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TECHNICAL ANALYSIS

Handbook

There are two principles of analysis used to forecast price movements in the financial markets -- *fundamental analysis* and *technical analysis*. Fundamental analysis, depending on the market being analyzed, can deal with economic factors that focus mainly on supply and demand (commodities) or valuing a company based upon its financial strength (equities). Fundamental analysis helps to determine **what** to buy or sell. Technical analysis is solely the study of market, or price action through the use of graphs and charts. Technical analysis helps to determine **when** to buy and sell.

Technical analysis has been used for thousands of years and can be applied to any market, an advantage over fundamental analysis. Most advocates of technical analysis, also called *technicians,* believe it is very likely for an investor to overlook some piece of fundamental information that could substantially affect the market. This fact, the technician believes, discourages the sole use of fundamental analysis. Technicians believe that the study of market action will tell all; that each and every fundamental aspect will be revealed through market action. Market action includes three principal sources of information available to the technician -- *price*, *volume*, and *open interest.* Technical analysis is based upon three main premises; 1) Market action discounts everything; 2) Prices move in trends; and 3) History repeats itself.

This manual was designed to help introduce the technical indicators that are available on *The Bloomberg Professional Service.* Each technical indicator is presented using the suggested settings developed by the creator, but can be altered to reflect the users' preference. For example the Relative Strength Index or RSI defaults to a 14-day look-back period, as the creator Welles Wilder used, but a 9-day RSI is considered by many to be the most useful when analyzing stocks. To change the default values permanently, type TDEF<Go>. This will provide you with the ability to change the settings for most of your charts on Bloomberg.

Only through proper trial and error will the advantages of technical analysis be seen. Saying that, technical analysis has been proven to be an effective tool for investors and is constantly becoming more accepted by market participants. When used in conjunction with fundamental analysis, technical analysis can offer a more complete valuation, which can make the difference in executing profitable trades.

For more detailed literature on technical analysis, two recommended textbooks are: *Technical Analysis of the Financial Markets*, John J. Murphy and *Technical Analysis Explained*, Martin J. Pring, 3rd Edition.

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TECHNICAL ANALYSIS APPLICATIONS

[Ticker] [Yellow Key] [Function] <Go>
Ex. INTC<Equity>GPO<Go>
USA<Cmdty>DMI<Go>

	Historical	*Intraday*
◩ Bar Charts	GPO	IGPO
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◩ On-Balance Volume	OBV	
◩ Parabolic Systems	PTPS	IPTS
◩ Pivot Technique	PIVG	PIV
◩ Point & Figure Chart	PFP	GIPF
◩ Rate of Change	ROC	IROC
◩ Relative Strength Index	RSI	IRSI
◩ Stochastics	TAS	ITAS
◩ Trading Envelopes	TE	ITE
◩ Williams %R	WLPR	
◩ Graph Worksheets	G	G

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BAR CHARTS

Ticker Symbol <Sector Key>GPO or IGPO<Go>

BENEFIT: Provides a price chart using the open, high, low and close information for the selected market along with the ability to include moving averages, volume, value traded and open interest. Shown in bar formation.

INTERPRETATION: Each vertical bar represents one period of price activity from the chosen periodicity. Values can be based upon, daily, weekly, monthly, quarterly or yearly data for historical charts and minute intervals for intraday charts. On a daily chart, the vertical bar represents one day's trading range whereby the top of the bar represents the market's high price of the day and the bottom of the bar represents the low. The left hash mark on the vertical bar indicates the opening price and the right hash mark on the bar indicates the closing price.

By including open, high, low and close information, bar charts allow for more detailed analysis than standard line charts. The chart also provides the option of displaying volume, value traded, and open interest if applicable. These options are listed on the top left-hand corner of the chart. Moving averages can also be displayed on the chart for prices, volume, value traded, and open interest. Enter the values immediately above the chart or save them in the technical defaults section, TDEF<Go>.

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CANDLE CHARTS

Ticker Symbol <Sector Key>GPC or IGPC<Go>

BENEFIT: Provides a price chart using the open, high, low and close information for the selected market along with the ability to include moving averages, volume, value traded and open interest. Shown in candle formation.

INTERPRETATION: Each candlestick represents one period of price activity from the chosen periodicity. Values can be based upon, daily, weekly, monthly, quarterly or yearly data for historical charts and minute intervals for intraday charts. For a daily chart, the candlestick represents one day's trading range and is displayed as *open* or *closed*. An *open candlestick* is represents a higher close than open and is shown without color. A *closed candlestick* represents a lower close than open and is shown colored, usually blue. Each candlestick drawn consists of two components: the *real body* and the *shadows.* The *real body* is the thick part of the candlestick that represents the open and the close. The thin lines above and below the real body are the *shadows*. These shadows represent the session's price extremes. The shadow above the real body is called the *upper shadow*, which measures the high of the session. The shadow below the real body is called the *lower shadow* that measures the low of the session. (See CNDL<Go> for more on candlestick analysis) By including open, high, low and close information, candle charts allow for more detailed analysis than standard line charts. The chart also provides the option of displaying volume, value traded, and open interest if applicable. These options are listed on the top left-hand corner of the chart. Moving averages can also be displayed on the chart for prices, volume, value traded, and open interest. Enter the values immediately above the chart or save them in the technical defaults section, TDEF<Go>.

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BOLLINGER BANDS
Ticker symbol<Sector Key>BOLL or IBOL<Go>

BENEFIT: Gauges trading activity through the use of trading bands. The bands that are drawn are used to identify support and resistance levels which can assist in trading decisions.

INTERPRETATION: Created by John Bollinger, Bollinger Bands are a modification of trading bands, or Moving Average Envelopes (MAE). Traditionally, trading bands were drawn at fixed percentage intervals around a moving average. Bollinger Bands, however, are plotted (*X*) standard deviations around a moving average. Since standard deviation is a measure of volatility, the bands are self-adjusting; they widen when volatility increases and contract when volatility decreases. As with envelopes, the basic interpretation of Bollinger Bands is that prices tend to stay within the upper and lower bands. According to John Bollinger: 1) Sharp price changes tend to occur after the bands tighten, as volatility lessens. 2) When prices move outside the bands, a continuation of the current trend is implied. 3) Bottoms and tops made outside the bands followed by bottoms and tops made inside the bands call for reversals in the trend. A move that originates at one band tends to go all the way to the other band. This observation is useful when projecting price targets. Bollinger Bands are typically drawn two standard deviations from a 20-day simple moving average for intermediate-term analysis, 10 days for short term with 1.5 standard deviations, and 50 for long-term studies with 2.5 standard deviations. The *Bandwidth* is presented just below the price chart. The band width formula is: (top band value - bottom band value) / (*n*) day arithmetic moving average x 100). This is a representation of the volatility in the security.

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BOLLINGER BANDS CONT'D

As the Band Width rises, volatility is increasing. As the Band Width tightens, volatility in the security's price is declining.
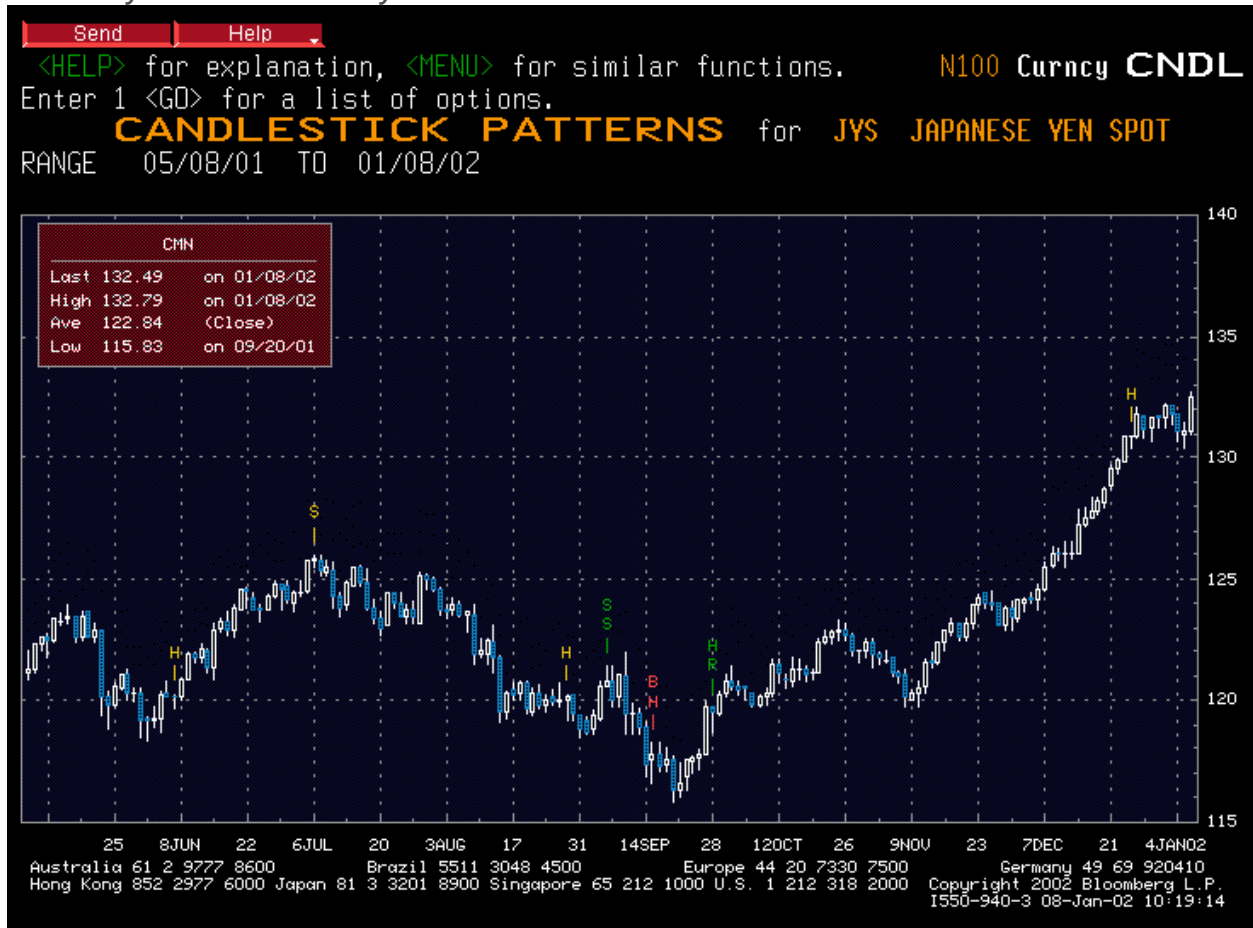
The *%b* section of the graph helps to identify when securities reach near-term support and resistance. The %b formula is: (the security's closing price - bottom band value) - (top band value - bottom band value).

WHEN ACTION MAY BE SUGGESTED: Like most technical indicators, Bollinger Bands have several methods of interpretation given current market conditions. In trading ranges, the location of price bars determines the strength of the current phase. Prices within the upper band signify strength while price within the lower band signals weakness. Direction of price within the band also identifies convergence and divergence with the current trend -- rising price within the lower band and falling price within the upper band signal divergence while rising within the upper band and falling within the lower band signal convergence. The lower, middle and upper bands represent support/resistance when positioned horizontally. Reversal off any band implies that price will return to the last band crossed or touched.

Price breakouts and directional momentum are signaled when price penetrates through the middle band; crossing from below center to above indicates an uptrend increase in strength while crossing from above center to below indicates a downtrend increase in weakness. If the direction of the upper band rises in response to approaching price, one can expect a series of upward prices, each riding higher along the top band. This is an uptrend in progress and is termed "climbing the ladder". Conversely, if the angle of the lower band falls in response to approaching price, once can expect a series of downward prices, each pushing lower along the bottom band. This is a downtrend in progress and is termed "the slippery slope".

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CANDLESTICK PATTERNS

Ticker Symbol <Sector Key>CNDL<Go>

BENEFIT: Candlestick charting uses open, high, low, and closing prices to provide additional insight into the market supply and demand balances. CNDL identifies many common candlestick patterns that can aid in trading decisions.

INTERPRETATION: Although Candlestick charts have been steadily gaining acceptance here in the United States, their history of use dates back centuries in the Far East, most notably Japan. On the surface, a Candlestick chart is constructed using the same trading data as a bar chart -- they both provide the open, high, low, and closing prices for the selected security. Each candlestick drawn consists of two components: the *real body* and the *shadows.*

The *real body* is the thick part of the candlestick between the open and the close. If the security closed higher than the open, it will have a white, or "open" body. If the security closed lower than it opened, it will have a blue, or "closed" body. If the security opens and closes at the same price, the candle will not have a real body -- this is called a *Doji*. The thin lines above and below the real body are the *shadows*. These shadows represent the session's price extremes. The shadow above the real body is called the *upper shadow*, which measures the high of the session. The shadow below the real body is called the *lower shadow* that measures the low of the session. The Japanese consider the real body the essential price movement; the shadows are usually looked upon as irrelevant price fluctuations.

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CANDLESTICK PATTERNS CONT'D

WHEN ACTION MAY BE SUGGESTED: Candlestick patterns are combinations of candlestick figures, from a single candle to as many as five candle figures. Although these patterns can be viewed to confirm bullish and bearish trends, most candle patterns signal trend reversals. In either case, it must be understood that these patterns do not exist in a vacuum. Rather, pattern development can only be properly appreciated when the short-term trend immediately preceding the pattern is known. This is crucial to the proper use of Candlestick analysis. Some of the candlestick patterns to look for which signal trend changes include "morning star", "evening star", "hammer", and "hanging man". For definitions of the different types of candlestick patterns, refer to the <Help> screen for CNDL.
Some special candlesticks to look for:

LONG DAY: A candlestick that has a long day is one in which there has been a big difference in opening and closing price compared with typical trading days in the previous five to ten days.

SHORT DAY: A candlestick that has a short day is one in which there has been a small difference in opening and closing price compared with typical trading days in the previous five to ten days.

MARUBOZU: A marubozu candlestick is one that exhibits no (or very little) upper or lower shadow. For a white candlestick this means that its open is equal to its low, and its close is equal to its high. For a black candlestick it means that its open is equal to its high, and its close is equal to its low.

SPINNING TOP: A spinning top is candlestick with a small real body and long upper and lower shadows.

DOJI: A doji is the most extreme case of a spinning top. It occurs when the real body exists as a line (when the day's open and close are the same). A long legged doji has long upper and lower shadows. A gravestone doji has a long upper shadow and no lower shadow. A dragonfly doji has no upper shadow and a long lower shadow. And a four-price doji has no upper or lower shadows (the open, high, low, and close are the same).

STAR: A star is a small real body that gaps above or below a long candlestick occurring the previous day.

UMBRELLA and INVERTED UMBRELLA: An umbrella is similar to a dragonfly doji: a small real body with no upper shadow and a long lower shadow. An inverted umbrella is similar to a gravestone doji: a small real body with a long upper shadow and no lower shadow.

Some suggested references for more detailed information on Candlestick analysis are *Japanese Candlestick Charting Techniques: A Contemporary Guide to the Ancient Investment Techniques of the Far East;* and *Beyond Candlesticks: More Japanese Charting Techniques Revealed (Wiley Finance Editions)* both by Steve Nison.

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CHAIKIN OSCILLATOR
Ticker Symbol <Sector Key>CHKO<Go>

BENEFIT: Shows if volume is "flowing into or out of a security." The Chaikin Oscillator can also signal divergences to help time optimal entry and exit points.

INTERPRETATION: The Chaikin Oscillator, developed by Marc Chaikin, is based on the assumption that volume and price normally rise and fall together. When this relationship changes, a possible change in the price trend may result.
The Chaikin Oscillator is calculated as follows:

Chaikin Oscillator = (3 day simple moving average of the ADL) - (10 day simple moving average of the ADL)
ADL = [(close - low) - (high - close)] * Volume) *Where ADL = Accumulation/Distribution line* (high - low)

WHEN ACTION MAY BE SUGGESTED: There are two ways in which the Chaikin Oscillator is used. The most important signal to note is divergence between price on the oscillator: when prices reach a new high or low in a trend and the oscillator *fails to exceed* its previous extreme reading and then reverses direction.
A second way to use the oscillator is to note changes in direction. BUY signals are given when the price of the security is above its 14-day moving average, the Oscillator turns upwards and the value of the Oscillator is negative. SELL signals are given when the price of the security is below its 14-day moving average, the Oscillator turns downwards and the value of the Oscillator is positive.

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COMMODITY CHANNEL INDEX
Ticker Symbol <Sector Key>CMCI or ICCI<Go>

BENEFIT: Identifies overbought/oversold conditions as well as possible divergences that can assist in identifying entry and exit points.

INTERPRETATION: The Commodity Channel Index (CCI), developed by Donald Lambert, measures the variation of a security's price from its statistical mean. High values show that prices are unusually high compared to average prices, whereas low values indicate that prices are unusually low. The CCI is a timing system that is best applied to securities that have cyclical or seasonal tendencies. CCI does not determine the length of cycles -- it is designed to detect when such cycles begin and end through the use of statistical analysis which incorporates a moving average and a divisor reflecting both the possible and actual trading ranges.

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COMMODITY CHANNEL INDEX CONT'D

WHEN ACTION MAY BE SUGGESTED: Like many other oscillators, there are two basic methods of interpreting the Commodity Channel Index: identifying overbought/oversold areas and price/oscillator divergent signals. The CCI typically oscillates between $\pm$ 100. To use the CCI as an overbought/oversold indicator, readings above +100 imply an *overbought* condition, while readings below -100 imply an *oversold* condition. Signals are given when the oscillator enters either the overbought or oversold area and turns in the opposite direction.

A *divergence* occurs when the price of a security is making new highs/lows while the CCI is failing to surpass its previous highs/lows. This divergence such as this under certain market conditions may indicate a forthcoming change in trend.

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DIRECTIONAL MOVEMENT INDICATOR
Ticker Symbol <Sector Key>DMI or IDMI<Go>

BENEFIT: Assists in determining if a market is trending and attempts to measure the strength of the trend. Because markets are said to trend only about 30 percent of the time while moving sideways about 70 percent of the time, this indicator is used to capture the period when the market shows significant trending or directional behavior.

INTERPRETATION: The Directional Movement Indicator, developed by Welles Wilder, is based upon the assumption that, when the trend is up, today's price should be higher than yesterday's high price. Conversely, when the trend is down, today's low price should be lower than yesterday's low price.
DMI consists of four indicator lines, **+DI, -DI, ADX**, and **ADXR.**

+DI - the "positive" Directional Indicator (green line) represents the difference between today's high price and yesterday's high price. These values are then summed up from the past 14 periods and plotted.

-DI - the "negative" Directional Indicator (red line) represents the difference between today's low price and yesterday's low price. These values are then summed up from the past 14 periods and plotted.

The greater the difference between +DI and -DI, the more the security is trending.

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DIRECTIONAL MOVEMENT INDICATOR CONT'D

ADX - The Average Directional Movement Index is a 14 period moving average of the difference between the +DI and –DI indicators that measures the extent to which a security is trending. Simply put, the higher the ADX, the more trending the market. The ADX does not distinguish between a rising or falling trend; it measures the strength of trend -- regardless of direction. It is perfectly normal for the ADX to be rising sharply when the market's price is falling, because by rising it is indicating the increasing strength of the downtrend. An ADX is that is rising is more significant than one that is falling. Whereas a high ADX value indicates a trend market, a low ADX values indicates the absence of a trend or a sideways, range-trading market.

ADXR – The Average Directional Movement Index Rating is a simple average of today's ADX value and the ADX from 14 periods ago. As with the ADX, a high ADXR that is moving up signifies a strong trend in the market.

WHEN ACTION MAY BE SUGGESTED: The Directional Movement trading system is a crossover indicator that involves comparing +DI and -DI. Wilder suggests buying when the +DI rises above the -DI and selling when the +DI falls below the -DI. The value and direction of ADX is very important to note when using the crossover signals.

Extreme Point Rule
Wilder qualifies these simple trading rules with the "extreme point rule". The rule states that on the first day the +DI and -DI lines cross, the trade should not be entered. Instead, note the high or low for the day and this will be the "extreme point" which will be used as a trigger point to implement a trade. If on a subsequent day the security's price surpasses the extreme point, it is a signal to enter or exit a position. For example, if the +DI line crosses the -DI line, signaling a buy, take note of the security's high price for the day. If on the next day the security's price rises above the extreme point, the signal to take a long position is given. If the price fails to rise above the extreme point, then the long position should not be taken. This rule is designed to reduce the number of trades and keep you from being whipsawed out of a position.

Using ADX
An often-overlooked use of ADX is actually a very important one – when a turning point in a trend is signaled. It was previously noted that a rising ADX is a signal that the current trend is getting stronger. However, if the ADX rises **above** both +DI and –DI, then a turning point is indicated. This takes place when the current trend is beginning to weaken. The signal is given when the ADX turns down once it's above both +DI and –DI lines. When this down turn takes place, Wilder suggests closing out the current position. One could re-enter the position if the DI indicators cross again or if the ADX turns back up.
If the ADX falls **below** both +DI and –DI, then Wilder suggests it's not the time to use a trend-following strategy, which would point to the use of an oscillator since this would be evidence of a range-bound or sideways trading market.

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FIBONACCI RETRACEMENTS
Ticker Symbol <Sector Key>GPO, GPC, IGPO, or IGPC<Go>

BENEFIT: Plots percentage retracement lines based upon the mathematical relationship within the Fibonacci sequence. These retracement levels provide multiple support and resistance levels that can be used to target price objectives.

INTERPRETATION: Based upon the number sequence presented by the 13th century mathematician Leonardo Fibonacci, a set of percentage retracements have been developed that identify important support or resistance areas. These are 23.6%, 38.2%, 50%, 61.8%, 76.4%, and 100%. Applying these percentages to the difference between the high and low price for the period selected generates a set of price objectives with regard to each retracement level. The theory of percentage retracements states that after a period of market movement in one direction (up or down), prices will often retrace a significant portion of the previous trend before resuming the move in the original direction. These countertrend moves tend to fall into certain predictable parameters, which are often the Fibonacci Retracement levels.

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FIBONACCI RETRACEMENTS CONT'D

WHEN ACTION MAY BE SUGGESTED: Because the markets have proven to stop frequently at Fibonacci Retracement Levels, each of the retracement levels present themselves as possible reversal points. Traditionally 50% was used for retracements, but the 38.2 and 61.8 Fibonacci levels, which many equate to 33% (1/3rd) and 67% (2/3rds), are also seen very often in the markets. These levels can best be used in conjunction with other technical signals, such as selling a bounce in a strong downtrend that rallies up to a Fibonacci Retracement Level at the same time that the market becomes overbought and is also hitting up against a near-term downtrend line. In other words, although some traders make plays at Fibonacci Levels, having additional technical indicators that confirm your believed turn-around in the market makes it more likely to occur.

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GENERAL OVERVIEW CHART (Ichimoku)
Ticker Symbol <Sector Key>GOC<Go>

BENEFIT: Signals the trend and near-term support and resistance of a chosen market and is used to project future market trends.

INTERPRETATION: The General Overview Chart was developed by Goichi Hosoda and is commonly referred to as Ichimoku Charts. There are several critical pieces of information that are presented on the chart.

First, interaction of the Conversion line (pink) and the Base Line (yellow) provides clues about near-term changes in trend. (The Base Line itself also defines bullish or bearish market trends.) Second, the Lagging Span (Gray) offers perspective on the rate of change of price movement of the underlying stock. Finally, the Leading Span 1 Line (orange) and The Leading Span 2 Line (green) works together to give insights into near-term resistance or support of the price.

About the 5 lines that are displayed:

The Conversion Line - the average price level between the high and the low price for the past 9-day period. This is similar to a moving average, but daily prices are not used. The difference is that only high and low prices are used.

The Base Line - the average price level between the high and the low price for the past 26 days. This is designed to simplify the market strength.

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GENERAL OVERVIEW CHART (Ichimoku) CONT'D

The Lagging Span - displays the close from 26 days in the past. This line, as well as both Leading Spans, is unique to the method developed by Hosada.

The Leading Span 1 - The average price for that day's Conversion Line and the Base Line entered 26 days in advance. The graph extends 25 days into the future.

The Leading Span 2 - the average price of the high price and the low price for the past 52 days entered 26 days in advance.

WHEN ACTION MAY BE SUGGESTED: As previously mentioned, there are several instances when buy and sell signals are given. These are the most important ones to look for:

1) The area between the Leading Span 1 and 2 is known as the "resistance zone" or "cloud"; if the price is *above* the resistance zone, it indicates an opportunity to *buy*. If the price is *below*, it indicates a signal to *sell.*

2) When the Conversion Line crosses the Base Line from *below*, it indicates an opportunity to *buy.* When the Conversion Line crosses the Base Line from *above*, it indicates an opportunity to *sell.* The Conversion Line also provides a measurement for the running market strength and the potential for any further rise.

3) When the Lagging Span is *above* the market level, it indicates an opportunity to *buy.* When the Lagging Span is *below* the market level, it indicates an opportunity to *sell.*

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HURST EXPONENT (Chaos Theory)

Ticker Symbol <Sector Key>KAOS<Go>


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    Send          Help
AOL  US $  ↓  32.38    -.3   T 2s   N 32.37/32.39 N  20x25
At 12:49 Vol 16,539,700 Op 32.85 T Hi 32.9 T Lo 31.401 T ValTrd 532.978m
        HURST  EXPONENT  GRAPH   for   AOL      US
RANGE  5/ 8/01 TO  1/ 8/02 PERIOD D (D-W-M-Q-Y)  BUY 0.62  SELL 0.58 COST/SHR
MOVING AVG  10  40   BAR/CANDLE CHART B  LOOKBACK  25          USD  0.000
   Last 32.40   on 1 /8 /02    High 58.51  on 5 /22/01   Ave  40.78   (Close)   Low  27.40  on 9 /21/01    60
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Australia 61 2 9777 8600        Brazil 5511 3048 4500      Europe 44 20 7330 7500    Germany 49 69 920410
Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 212 1000 U.S. 1 212 318 2000 Copyright 2002 Bloomberg L.P.
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BENEFIT: Seeks to forecast the future path of prices, including sudden changes that occur during periods of intense market activity. The Hurst Exponent measures the degree to which a times series is partially predictable.
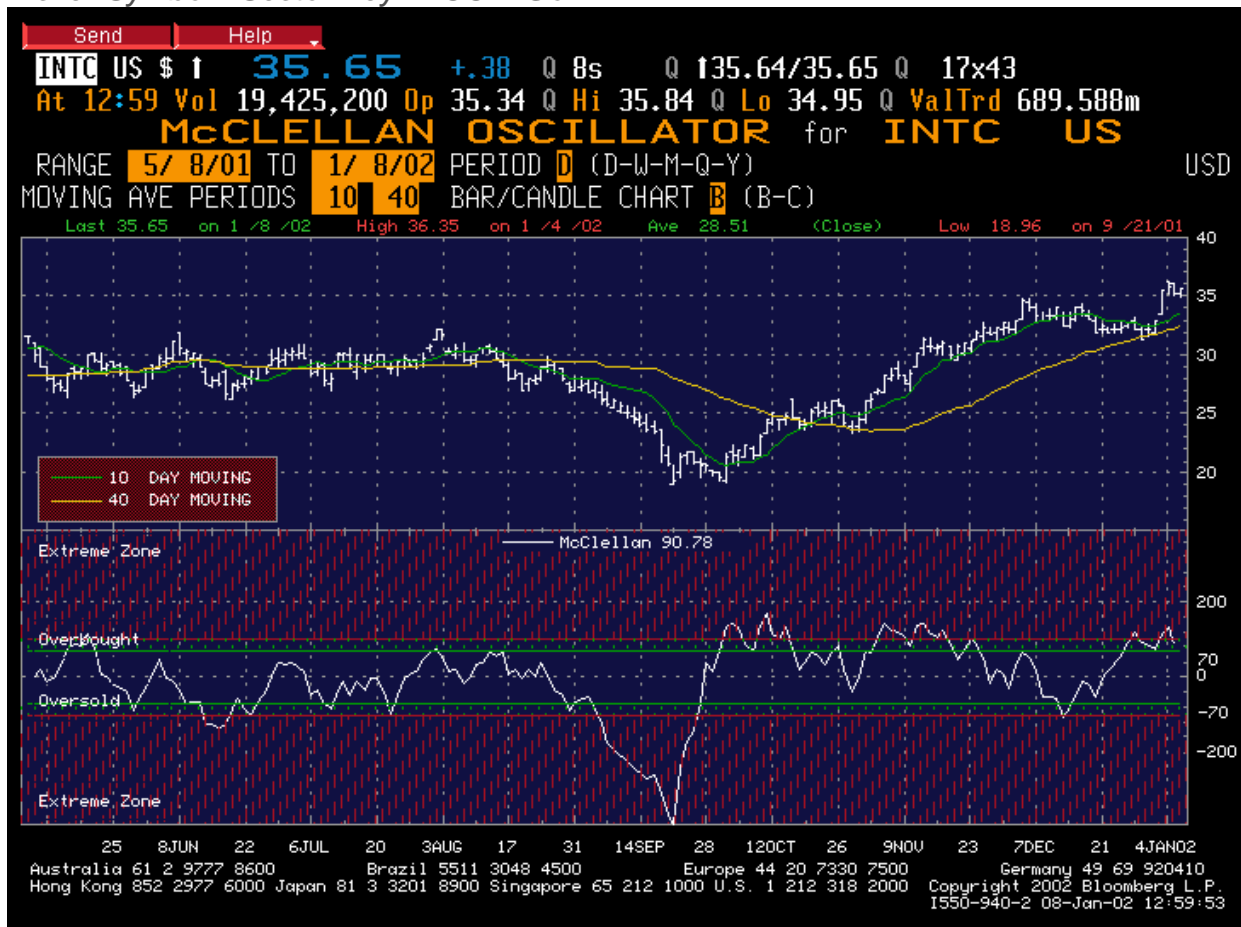
INTERPRETATION: Chaos theory itself has been around for many years, but the *Bloomberg* application of the Hurst Exponent is relatively new; it is based on the work done by Christopher May, which involves nonlinear pricing methodology. The portfolio theory of the 1970's assumes that price movement of any traded security is random 100% of the time, that is, it's unpredictable. KAOS shows the assumption of randomness is overly restrictive. In fact a time series, successive prices plotted over time, can be partially predicted. A time series can be persistent, random, or anti-persistent. A persistent time series has the tendency to continue doing what it has been doing, i.e., going up or going down. A random time series is totally unpredictable and an anti-persistent time series has a higher probability of reversing its current trend rather than continuing. Thanks to computers, applied math has shown that the assumption of randomness is incorrect. Prices persist or anti-persist more often than they are random as the KAOS graph indicates. On the middle portion of the graph the Hurst Exponent is plotted for each day. If the portfolio theory were correct, the Hurst Exponent would constantly have a value of 0.5, which identifies a random time series. As the graph shows, most of the time prices are either persistent or anti-persistent.

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HURST EXPONENT (Chaos Theory) CONT'D

WHEN ACTION MAY BE SUGGESTED: KAOS automatically generates buy & sell levels. When the Hurst Exponent reaches the buy level, a green "B" is plotted on the bottom profit and loss section. When a sell level is reached, a red "S" is plotted. The cumulative profit and loss based upon buying and selling at each signal.

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McCLELLAN OSCILLATOR
Ticker Symbol <Sector Key>MCCL<Go>

BENEFIT: Measures overbought and oversold levels based on market breadth that are used to determine market entry and exit points.

INTERPRETATION: The McClellan Oscillator is based on the smoothed difference between the number of advancing and declining issues of a particular stock market. For U.S. stocks, the NYSE advance/decline data is used. (Note: this results in the same chart being displayed for *any* U.S. stock) A "breadth" indicator measures the participation of the entire stock market in order to gauge the strength or weakness of it. This can then be applied to a particular stock in that market. For example, a healthy bull market is accompanied by a large number of stocks making moderate upward advances in price. A weakening bull market is characterized by a small number of stocks making large advances in price, giving the false appearance that everything is well. This type of divergence often signals an end to the bull market, which can also signal the same for particular stocks. A similar interpretation applies to market bottoms where the market index continues to decline while fewer stocks are declining.

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McCLELLAN OSCILLATOR CONT'D

WHEN ACTION MAY BE SUGGESTED: Similar to other momentum based oscillators, overbought and oversold signals are commonly used. Buy signals are generated when the oscillator falls into the oversold area of -70 to -100 and then turns up; sell signals are generated when the oscillator rises into the overbought area of +70 to +100 and turns down. If the oscillator goes beyond these areas, i.e., rises above +100 or falls below -100, it is a sign of an extremely overbought or oversold condition and these extreme readings usually point to the continuation of the current trend.

MONEY FLOWS

Ticker Symbol <Sector Key>GM or GIM<Go>for Non-Block Money Flows
Ticker Symbol <Sector Key>GM B or GIMB<Go>for Block Money Flows
Ticker Symbol <Sector Key>GM T<Go>for Total Money Flows

BENEFIT: Indicates if money is moving into or out of a stock or stock index, which can help to determine if it is under accumulation or distribution.

INTERPRETATION: Money Flows, developed by Lazlo Birinyi, is essentially a form of ticker tape reading. The analysis suggests that a stock's price rises because its shares are under accumulation, and its price declines because it shares are under distribution. However, there are instances when price and money flows do not move in tandem, which can lead to possible turning points in the market.

The actual method of calculation is as follows: the Money Flows value is set at zero each day. Upon the start of trading, each transaction is then compared to the previous one. An uptick from the previous transaction is considered accumulation or "positive" Money Flows.

MONEY FLOWS CONT'D

The total value of the uptick transaction (shares * price) is then added to the Money flows value. A downtick from the previous transaction is considered distribution or "negative" money flows. The total value of the downtick transaction (shares * price) is subtracted from the money flows value. Any transaction done at the same price as the previous one as no impact and is not included. Money Flows charts indicate the cumulative money that has flowed into or out of the security during the time period chosen. Price action is measured on the left-hand side of the scale and the cumulative money flow on the right-hand scale.

WHEN ACTION MAY BE SUGGESTED: The underlying premise of money flows is that price ultimately follows money. Birinyi does not categorize money flows as a technical indicator; rather he states that money flows are evidence of the accumulation or distribution of a stock based on some future fundamental event. When price and money flows do not move in sync, this is called a "divergence." Theory suggests that a divergence can last for only a short period of time before it is reconciled, hence providing a possible opportunity to buy or sell.
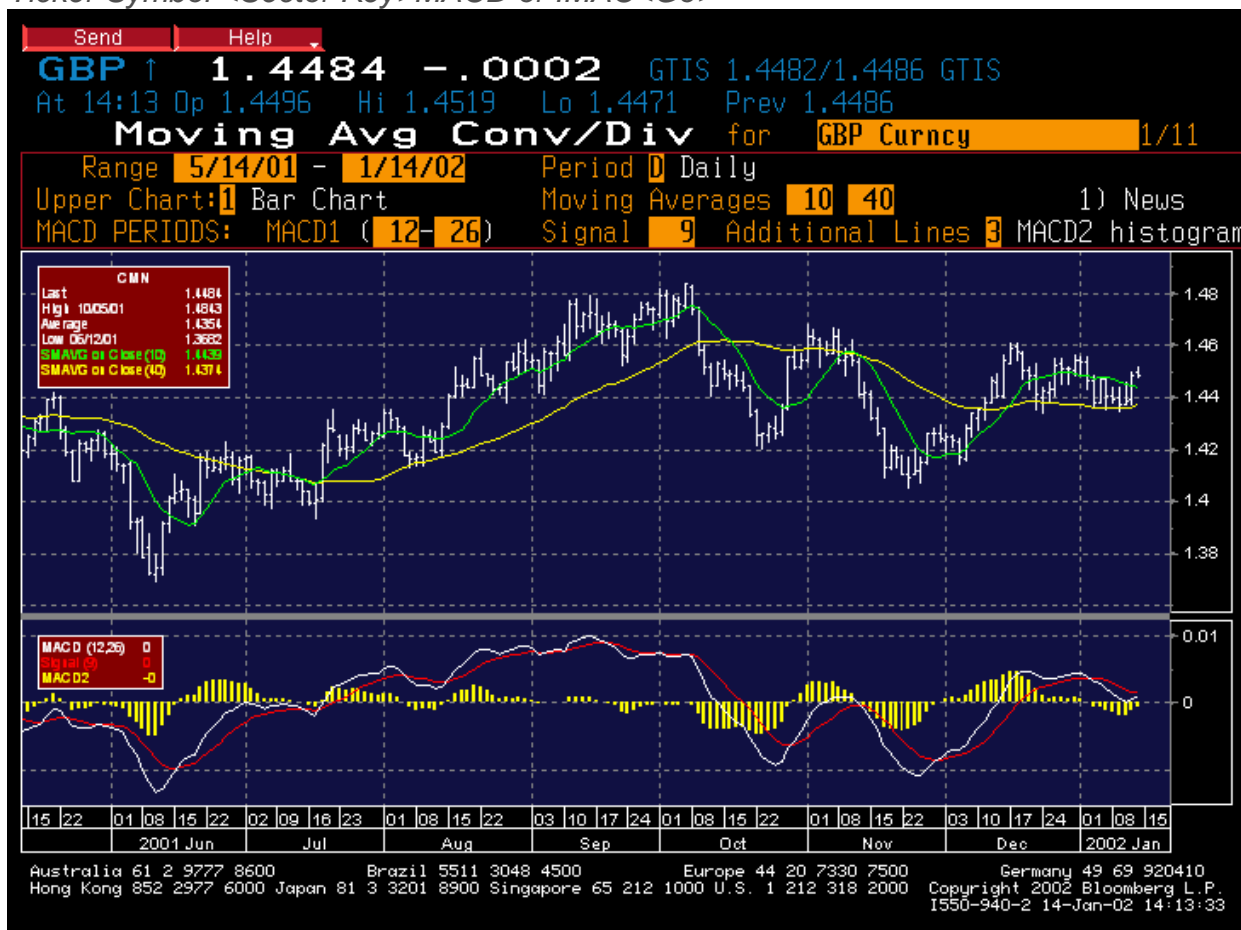A positive divergence occurs when price falters but money continues to move into the stock. This is generally described as "buying on weakness".
A negative divergence occurs when price continues to rise in the face of declining money flows. This is generally described as "selling on strength".
When price and money flows move higher in tandem, "better buying" is seen, whereas "better selling" is used to describe where price and money flows are both moving lower.

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MOVING AVERAGE CONVERGENCE/ DIVERGENCE
Ticker Symbol <Sector Key>MACD or IMAC<Go>

BENEFIT: Provides indications of the market's underlying trend. Theory suggests that when price is trending, it's expected from time to time, that speculative forces "test" the trend. By exponentially weighting price action, MACD can help to determine if it is just a short-term deviation from the trend or if it is a structural change in the trend.

INTERPRETATION: The MACD indicator, developed by Gerald Appel, is a trend following indicator that shows the relationship between two *exponential* moving averages of price. MACD plots the spread between a 12 and 26 period moving average and is shown in *white*. A 9-day ema of the MACD, called the "signal" line, is plotted on top of the MACD in *red*. Because the MACD is considered a trend following indicator, it proves most effective in wide-swinging or trending markets. MACD and moving averages are both examples of trend following, or "lagging" indicators.

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MOVING AVERAGE CONVERGENCE/ DIVERGENCE CONT'D

WHEN ACTION MAY BE SUGGESTED: The three most popular ways to use the MACD are Crossovers, Divergences and Overbought/Oversold conditions.

Crossovers
The crossover interpretation involves the signal line that is used with the MACD and helps to determine the appropriate entry and exit point. The basic MACD trading rule is to sell when the MACD falls below its signal line and to buy when the MACD rises above its signal line.

Divergences
An indication that an end to the current trend may be near occurs when the MACD diverges from the security. A divergence occurs when the trend of a security's price doesn't agree with the trend of the MACD. A bearish divergence occurs when the MACD is making new lows while prices fail to reach new lows. A bullish divergence occurs when the MACD is making new highs while prices fail to reach new highs. When this occurs, prices usually change direction to confirm the trend of the MACD.

Overbought/Oversold Conditions
The MACD is also useful as an overbought/oversold indicator. When the shorter moving average pulls away dramatically from the longer moving average (i.e., the MACD rises), it is likely that the security price is overextending and will soon return to more realistic levels.
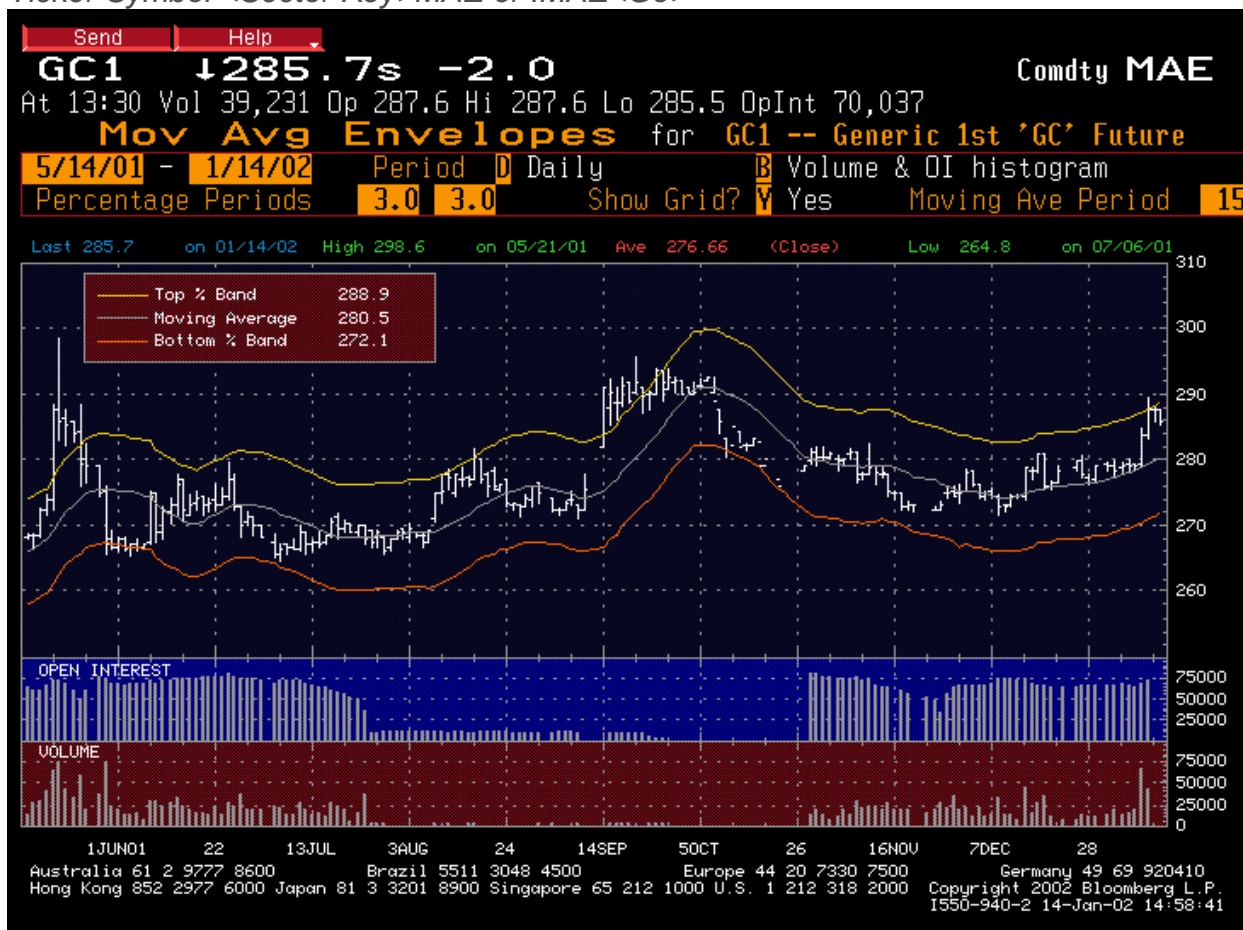
MACD2 (line or histogram)
MACD2 is a third indicator value that can be viewed on the chart either as a line or a histogram. MACD2 shows the difference between the MACD and the Signal. High MACD2 values are seen when trends are moving strongly in one direction, either up or down. Falling and low MACD2 values are evidence of a weakening trend and possible crossovers. A popular use of MACD2 is as an "early-warning" strategy that entails closing out the current position when the MACD2 value begins the fall from its extreme point instead of waiting for the reverse crossover to occur.

Popular MACD settings
As indicated previously, MACD was introduced by Appel using a 12-day and 26-day price exponential moving average with a 9-day exponential moving average of the MACD (signal line). Other popular settings in the market include 8, 17, & 9 and 3, 6, & 9 respectively. The Bloomberg MACD defaults are 12, 26, & 9.

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MOVING AVERAGE ENVELOPES
Ticker Symbol <Sector Key>MAE or IMAE<Go>

BENEFIT: Gauges trading activity through the use of trading bands. The bands that are drawn are used to identify support and resistance levels which can assist in trading decisions.

INTERPRETATION: Moving Average Envelopes use fixed percentage trading bands that envelop a defined moving average; one band is drawn X% *above* the moving average selected, the other band is drawn X% *below* the moving average selected thus creating the "envelope". MAE defaults to 3% percentage bands and a 20-day moving average. (These can be modified under TDEF<Go>) The optimum percentage shift depends how volatile the security is - the more volatile, the larger the percentage shifts should be.
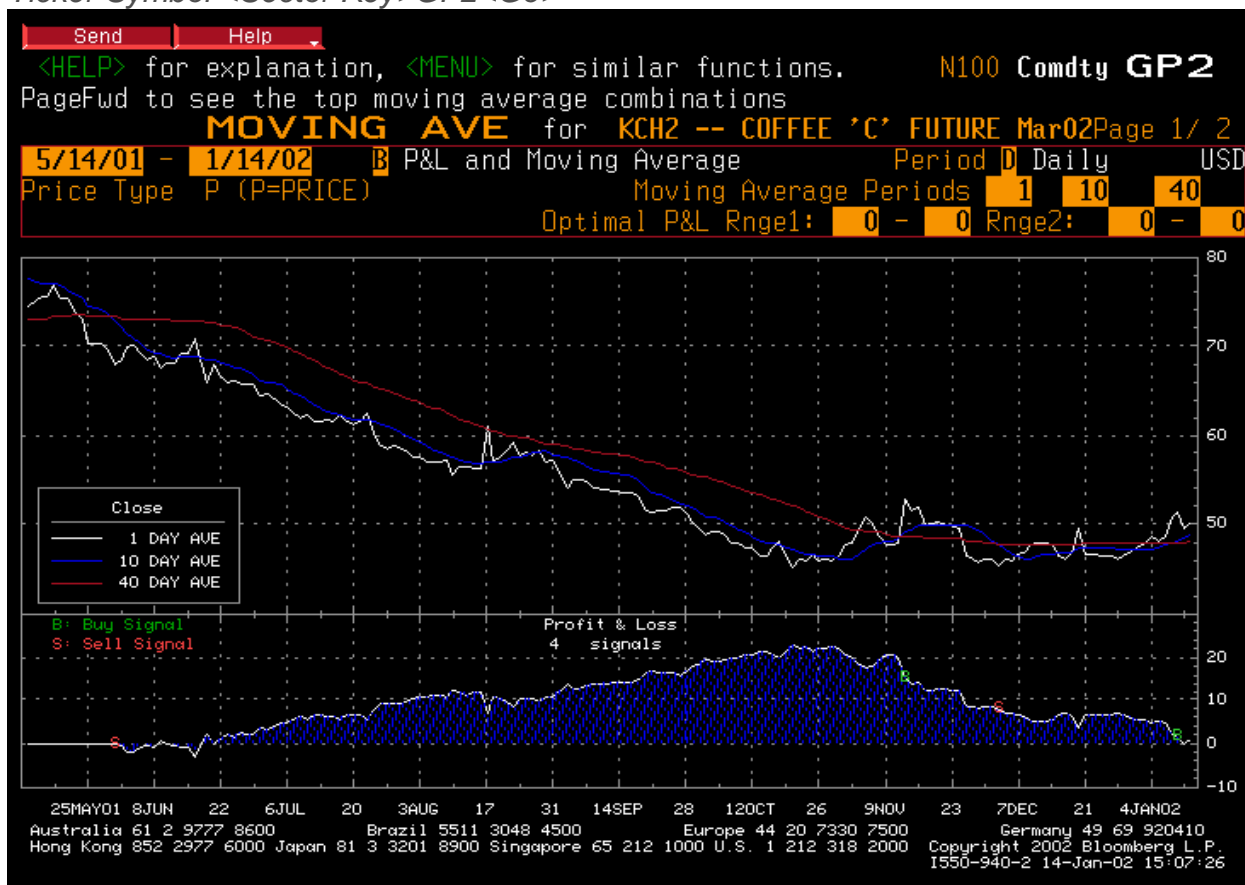 The theory behind envelopes is that overzealous buyers and sellers push prices to extremes, i.e. the upper and lower bands, at which point prices often stabilize by moving to mean reversion levels.

WHEN ACTION MAY BE SUGGESTED:
 When the price of a security reaches the top band, it is assumed that resistance will be encountered; at this point a signal to *SELL* is implied. When the price of a security reaches the lower band, the assumption is support will be found; at this point the signal to *BUY* is implied. In situations where the price action breaks through the top or bottom band, a breakout has occurred and the continuation of the current trend is expected.

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MOVING AVERAGE CHART

Ticker Symbol <Sector Key>GP2<Go>

BENEFIT: Identifies buy and sell signals using moving average crossovers as a trading indicator. It also can identify the historical optimal crossover combinations for a given security and time period.

INTERPRETATION: GP2 displays a graph of three moving averages for the selected security on the top section of the chart and a profit and loss section at the bottom. (Although there are three moving average lines that can be plotted on GP2, the profit and loss graph will only interpret the crossover signals between the 2nd and 3rd moving averages entered.) The P&L section illustrates the cumulative profit or loss based on the scenario that at the first signal given, 1 unit is bought or sold and at every subsequent signal 2 units are bought or sold. This results in maintaining a long or short position at all times. Buy signals are represented by a green "B"; sell signals are represented by a red "S". On the top left-hand portion of the GP2 chart is the optimal P&L range. It is designed to find the "best combination" of moving average crossovers for a specific security over a specific period of time. The "best combination" is defined as the combination that resulted in the highest net profit over the period of time entered on the chart. To use the optimal P&L Range, enter two sets of moving average periods under optimal P&L range 1 and range 2. GP2 will then try each combination of numbers from range 1 with numbers from range 2 until it finds the "best combination".

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MOVING AVERAGE CHART CONT'D

WHEN ACTION MAY BE SUGGESTED: Based upon the common theory that a bullish signal is given when a short-term moving average crosses UP through a longer-term moving average, one would look to enter the market on the long side and/or cover any short positions when this takes place. A bearish signal is given when a short-term moving average crosses DOWN through a longer-term moving average signaling to become short and/or liquidate any long positions.

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ON-BALANCE VOLUME
Ticker Symbol <Sector Key>OBV<Go>

BENEFIT: Measures volume activity and identifies if it is "flowing into or out of a security." This can signal divergences than can be used as possible entry or exit points.

INTERPRETATION: On-balance volume, created by Joe Granville, is based on the theory that volume activity is directly proportional to the direction of true trend of a market's price. High volume on days where the market closes higher is strong evidence of an uptrend versus low volume on those days when the market closes higher. Increased volume on the days when a market closes lower suggests a weak price action compared with a day when the market closes lower on thin volume. In theory, On-balance volume changes should precede price changes. The On-balance volume line is calculated in the following manner: If the market closes higher than the previous day's close, then OBV will equal the previous day's OBV, plus today's volume. If the market closes lower than the previous day's close, then OBV will equal the previous day's OBV, minus today's volume. If the market closes at the same price as the previous day's close, then OBV will equal yesterday's OBV. Once the OBV value is calculated each day, it is added or subtracted to the running OBV total. (The original OBV is the first day's volume).

WHEN ACTION MAY BE SUGGESTED: When the OBV indicator is on a rising trend, it is generally a bullish sign, even when the market's price may have declined slightly. When the OBV is falling, the indication is bearish even when the market may be in a short-term rally. The overall direction of line is the important factor, not the value of OBV. Historical observations suggest price ultimately follows OBV indicator when they diverge.

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PARABOLIC SYSTEMS
Ticker Symbol <Sector Key>PTPS or IPTS<Go>

BENEFIT: This "system" is designed to allow for the market to move against you in the early days of a trade without being whipsawed until the price moves directionally.

INTERPRETATION: The Parabolic Time/Price System, developed by Welles Wilder, is best used in a moving or trending market. The theory behind it involves knowing when to get out of a market through the use of stop orders. The Parabolic system is similar to a moving average, but it has the added advantage of a trailing stop/reversal indicator that moves in the direction of the price trend. Known as the stop-and-reversal (SAR) point, the indicator suggests the point at which participants should liquidate an existing position and start a new one in the opposite direction. The SAR point is not only a function of price but also a function of time. For example, in a long trade the SAR point moves UP based upon positive price movement and/or the element of time. (The opposite is true in a short trade) The SAR point *never* retraces. The SAR on the first day of a trade is equal to the extreme price (EP) reached in the previous trade. The extreme price can be defined in a long trade as the lowest price reached while in the previous short trade. (The opposite is true in a short trade).
When a trend begins, the SAR points move in small increments and maintain their furthest difference from the price. This allows the trend to develop and prevents positions from being closed out in the event of an early adverse price movement.

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PARABOLIC SYSTEMS CONT'D

When the trend becomes established and gains momentum, the gap between SAR's widen and distance from the price narrows. This is due to the Acceleration Factor (AF) in the system. The default AF begins with the value of .02 and increases by .02 either each day the market reaches a new high in a long position or each day the market hits a new low when in a short position. If the market does not reach a new extreme price, the AF remains the same. As the AF increases, the speed at which the SAR points gravitate towards the price also increases.

WHEN ACTION MAY BE SUGGESTED: Using the PTPS system, when the price level reaches the SAR point one should close out the current position and open a new one in the opposite direction. When in a long position, the SAR point will increase until it eventually reaches the price level, at which point the model suggests to stop and reverse positions, i.e. become short (sell). When in a short position, the SAR point will decrease until it eventually reaches the price level at which point the model suggests to stop and reverse positions, i.e. become long (buy).

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PIVOT TECHNIQUE
Ticker Symbol <Sector Key>PIVG or PIV<Go>

BENEFIT: Provides day traders with support and resistance levels that can assist in trading decisions. Identifies where "locals" are buying and selling.

INTERPRETATION: The "pivot technique" as it is referred to, is very widely used among professional futures floor traders (also known as "locals"). The pivot technique consists of five basic algebraic formulas:

Pivot Point - also referred to as the daily pivot; it adds the previous days' high plus low plus closing prices for the security and then is divided by three. $P.P. = (H+L+C) / 3$
Resistance Primary - also referred to as resistance level 1; it consists of multiplying the Pivot Point by two and then subtracting the previous days' low. $R1 = [(2)(P)] - L$
Support Primary - also referred to as support level 1; it consists of multiplying the Pivot Point by two and then subtracting the previous days' high. $S1 = [(2)(P)] - H$
Resistance Secondary - also referred to as resistance level 2; it consists of subtracting the Support Primary from the Pivot Point then adding the difference to the Resistance Primary value. $R2 = [(P - S1)] + R1$
Support Secondary - also referred to as support level 2; it consists of subtracting the difference between the Resistance Primary and the Support Primary from the Pivot Point. $S2 = [(R1 - S1)] – P$ *Note - These calculations can be done using the Pivot Calculator, PIV<Go>*
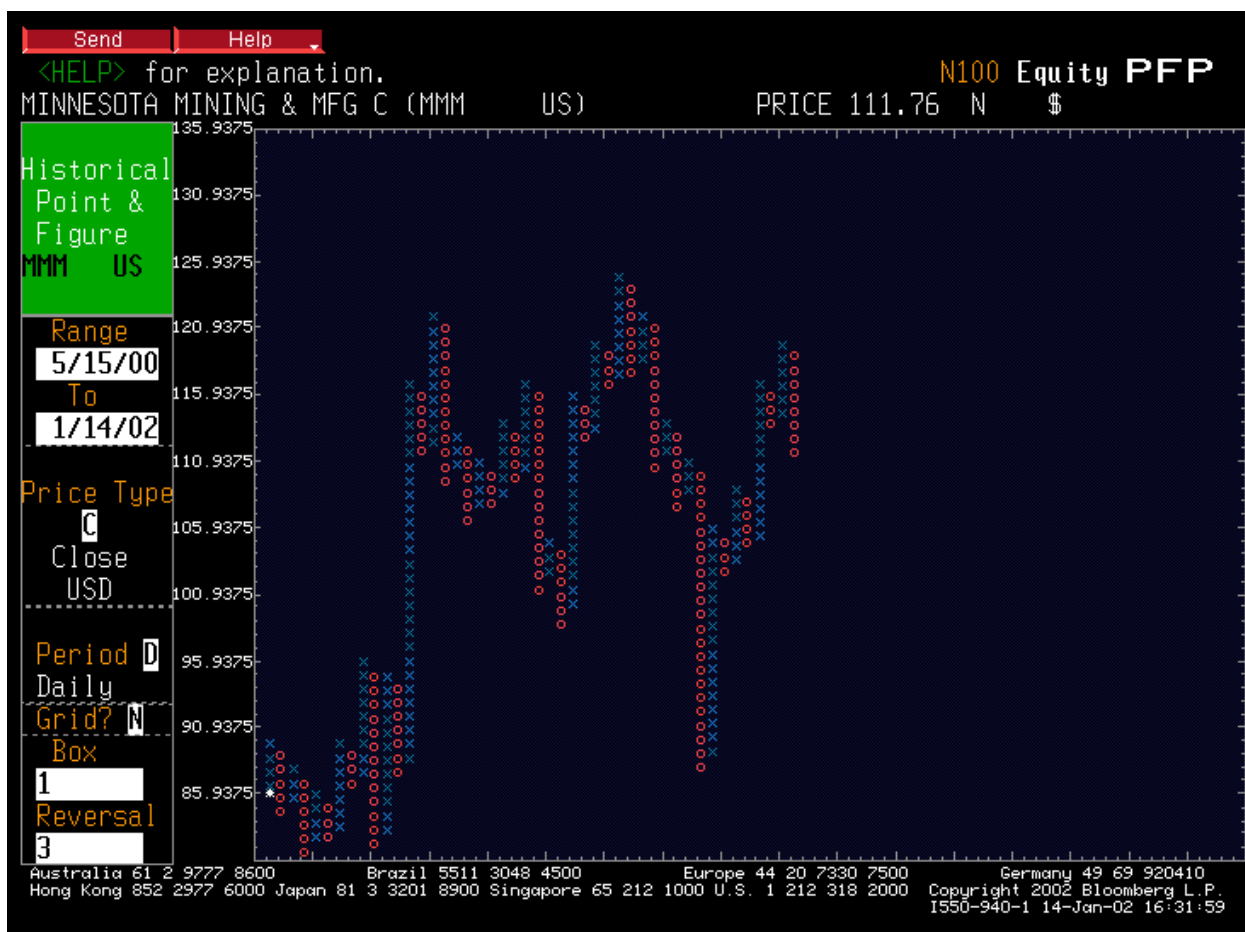
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PIVOT TECHNIQUE CONT'D

The Pivot Point is probably the most looked at and "leaned on" price level each day by futures floor traders. It represents the major point of inflection each day. The other four calculated numbers have significance too, but to a lesser degree. For example, if a market opens above the P.P. and starts to sell off, many floor traders will cover shorts and also go long into this price level. If the market rallies from the P.P., "locals" will look to liquidate into R1 as well as short there. If the market proceeds to penetrate above R1, locals will lean on this level by covering their shorts and going long thus trying to push the market to the next inflection point higher, R2. The same holds true that they will lean on this R2 level just as they did the R1. The same method of leaning on these inflection points also occurs if the market is below the P.P. Locals will lean on S1 and look to buy there hoping to push the market back to the P.P. If S1 gives way locals will sell out their longs and go short, looking for a move down to S2.

WHEN ACTION MAY BE SUGGESTED: The popular interpretation is to use the Pivot Point as the main inflection level of the day and any of the other four points, R1, R2, S1, S2 as possible exit/entry points.

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POINT & FIGURE CHARTS
Ticker Symbol <Sector Key>PFP or GIPF<Go>

BENEFIT: Assists in identifying support and resistance levels and various chart patterns and formations that aid in detecting trends, corrections, and reversals.

INTERPRETATION: Point & Figure charting is unique in the fact that it disregards the element of time in its analysis and is solely a study of price action. The columns of blue X's that are drawn indicate bullish trends and the columns of red O's indicate bearish trends. Each box, X or O, represents a specific minimum price change so that as a trend continues the appropriate character(s) is added to the column. Since X's and O's cannot occupy the same column, each column is a trend reversal. You can control both the minimum price increments that contribute to the box size and the reversal box size by using the fields on the screen.

For example, if the box size is ¼, each continuing price movement of ¼ point will add a character to the chart. (This character can be either an X or O depending on the direction of the current trend.) In order to go from and X to an O or vice versa (in other words to get a reversal), the market must move at least the value of the reversal box size in the opposite direction of the current column's direction. If however this movement is less than the reversal box size the chart remains unchanged. Because time is not a factor, this movement can easily occur in small increments over several days.

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POINT & FIGURE CHARTS CONT'D

In order to choose the appropriate box and reversal size for the selected market, the following scale is commonly used as a reference.
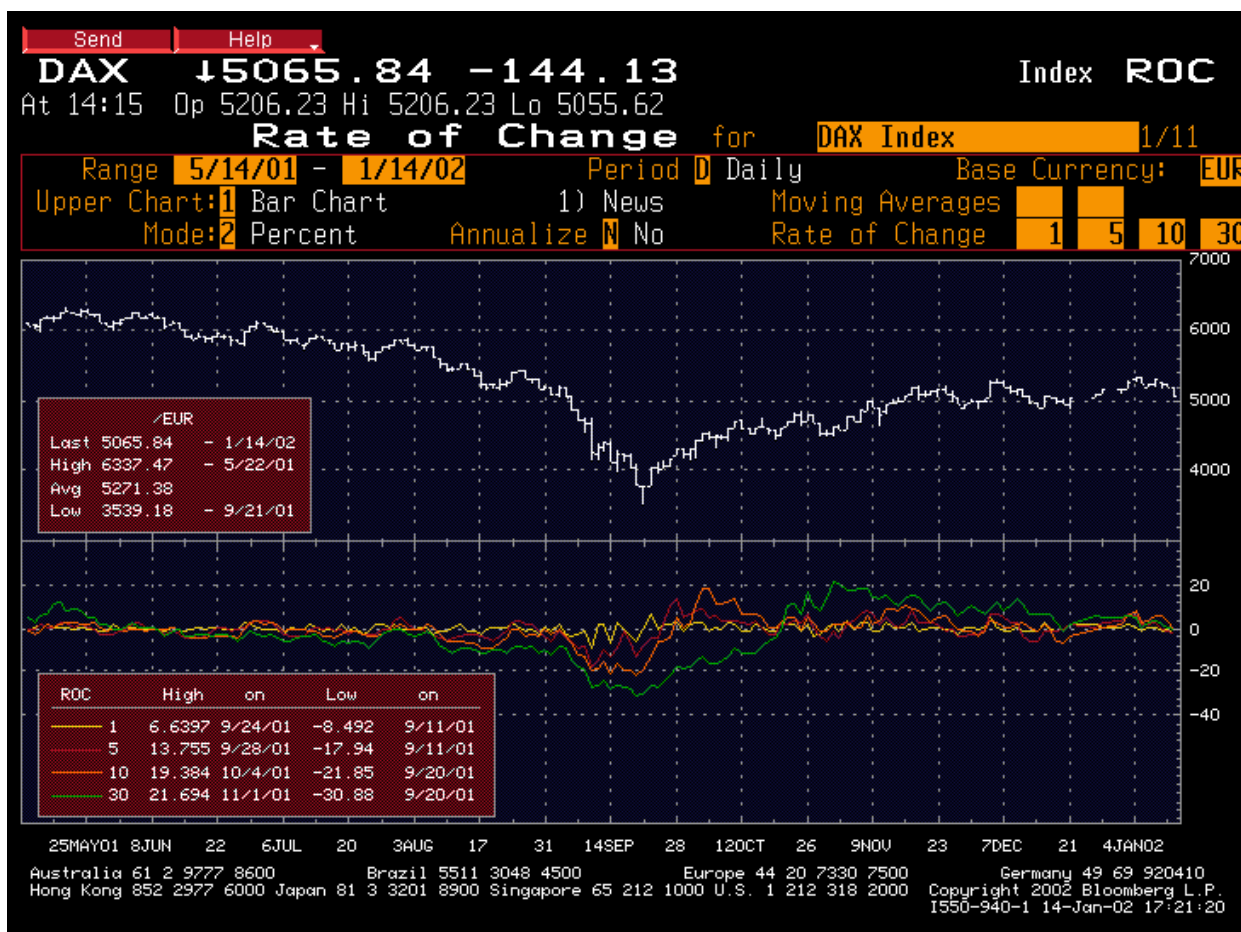
Price	Box Size
0 – 5	.25
5 – 20	.50
21-100	1
102+	2

As markets move and price levels change, the box sizes are also modified to reflect the new price level. The majority of point & figure chartists use a 1x3 box/reversal relationship – the reversal box size is typically three times the amount of the chosen box size. This setting requires a stronger contra-trend move in order to signal a reversal or resistance. By adjusting the box and reversal sizes, the chart can become more or less sensitive to price changes and reversals. Smaller values cause greater sensitivity and are more appropriate for short-term action; higher values constitute a longer-term outlook. It is this type of flexibility that makes point & figure charting a more versatile tool than conventional bar or candle charts.

WHEN ACTION MAY BE SUGGESTED: As with many other technical analysis applications, point & figure graphs can be interpreted differently depending on the user. One of its classic uses is as a detector of trends and reversals as well as helping to indicate where support and resistance levels are, often not readily seen on a bar chart. Another way to use point & figure graphs is to look for certain, specific formations, much the same way standard bar charts are used. They range from simple breakout patterns, such as a bull formation, to the more complex, such as bearish triangles.

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RATE OF CHANGE
Ticker Symbol <Sector Key>ROC or IROC<Go>

BENEFIT: Measures the pace at which a security's price is changing which can help to confirm trends and forewarn of market reversals.

INTERPRETATION: The basis for the Rate of Change Indicator comes from the two things that propel all markets: fear and greed. The Rate of Change indicator gives visual indication of these market moods by signaling when a market is beginning to change direction. The Rate of Change Indicator compares a security's price to the price *(n)* days previous.
The Rate of Change is calculated as follows:

> Rate of Change = ((Today's close - close (n) days previous) / close (n) days previous) * 100

As with many oscillators, the shorter the period used, the more sensitive the analysis. The ultimate goal is to identify timely trading signals by using a small values and eliminating false signals by comparing the signals with larger values. It is simply a matter of trying different numbers for (n) until you find those that best suit your trading needs.

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RATE OF CHANGE CONT'D

WHEN ACTION MAY BE SUGGESTED: There are *three* general techniques that are used in conjunction with the Rate of Change Indicator.

(A) Overall, when the Rate of Change Indicator is positive, it indicates that the security is increasing in price; a negative reading indicates that price is declining. If the Rate of Change crosses the zero point of the oscillator in the same direction as the overall trend of the market, it will generally indicate a more successful trade than when the midpoint crossing is in opposition to the trend.

(B) Another area where the Rate of Change can provide strong indications is when the price is forming new highs (lows) and the Rate of Change is not making a higher high (lower low) relative to its most recent peak (trough). This is known as a divergent signal and can often lead to a reversal of trend. This is considered to be most useful in a sideways, or non-trending, market.

(C) Another technique is to watch for the Rate of Change reaching a new extreme value. This may indicate a very overbought or oversold condition that may become a peak or a bottom for the market.

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RELATIVE STRENGTH INDEX

Ticker Symbol <Sector Key>RSI or IRSI<Go>

BENEFIT: Measures the velocity of a security's price movements, hence identifying potential turning points. Prices are generally considered to be elastic in that they can move only so far from a mean price before retreating or accelerating. Rapid price increases result in overbought conditions and rapid price decreases result in oversold conditions, which if properly identified can assist in maximizing proper entry/exit decisions.

INTERPRETATION: The Relative Strength Index (RSI), an oscillator introduced by J. Welles Wilder, Jr., is in fact an internal strength indicator as it compares the price of a security relative to itself, not the relative strength of a security vs. a market. The indicator measures the relative strength of price gains on days that the security closes above the previous days close to price losses on days that the security closes below the previous days close.

The RSI is calculated by averaging up and down closes over a given period of time and inserting the result into the RSI formula, RSI = 100 - (100/(1+RS)). The result is plotted on a vertical scale of 0 to 100 and is used to demonstrate the inner strength of a price trend

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RELATIVE STRENGTH INDEX CONT'D

WHEN ACTION MAY BE SUGGESTED: There are several possible interpretations for the Relative Strength Index, any of which can be very powerful depending on the market conditions and trading/investment approach. In his book, Wilder highlights five uses of the RSI: Tops and Bottoms, Chart Formations, Failure Swings, Support and Resistance, and Divergence.

Tops and Bottoms
The RSI overbought/oversold indications are 70 and 30 respectively. Buy signals are triggered when RSI is in an oversold area, below 30, potentially meaning that the security is about to reach its low for this trend, and sell signals are triggered when RSI is in an overbought area, above 70, potentially signaling a market top. It usually forms these tops and bottoms before the underlying market, which can signal an impending reversal.

Chart Formations
The RSI often forms chart patterns such as head and shoulders or triangles that may not be visible on the underlying price chart.

Failure Swings
Also known as support or resistance penetrations or breakouts, this is where the RSI fails to surpass a previous high or low and then surpasses its most recent peak or trough. The failure swing is considered a confirmation of the impending reversal and the strongest ones occur above 70 or below 30.

Support and Resistance
Levels of support and resistance are highlighted in the RSI many times before they can clearly be seen on the underlying price chart. Support/Resistance lines are drawn on the Index as they are drawn on a traditional price chart.

Divergences
Divergences occur when the price makes a new high (or low) that is not confirmed by a new high (or low) in the RSI. Prices usually correct and move in the direction of the RSI.
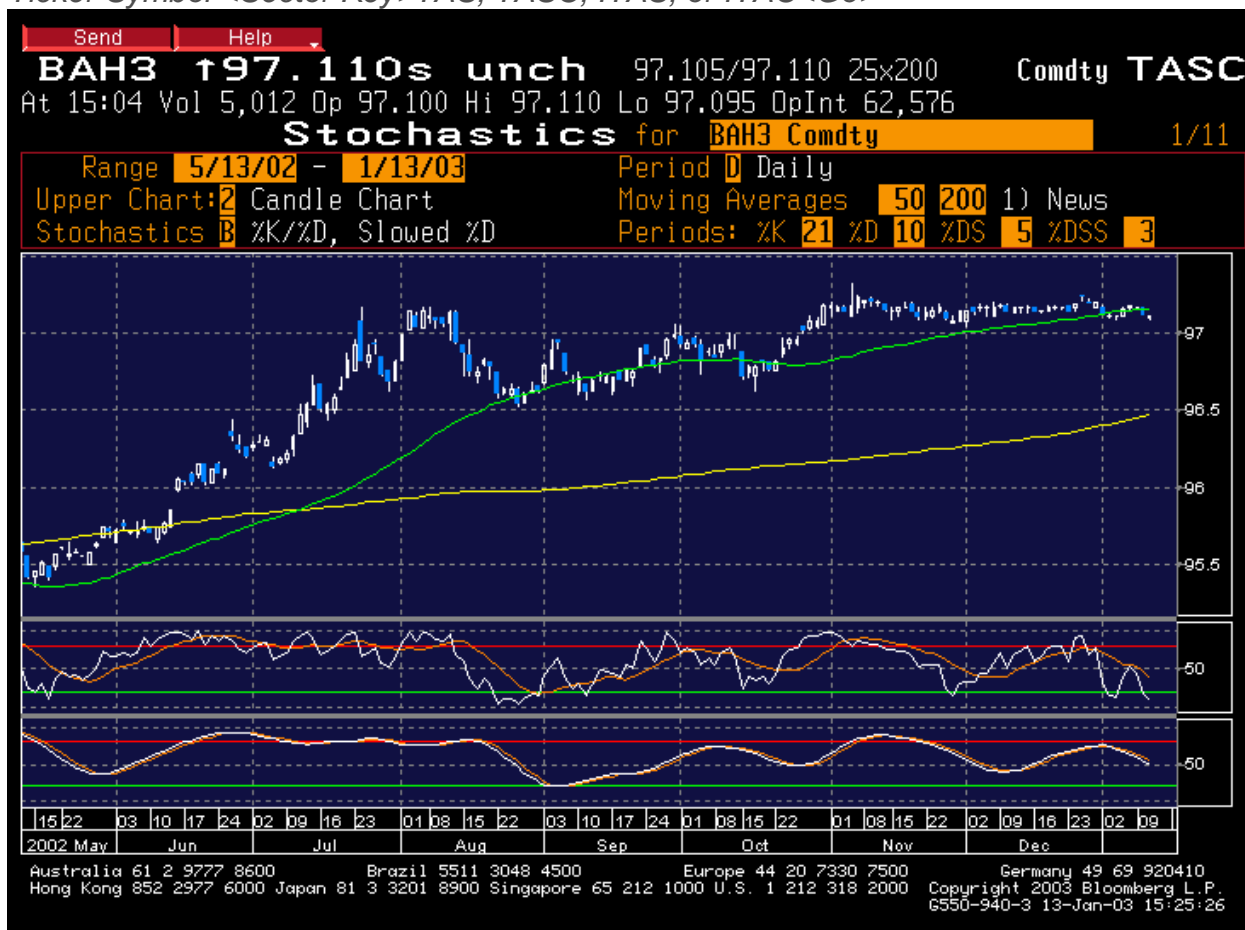
Another method of interpretation for the RSI that is used by many is to view it as a bullish or bearish signal when it crosses 50. When the RSI crosses above 50 it can be considered bullish, and when it crosses below 50 it can be considered bearish. The concept here is that markets that are overbought will quickly turn to oversold and vice versa.

Popular RSI settings
When Wilder introduced the RSI, he recommended using a 14-day RSI. Since then, 3-day, 9-day and 25-day RSI settings have also been used.

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STOCHASTICS
Ticker Symbol <Sector Key>TAS, TASC, ITAS, or ITAC<Go>

BENEFIT: Measures price momentum to identify overbought/oversold conditions, which may assist in maximizing entry or exit decisions.

INTERPRETATION: The Stochastics oscillator, developed by Dr. George Lane, uses closing prices in comparison with highs and lows of current trading ranges to indicate the trend of price movements. The premise behind the indicator is that the market will close at the upper end of a given period's trading range when the price is trending upward and that it will close at the lower range during downtrends. Peaks of the oscillator are presumed to indicate overbought positions, while minimum values of the oscillator are presumed to indicate oversold positions.

The stochastics indicator is plotted as two lines, %K and %D. The range of the stochastics oscillator is between 0 and 100. There are two types of stochastics: fast stochastics and slow stochastics. % K and % D produce what is known as the *Fast Stochastics*, which many traders feel are too erratic. To smooth this extreme sensitivity to price movement, *Slow Stochastics* were created whereby the more sensitive % K line is dropped in favor of a smoothed % D-Slow and % D is replaced by the % DS-Slow line.

When calculating fast stochastics, the raw value of %K is the point at which the current price lies within the historical price range of its given period, and the value of %D is the moving average of %K over a given number of periods.

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STOCHASTICS CONT'D

When calculating slow stochastics, the value of %K slow is the %D-period moving average of the point at which the current price lies within the historical price range of its given period (or raw %K), and the value of %D slow is the moving average of the %K slow over a given number of periods.

The actual calculations of the indicator are as follows:

> $\%\,K$ = 100 [{C - L (n)} / {H (n) - L (n)}] where C is the current close, L (n) is the low of the (n) period, and H (n) is the high of the (n) day period.
> $\%\,D$ = a moving average of % K for the specified period.
> $\%\,D\text{-}Slow$ = a moving average of % D for the specified period.
> $\%\,DS\text{-}Slow$ = a moving average of % D-Slow for the specified period.

WHEN ACTION MAY BE SUGGESTED: Stochastics can be used with several interpretations: among them are divergences, crossovers, and overbought/oversold breakouts.

Divergences
One interpretation (and the one Lane believes to be most important) is to look for divergences between the stochastic oscillator and the price. An overbought market occurs when the oscillator makes a series of lower highs while the price makes a series of higher highs. An oversold market occurs when the price makes a series of lower lows while the oscillator makes a series of higher lows. When a divergence occurs between an indicator and prices, the indicator typically provides the clue as to where prices will head.

Crossovers
A second interpretation is to receive signals based on a crossover of the two lines. When the %K line rises above the %D line it is considered bullish, and when the %K line falls below the %D line, it is considered bearish. You can eliminate some false signals by using only the signals that correspond to the direction of the intermediate- to long-term trends.

Overbought/oversold breakouts
A third interpretation is that a buy signal is generated when either line dips below and then rises above 20, and a bearish signal is generated when either line rises above and then dips below 80.

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TRADING ENVELOPES
Ticker Symbol <Sector Key>TE or ITE<Go>

BENEFIT: Gauges trading activity through the use of trading bands. The bands that are drawn are used to identify support and resistance levels which can assist in trading decisions.

INTERPRETATION: The theory behind envelopes is that overzealous buyers and sellers push prices to extremes, i.e., the upper and lower bands, at which point prices often stabilize by reverting back to the selected moving average. The interpretation of Trading Envelopes is very similar to that of Bollinger Bands and Moving Average Envelopes. One band is drawn (X) standard deviation levels *above* the moving average selected; the other band is drawn (X) standard deviation levels *below* the moving average selected thus creating the "envelope." The envelope created is *self-adjusting*; widening during volatile markets and contracting during quiet periods. Standard deviation is considered to be a very good measure of volatility.

WHEN ACTION MAY BE SUGGESTED: In a trendless or sideways market, one could look for the market to encounter support at the lower band, i.e. a possible buying opportunity and resistance at the upper band, i.e. a possible selling opportunity. In a strongly trending market, like many other oscillators, one would expect to produce many occurrences where the market touches and/or even penetrates these bands. However, it is at these times that one must proceed cautiously in selling what appears to be an overbought condition or buying what appears to be a market that is oversold, as the continued trend will repeatedly produce these observances.

WILLIAMS %R

Ticker symbol<Sector Key>WLPR<Go>

BENEFIT: Measures price momentum to identify overbought/oversold conditions, which may assist in maximizing entry or exit decisions

INTERPRETATION: Williams' %R, developed by Larry Williams, is very similar to other momentum-based oscillators. Price action is evaluated over a rolling (n) day period in order to detect extreme price movements.
The calculation of Williams' %R is as follows:

$$\text{Williams' \%R} = \frac{(\text{Highest high in (n) periods - today's close}) * (-100)}{(\text{Highest high in (n) periods - lowest low in (n) periods})}$$

The %R oscillator value ranges from 0 to -100. It helps in identifying support, resistance and current short-term trends. Generally speaking, a %R value above -20 indicates a possible *overbought* condition (green zone) and a value of -80 or less indicates a possible *oversold* condition (red zone). This does not mean price will immediately reverse once either of these levels is reached. Prices can remain overbought or oversold for long periods of time, commonly seen in trending phases. It is more likely that price will consolidate, before any major directional change occurs. The %R indicator is very good at anticipating a reversal in the underlying security's price. The indicator almost always forms a peak and turns down a few days before the security's price peaks and turns down. Likewise, %R usually creates a trough and turns up a few days before the security's price turns up.

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WILLIAMS %R CONT'D

WHEN ACTION MAY BE SUGGESTED: As with all overbought/oversold indicators, it is best to wait for the security's price to change direction before taking action. A signal to buy or sell is given when the %R *leaves* the overbought or oversold area. However, like other momentum-based studies, the best signals typically are seen in trendless or sideways markets. Divergent signals, when the %R oscillator and price do not move in tandem, are also very poweful turning point indications. In this instance, many follow the direction of %R, not price.

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BENEFITS: Gain insight to the future movement of any markets you follow by creating custom charts that highlight trading patterns of securities, commodities, and indices. G can help you analyze **historical or intraday price trends.** And you're just a click away from current news headlines or news for any date you choose. It's a great way to gather insight into price and volume action that may influence your interpretation.

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Quick access to news headlines *for any date on the chart lets you further investigate price and volume action that may further support or alter your interpretation.*

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> DeMark Indicators ™
> Money Flow
> Volume & value traded
> Put/call volatility & volume
> Price ratios (for equities) – P/E, P/Book, Market cap. Etc.

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GRAPH WORKSHEETS (in NW and BQ applications)

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