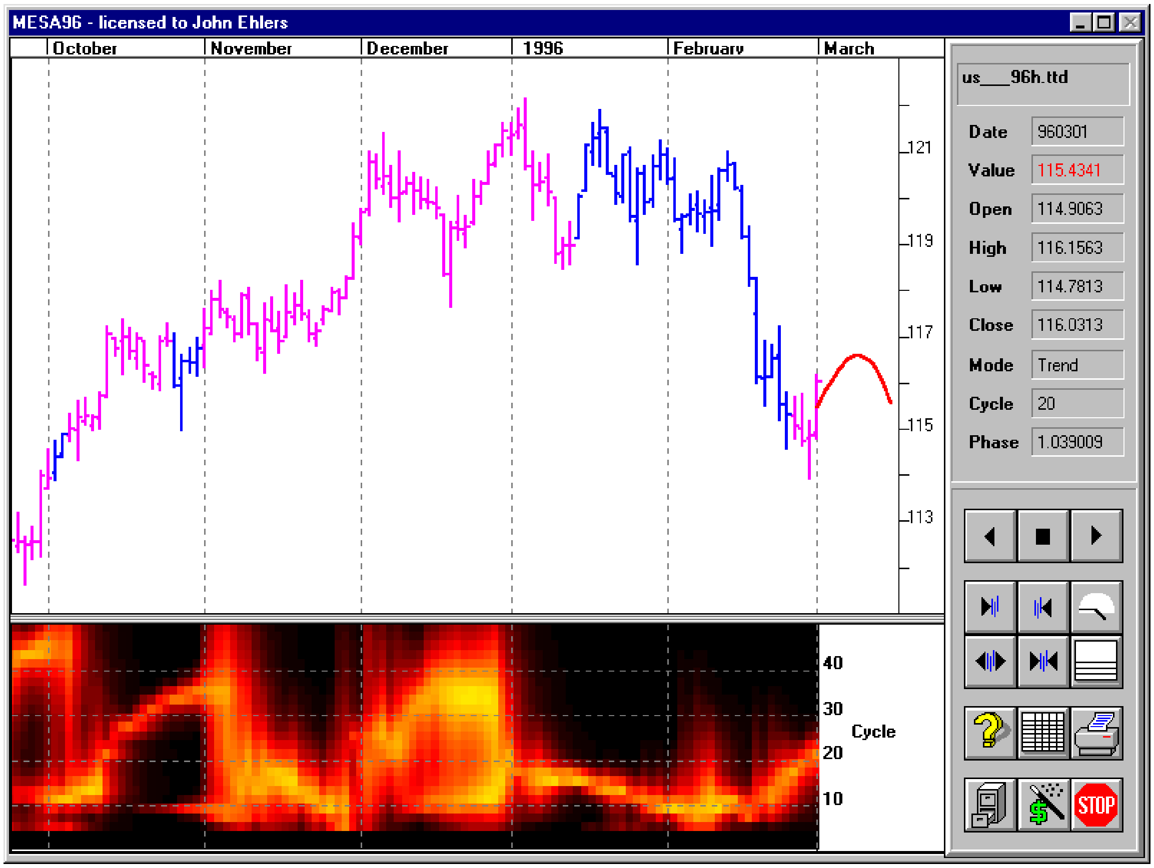

Figure 6. MESA Cycle Measurement of March 96 Treasury Bonds

IMPORTANCE OF PHASE

To use phase, we must first understand what it is. It, quite simply, is a description of where we are in the cycle. Are we at the beginning, middle, or end of the cycle? Phase is a quantitative description of that location. Each cycle passes through 360 degrees to complete the cycle. One basic definition of a cycle is that it consists of an action having a uniform rate-change of phase. For example, a 10 day cycle passes through 360 degrees every 10 days. For a perfect cycle it must change phase at the rate of 36 degrees per day each day throughout the cycle.

How does this help us see a Trend Mode? Easy. By reverse logic. In a Trend Mode there is no cycle, or at least a very weak one. Therefore there is no rate change of phase. So, if we compare the rate change of measured phase to the theoretical rate change of phase of the weak dominant cycle present in the Trend Mode, we get a correlation failure. This failure to correlate the two cases of the rate change of phase enables us to define the presence of a trend. Knowing we have a trend, it is easy to set our strategy to a simple buy-and-hold until the trend disappears.

One easy way to picture a cycle is as an indicator arrow bolted to a rotating shaft as shown in the phasor diagram of Figure 7. Each time the arrowhead sweeps through one complete rotation a cycle is completed. The phase increases uniformly throughout the cycle as shown in Figure 8. The phase continues on for the next cycle, but is usually drawn as being reset to zero to start the next cycle. If we additionally place a pen on the arrowhead and draw a sheet of paper below the arrowhead at a uniform rate, like they do for seismographs, the pen draws a theoretical sinewave. The relationship between the phasor diagram and the theoretical sinewave is shown in Figure 9. The sinewave is the typical cycle waveform we recognize in the time domain on our charts. The phase angle of the arrow uniquely describes where we are in the time domain waveform

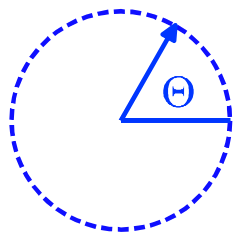

Figure 7. Phase Shows the Position within the Cycle

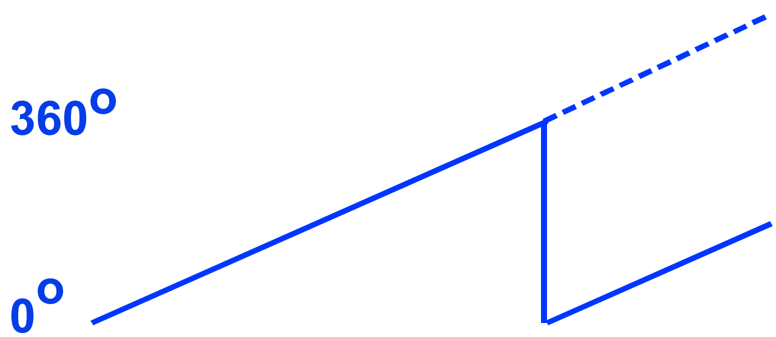

Figure 8. Phase Varies Uniformly over the Entire Cycle

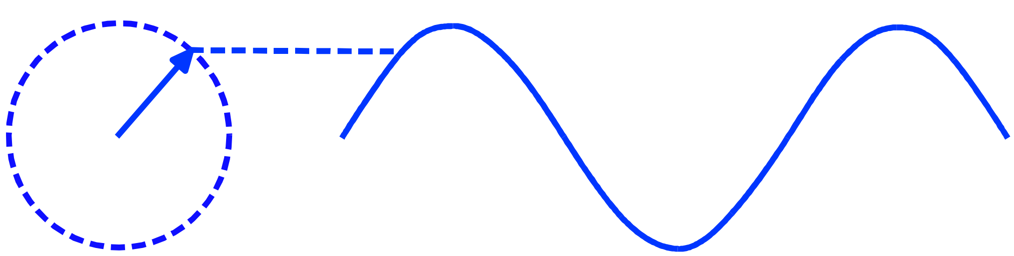

Figure 9. The Relationship Between the Phasor and the Time Domain Waveform

The position of the tip of the arrow in Figure 7 can be described in terms of the length of the arrow, L, and the phase angle, q. If we let the arrow be the hypotenuse of a right triangle we can convert the description of the arrow from length and angle to two orthogonal components - the other two legs of the right triangle. The vertical component is $L*Sin(\theta)$ and the horizontal component is $L*Cos(\theta)$. The ratio of these two components is the tangent of the phase angle. So, if we know the two components, all we have to do to find the phase angle is to take the arctangent of their ratio. This is something that may be tough for you, but it's a piece of cake for your computer.

We measure the phase of the dominant cycle by establishing the average lengths of the two orthogonal components. This is done by correlating the data over one fully cycle period against the sine and cosine functions. Once the two orthogonal components are measured, the phase angle is established by taking the tangent of their ratio. A simple test is to assume the price function is a perfect sinewave, or $Sin(\theta)$. The vertical component would be $Sin^2(\theta) = .5*(1-Cos(2\theta))$ taken over the full cycle. The $Cos(2\theta)$ term averages to zero, with the result that the correlation has an amplitude of Pi. The horizontal component is $Sin(\theta)*Cos(\theta) = .5*Sin(2\theta)$. This term averages to zero over the full cycle, with the result that there is no horizontal component. The ratio of the two components goes to infinity because we are dividing by zero, and the arctangent is therefore 90 degrees. This means the arrow is pointing straight up, right at the peak of the sinewave.

One additional step in our calculations is required to clear the ambiguity of the tangent function. In the first quadrant both the sine and cosine have positive polarity. In the second quadrant the sine is positive and the cosine is negative. In the third quadrant both are negative. Finally, in the fourth quadrant the sine is negative and the cosine is positive. The phase angle is obtained regardless of the amplitude of the cycle.

An interesting observation is that if the price is a linear slope, summing the product of the price and a sine over a cycle is the discrete equivalent of the integral $\int x \; Sin(x) \; dx$. Correspondingly, the real part is the equivalent of the integral $\int x \; Cos(x) \; dx$. Working through these theoretical examples, we find that the phase is 180 degrees for a trending upslope and is zero degrees for a trending downslope. Thus, phase can possibly be an additional way to determine the direction of the trend.

SINEWAVE INDICATOR

We can make an outstanding cyclic indicator simply by plotting the Sine of the measured phase angle. When we are in a Cycle Mode this indicator looks very much like a sinewave. When we are in a Trend Mode the Sine of the measured phase angle tends to wander around slowly because there is only an incidental rate change of phase. A clear, unequivocal indicator can be generated by plotting the Sine of the measured phase angle advanced by 45 degrees. This case is depicted for the phasor diagram and the time domain in Figure 10. The two lines cross SHORTLY BEFORE the peaks and valleys of the cyclic turning points, enabling you to make your trading decision in time to profit from the entire amplitude swing of the cycle. A significant additional advantage is that the two indicator lines don't cross except at cyclic turning points, avoiding the false whipsaw signals of most "oscillators" when the market is in a Trend Mode. The two lines don't cross because the phase rate of change is nearly zero in a trend mode. Since the phase is not changing, the two lines separated by 45 degrees in phase never get the opportunity to cross.

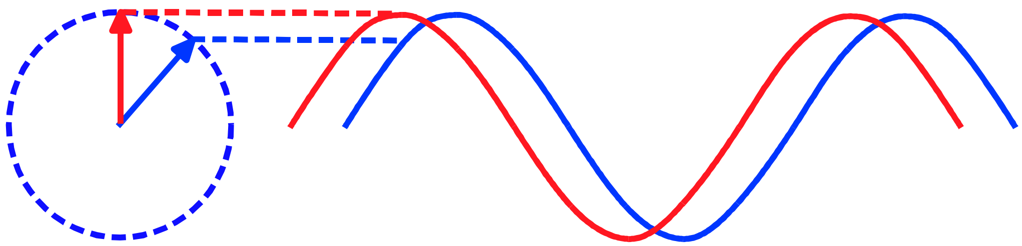

Figure 10. Generation of the Sinewave Indicator

If the rate of change of the measured phase does not correlate with the theoretical phase rate-change of the dominant cycle, then a Trend must be in force. A workable definition is a Trend exists when the measured phase rate of change is less than 67% of the theoretical phase rate of the dominant cycle. This is a very sensitive detector for the Trend Mode, enabling you to capture high percentages of the Trend movement.

USING MOVING AVERAGES WITH CYCLES

All moving averages smooth the input data and all moving averages suffer lag. The more smoothing you perform the more lag you incur. Those are the facts of life. Within these parameters, some moving averages have unique characteristics. For example, a weighted moving average tends to have a delay response similar to a Bessel Filter. That is, a large range of cycle lengths all have the same delay. This minimizes distortion of the filtered output. The amount of lag a moving average causes is calculated as the "center of gravity" (cg) of its weighting function. Since the weighting function of a conventional weighted moving average is a triangle, the induced lag is just one third of the window length.

Simple Averages are of more interest for use with cycles because they can be used to completely eliminate the dominant cycle component. The transfer response of a simple average is Sin(X) / X, which is the Fourier Transform of its rectangular weighting function. X is π times the frequency being filtered relative to the cycle length that just fits in the average window. Consider an average length that is exactly one cycle long. Within this averaging window there are exactly as many sample points above the center as below it. The result is that the average is zero, and the cycle within this window is completely eliminated by the averaging. We can make the simple average length just the length of the dominant cycle on any given day. This eliminates the dominant cycle at the output of the filter. If we repeat this every day, and connect the filter output values together, we have an adaptive moving average where the dominant cycle is completely eliminated. This adaptive moving average then becomes an instantaneous trendline because we asserted our model of the market could only have a Cycle Mode and a Trend Mode. Since the cyclic components are eliminated, the residual must be the instantaneous trendline. Creating an instantaneous trendline is a significant result of our cyclic analysis.

If we use a Zero Lag Kalman Filter, this filter line will cross the Instantaneous Trendline every half cycle when the market is in a Cycle Mode. If the Zero Lag Kalman filter fails to cross the Instantaneous Trendline within the last half cycle period, then this is another way of declaring a Trend Mode is in force. The Trend Mode ends when the Zero Lag Kalman Filter line again crosses the Instantaneous Trendline.

By examining the peak to peak swing of the Zero Lag Kalman Filter, we can make an estimate of the peak swing of the dominant cycle. In general, if the peak to peak swing of the Zero Lag Kalman Filter is greater than twice the average range of the price bars, then we have sufficient cycle amplitude to trade the short term cycle in the Cycle Mode. If the peak swing of the cycle is less than twice the average bar height, then getting a good entry and exit for the trade becomes a crapshoot. It is best to stand aside if the market is in a Cycle Mode and the cycle amplitude is low.

TRADING STRATEGIES AND TACTICS

Figure 11 is the ***MESA2000*** screen for a theoretical 24 bar cycle. There are four display segments on the screen. These are:

1. The price bars, with the overlay of the instantaneous trendline and the Zero Lag Kalman Filter. This segment also contains the price prediction 10 bars into the future. The price bars change color according to the measured Mode of the market.
2. The Sinewave Indicator, consisting of the Sine of the measured phase and the LeadSine where the phase is advanced by 45 degrees.
3. The phase measurement, where phase varies between 0 and 360 degrees.
4. The Dominant Cycle and colorized spectral contour.

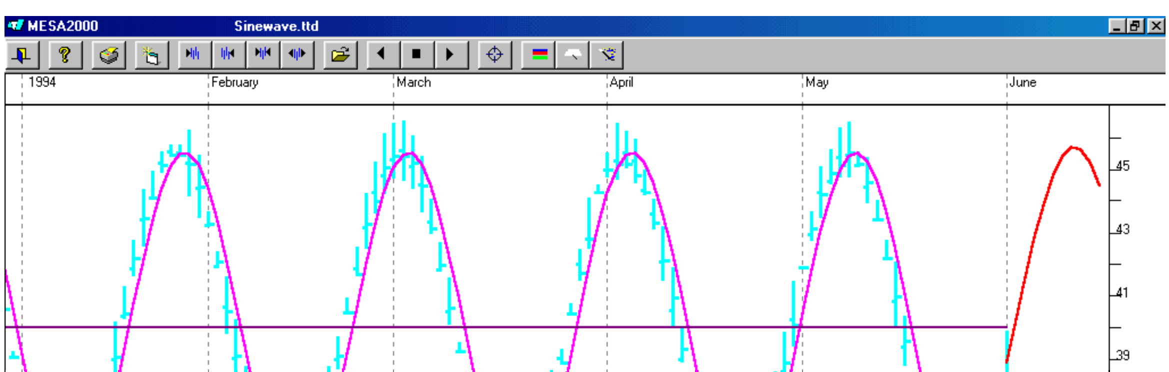

Figure 11. MESA2000 Display of a Theoretical 24 Bar Cycle

Since the data is a theoretical 24 bar cycle, the high resolution spectral contour in the bottom segment is essentially a straight line centered at the correct 24 bar cycle length. Similarly, the phase increases uniformly across the perfect cycles, snapping back to zero degrees to begin a new cycle when reaching 360 degrees at the end of a cycle. These two displays are uninteresting for the theoretical waveform other than to confirm the correct measurement of the data cycle.

The Sinewave Indicator segment has the darker line as the Sine of the measured phase, and is exactly in phase with the cycle in the price data. The LeadSine curve crosses the Sine curve with just enough advance notice to enable an entry or exit at the exact peak and exact valley of the price data.

The price bar segment shows the theoretical 24 bar cycle bars, having a swing of ±5, centered at 40. This chart has data in the Cycle mode because the phase is changing uniformly, and therefore the bars are colored bright cyan to show the cycle mode. The instantaneous trendline is a straight line at the 40 level since this theoretical waveform has no trend.

We can make some observations about the indicators. Since we are in a Cycle Mode, the Sinewave indicator gives far and away the best signals. The half dominant cycle adaptive moving average crossing the instantaneous trendline gives exactly the wrong signals in this Cycle Mode condition. However, the half dominant cycle adaptive moving average indicates the cycle amplitude is sufficient to trade in the Cycle Mode.

The red line to the right of the barchart is the 10 bar prediction. That prediction is not too shabby for this theoretical waveform.

COMBINING CYCLE-BASED INDICATORS

We will describe all the ***MESA2000*** indicators with the real-world example of the September 98 S&P Futures contract shown in Figure 12. As an overview, we see that the S&P was in a Trend Mode in March and half of April, in a Cycle mode for the other half of April and half of May, and then reverted to a Trend Mode for half of May and June. There was a short Cycle Mode period in June, and the market returned to a Trend Mode in July. Here's how we can make this assessment: In March and the early part of April the dominant cycle length was changing (the data was not stationary) and the spectrum is decidedly nonfocussed. In addition, the phase plot shows the phase is consistently near 180 degrees during this period. From the phase plot we know the market is in an uptrend, even without looking at the prices.

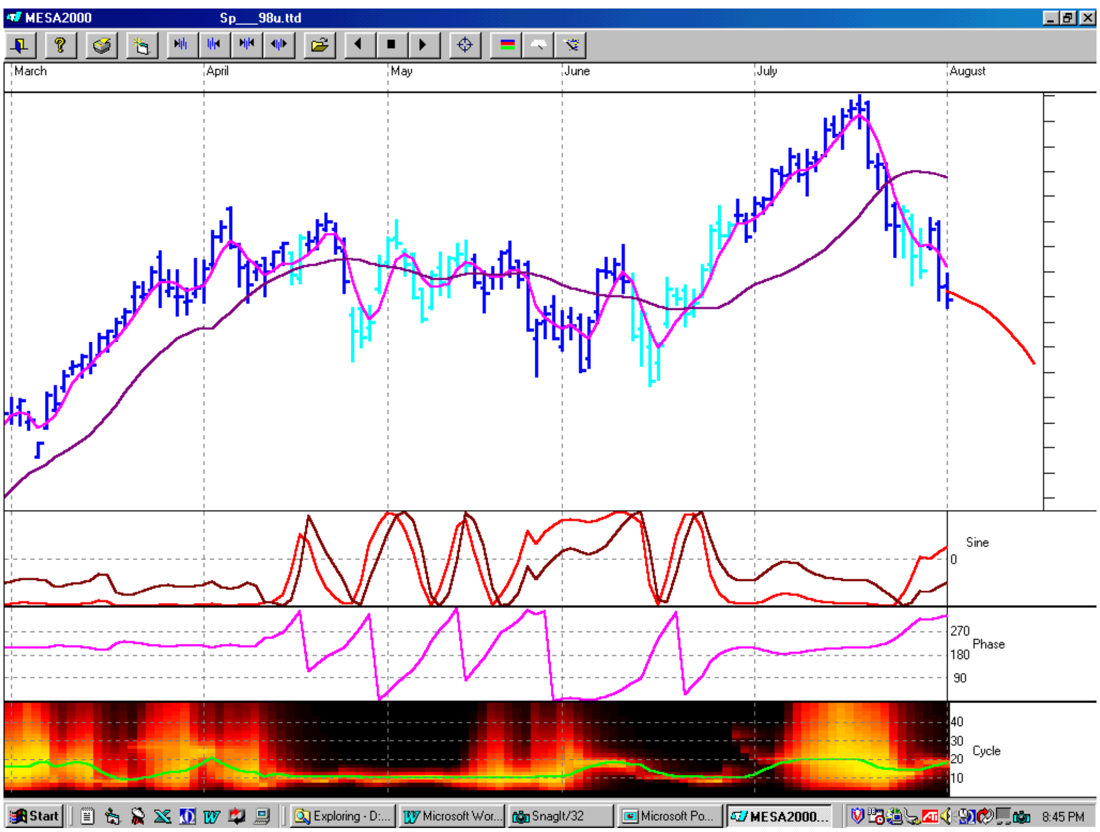

Figure 12. MESA2000 Display of S&P September 98 Futures

Turning our attention to the price bar display segment, the bars are colored blue, signifying a Trend Mode. The Zero Lag Kalman Filter is above the instantaneous trendline. For all these reasons we would hold a long position through March and well into April. At mid-April we get a quick long and short signal from the Sinewave Indicator. We should not take these signals because the cycle amplitude in the previous half dominant cycle period (as determined by the excursion of the half dominant cycle moving average from the instantaneous trendline) is small. Therefore, when the market changes to the Cycle Mode we should stand aside.

The next Sinewave Indicator signal comes four bars before the end of April. We should take this long entry because the cyclic swing in the prior half cycle has been substantial. Similarly, we should take the next short and long positions as given by the Sinewave Indicator (and the market being in the Cycle Mode). However, the short signal at mid May, and the remaining Sinewave Indicator signals in May should not be taken because the cycle amplitude simply is insufficient to make a good trade. During the last half of May the best strategy would have been to stand aside.

When the market switches back to the Trend Mode at the end of May, there would be a temptation to go short because of the relationship of the Zero Lag Kalman Filter relative to the instantaneous trendline. Let’s suppose we took that short position. Then there is a big cyclic swing to the upside by the 7th bar in the month. Although a Trend Mode is indicated by the automatic analysis of MESA2000, the best course of action would be to hold the short on the basis of the Sinewave Indicator crossing to the downside. Even though the spectrum is not focused, the Sinewave signal should be considered because of the swing in prices. By midmonth the Sinewave Indicator gives an excellent long entry signal as the Cycle Mode is identified.

A Cycle Mode short is signaled by the Sinewave Indicator for an entry 6 bars before the end of June. This turns out to be a bad trade because the cyclic turning point did not develop. Rather, the rate of phase slowed and the Trend Mode is indicated several bars before the end of June. As this point, the best strategy would be to reverse to a long position and follow the Trend Mode signals for the remainder of the chart. During July the phase stayed near 180 degree, indicating an uptrend. Near the end of the month the phase was transitioning to be near 360 (or zero) degrees, show a trend reversal to the downside.

This examination of the S&P Futures contract was given to illustrate how all the philosophy, cycle-based indicators, and strategies and tactics all play together. Even the logic to break the rules generated by the automatic analysis was given. We hope the perspective on trading given in this tutorial has been educational and inspirational for you. Now, go get ‘em. Good Trading!