

Version

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# Active Trader Pro®

Charting Indicator Definitions,  
Interpretations and Calculations



FIDELITY INVESTMENTS

# Active Trader Pro

## Charting Indicator Definitions

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For the complete list of ATP charting indicators please see ATP Help, Terms and Definitions.

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## Accumulation Distribution

### Description

Accumulation Distribution (created by L. Williams) uses the closing price's proximity to the high or low to determine if accumulation or distribution is occurring in the market. The proximity value is multiplied by volume to give more weight to moves with higher volume.

You can often spot divergences between price action and the Accumulation Distribution indicator. For example, if prices make a new high but the move is not accompanied by sufficient volume, Accumulation Distribution will fail to make a new high. Divergences can be a sign the trend is nearing completion.

### Interpretation

The actual value of the Accumulation Distribution is unimportant. Concentrate on its direction.

- When both price and Accumulation Distribution are making higher peaks and higher troughs, the up trend is likely to continue.
- When both price and Accumulation Distribution are making lower peaks and lower troughs, the down trend is likely to continue.
- When price continues to make higher peaks and Accumulation Distribution fails to make higher peak, the up trend is likely to stall or fail.
- When price continues to make lower troughs and Accumulation Distribution fails to make lower troughs, the down trend is likely to stall or fail.
- If during a trading range, the Accumulation Distribution is rising then accumulation may be taking place and is a warning of an upward break out.
- If during a trading range, the Accumulation Distribution is falling then distribution may be taking place and is a warning of a downward break out.

### Calculation

$$AD = \sum \frac{(close - low) - (high - close)}{(high - low)} \times volume$$

## ADX

### Description

ADX stands for Average Directional movement Index and is used to measure the overall strength of the trend. The ADX indicator is an average of DX values, see DX. The ADX is a component of the Directional Movement System developed by Welles Wilder. This system attempts to measure the strength of price movement in positive and negative direction using the DMI+ and DMI- indicators along with the ADX.

### Interpretation

- The ADX is an excellent indicator for showing trend strength. The larger the value the stronger the current trend. A value above 25 is considered to be a trending market.
- When the ADX turns down from high values, then the trend maybe ending. It might be a good time to start closing open positions.
- If the ADX is declining, then the market is becoming less directional, the current trend is weakening. You should not be trading a trend system.
- When the ADX stays at a low value, the market is considered to be flat or dull. The longer the ADX stays at a low value the more likely a strong trending move will occur.
- If after staying low for a lengthy time, the ADX rises by 4 or 5 units, (for example, from 15 to 20), it gives a strong signal to trade the current trend.
- If the ADX is rising then the market is showing a strengthen trend. The value of the ADX is proportional to the slop of the trend. The slope of the ADX line is proportional to the acceleration of the price movement (changing trend slope). If the trend is a constant slope then the ADX value tends to flatten out.

### Calculation

ADX is simply the mean, or average, of the values of the DX over the specified *Period*.

## DX

### Description

DX is a component of the Directional Movement System developed by Welles Wilder. This system attempts to measure the strength of price movement in positive and negative directions, as well as the overall strength of the trend. The DX is used in calculating the ADX indicator which is normally charted along with the DMI+ and DMI- indicators. Typically it uses 14 periods in its calculations.

### Interpretation

- DX measures the trendiness of a market, and ranges from 0 to 100. If the Trend is strong then the spread between the two smoothed directional lines, (DMI+ and DMI-) increases and the DX value increases. The higher the DX, the more directional movement present in the market.
- If prices rise for the number of periods specified then the DMI-value would be near zero and DMI+ would have a high value. This directional upwards price movement results in a high DX value.
- If prices fall for the number of periods specified then the DMI-would be a high value and the DMI+ value would be near zero. This directional downwards price movement result in a high DX value.
- If prices fluctuate for the number of periods specified, like in a trading range, then DMI+ and DMI-will have similar values. This non-directional sideways price movement results in a low DX value.

### Calculation

$$DX = ((DMI+ - DMI-) / (DMI+ + DMI-)) * 100$$

## DMI+

### Description

DMI+ is a component of the Directional Movement System developed by Welles Wilder. This system attempts to measure the strength of price movement in positive and negative directions, as well as the overall strength of the trend. DMI+ is normally used with the DMI-, DX and ADX indicators and typically uses 14 periods.

The DMI+ value represents upward price movement as a percentage of true range. The more each up bar's price is equal to the true range, the larger the value of the DMI+. The DMI+ and the DMI- are not mirror images.

### Interpretation

- DMI+ measures a market's positive directional movement. If DMI+ is greater than DMI-, prices have a stronger positive directional movement.
- If prices rise for the number of periods specified then the DMI+ would be a high value and the DMI-value would be near zero.
- If prices fall for the number of periods specified then the DMI+ value would be near zero and DMI-would have a high value.
- If prices fluctuate for the number of periods specified, like in a trading range, then DMI+ and DMI-will have similar values.
- The greater the difference between the DMI+ and DMI-the stronger the trend. The DX indicator takes advantage of this.

### Calculation

$$DI+ = (DM+ / TR) * 100$$

where,

$$DI+ = DMI+$$

$$DM+ = \text{Weighted DM}$$

$$TR = \text{True Range of current bar}$$

The +DI is then smoothed over the period specified, the same way as a simple moving average, and +DM is calculated as follows:

1. For up trending days, +DM = today's high - yesterday's high
2. For down trending days, +DM = zero
3. For inside days, +DM = zero
4. For outside days, if today's high - yesterday's high, is greater than yesterday's low- today's low, then +MD = today's high - yesterday's high, otherwise +DM = zero

5. For upwards gap days, +DM = today's high - yesterday's high
6. For downwards gap days, +DM = zero

## DMI-

### Description

DMI- is a component of the Directional Movement System developed by Welles Wilder. This system attempts to measure the strength of price movement in positive and negative directions, as well as the overall strength of the trend. DMI+ is normally used with the DMI-, DX and ADX indicators and typically uses 14 periods.

The DMI- value represents downward price movement as a percentage of true range. The more each down bar's price is equal to the true range, the larger the value of the DMI-. The DMI+ and the DMI- are not mirror images.

### Interpretation

- DMI- measures a market's negative directional movement. If DMI- is greater than DMI+, prices have a stronger negative directional movement.
- If prices fall for the number of periods specified then the DMI- would be a high value and the DMI+ value would be near zero.
- If prices rise for the number of periods specified then the DMI- value would be near zero and DMI+ would have a high value.
- If prices fluctuate for the number of periods specified, like in a trading range, then DMI+ and DMI- will have similar values.
- The greater the difference between the DMI+ and DMI- the stronger the trend. The DX indicator takes advantage of this.

### Calculation

$$DI = (DM- / TR) * 100$$

where,

DI = DMI-

DM- = Weighted DM

TR = True Range of current bar

The -DI is then smoothed over the *Period* specified, the same way as a simple moving average, and, -DM is calculated as follows:

1. For up trending days, -DM = zero
2. For down trending days, -DM = yesterday's low - today's low
3. For inside days, -DM = zero
4. For outside days, if yesterday's low - today's low, is greater than today's high- yesterday's high, then
5. -MD = yesterday's low - today's low, otherwise -DM = zero
6. For upwards gap days, -DM = zero
7. For downwards gap days, -DM = yesterday's low - today's low

## Average True Range (ATR)

### Description

The Average True Range is the average of the true ranges over the specified Period. ATP uses the moving average as formulated by Welles Wilder, the indicator's inventor. The ATR is a measure of volatility and it takes into account any gaps in the price movement. Typically the ATR calculation is based on 14 periods; this can be intraday, daily, weekly or monthly. To measure recent volatility use a shorter average, 2 to 10 periods. For longer term volatility use 20 to 50 periods.

### Interpretation

- An expanding ATR indicates increased volatility in the market. The range of each bar is getting larger. ATR often peaks at major tops and bottoms. High ATR values usually result from a sharp advance or decline and are unlikely to be sustained for extended periods.
- A low average true range value indicates a series of periods with small ranges (quiet days). These low ATR values are often found during extended sideways price action, thus lower volatility. A

prolonged period of low ATR values may indicate a consolidation area and the beginning of a continuation move or reversal.

- ATR is very useful for stops or entry triggers, as it allows for changes in volatility. Whereas fixed dollar, points or percentage stops will not allow for volatility. The ATR stop will adapt to sharp price moves or consolidation areas, and trigger on an abnormal price movement in either area. Use a multiple of ATR, such as 1.5 x ATR (5 period) to catch these abnormal price moves.

### Calculation

Average True Range is calculated by applying Wilder's Moving Average to True Range over the period specified:

$$\text{ATR} = (\text{Previous ATR} * (n - 1) + \text{TR}) / n$$

where,

ATR = Average True Range  
n = number of periods or bars  
TR = True Range

The True Range for today is the greatest of the following:

- . Today's high minus today's low.
- . The absolute value of today's high minus yesterday's close.
- . The absolute value of today's low minus yesterday's close.

## Bollinger Bands

### Description

Bollinger Bands are a type of price envelope developed by John Bollinger. Bollinger Bands are envelopes that are plotted at a standard deviation level above and below a simple moving average of the price. Because the distance of the bands is based on standard deviation, they adjust to volatility swings in the underlying price.

Bollinger Bands accept 2 parameters, *Period* and Standard Deviations, *StdDev*. The recommended values are 20 for period, and 2 for standard deviations, although other combinations offer effective results as well.

Bollinger bands help determine whether prices are high or low on a relative basis. They are used in pairs, both upper and lower bands and in conjunction with a moving average. Further, the pair of bands are not intended to be used on their own. Use them to confirm signals given with other indicators. For example, RSI and Bollinger bands are a good combination.

### Interpretation

- When the bands tighten, as volatility decreases, then expect a sharp move in price. This may begin a trending move. Watch out for a false move in opposite direction which reverses before the proper trend begins.
- When the bands separated by an unusual large amount, volatility increases and any trend that may be in place may be ending.
- Prices normally have a tendency to bounce within the bands envelope, touching one band then moving to the other band. You can use this for profit targets. For example, if prices bounces of the lower band then cross above the moving average the upper band then becomes the profit target.
- Price can exceed or hug a band envelope for prolonged periods during strong trends. On divergence with a momentum oscillator you should consider taking profits.
- A strong trend continuation can be expected when the price moves out of the bands. However if prices move immediately back inside the band, then the suggested strength is negated.

### Calculation

First calculate and plot a simple moving average (middle band, not displayed). Next, calculate the standard deviation over the same number of periods as the simple moving average. For the upper band, add the standard deviation to the moving average, for lower band, subtract the standard deviation from the moving average.

Typical values used:

Short term: 10 day moving average, bands at 1.5 standard deviations. (1.5 times the standard dev. +/- the SMA)

Medium term: 20 day moving average, bands at 2 standard deviations.

Long term: 50 day moving average, bands at 2.5 standard deviations.

## Bollinger Band Width

### Description

The Bollinger Band Width is the difference between the upper and the lower Bollinger Bands divided by the middle band. This technical indicator provides an easy way to visualize consolidation before price movements (low bandwidth values) or periods of higher volatility (high bandwidth values).

The Bollinger Band Width takes the same two parameters as the Bollinger Bands: a simple moving average period (for the middle band) and the number of standard deviations by which the upper and lower bands should be offset from the middle band.

### Interpretation

During a period of rising price volatility, the distance between the two bands will widen and Bollinger Band Width will increase. Conversely, during a period of low market volatility, the distance between the two bands will contract and Bollinger Band Width will decrease).

There is a tendency for bands to alternate between expansion and contraction. When the bands are unusually far apart, that is often a sign that the current trend may be ending. When the distance between the two bands has narrowed too far, that is often a sign that a market may be about to initiate a new trend.

### Calculation

$$\text{BandWidth} = (\text{Upper Bollinger Band} - \text{Lower Bollinger Band}) / \text{Middle Bollinger Band}$$

## CBOE Market Volatility Index (VIX)

### Description

The CBOE Market Volatility Index (VIX) is a measure of implied volatility based on the prices of a basket of S&P 500 Index options with 30 days to expiration.

### Interpretation

When the VIX rises, it indicates that traders expect the S&P 500 Index to become more volatile. The higher the VIX, the higher the fear, which, according to market contrarians, is considered a buy signal. A falling VIX indicates that traders in the options market expect the S&P 500 Index to trade more quietly. In the same respect, the lower the VIX, the lower the fear, indicating a more complacent market.

## CBOE Nasdaq Market Volatility (VXN)

### Description

The CBOE Nasdaq Market Volatility is a measure of implied volatility based on the prices of a basket of Nasdaq 100 Index options with 30 days to expiration.

### Interpretation

When the VXN rises, it indicates that traders expect the Nasdaq 100 Index to become more volatile. The higher the VXN, the higher the fear, which, according to market contrarians, is considered a buy signal. A falling VXN indicates that traders in the options market expect the Nasdaq 100 Index to trade more quietly. In the same respect, the lower the VXN, the lower the fear, indicating a more complacent market.

## Commodity Channel Index (CCI)

### Description

The Commodity Channel Index (CCI) developed by Lambert, is designed to identify and trade cyclical turns in

commodities. It assumes the commodity or stock moves in cycles. Lambert recommends using 1/3 of the cycle as the calculation period. The cycle is considered an interval of low-to-low or high-to-high. Commodities can cycle around 60 days, thus the period would be 20 days. Signals are given when CCI moves into the +100 or -100 regions.

#### Interpretation

- When the CCI moves above +100, then a new strong uptrend is beginning, buy here, close the position on CCI falling below +100. Use trending indicators or other technical analysis methods to confirm.
- When the CCI moves below -100, then a new strong downtrend is beginning, sell here, close the position on CCI rising above -100. Use trending indicators or other technical analysis methods to confirm.
- If underlying prices make a new high or low that isn't confirmed by the CCI, this divergence can signal a price reversal. CSI divergences from price indicates very strong buy or sell signal.
- Look for oversold levels below -100 and overbought levels above +100. These normally occur before the underlying price chart forms a top or a bottom.

#### Calculation

The Commodity Channel Index (CCI) is calculated by determining the difference between the mean price of a security and the average of the means over the period chosen. This difference is compared to the average difference over the time period. Comparing the differences of the averages allows for the commodities volatility. The result is multiplied by a constant to ensure that most values fall within the standard range of +/- 100.

$$CCI = (AveP - SMA\_of\_AveP) / (0.015 * Mean Deviation)$$

where,

CCI = Commodity Channel Index

AveP = Average Price =  $(High + Low + Close) / 3$  (Also known as the Typical Price)

The 0.015 constant ensures 70 to 80 percent of CCI values fall within the +100 to -100 range.

## Chaikin Money Flow (CMF)

#### Description

Chaikin Money Flow (CMF) is a volume weighted average of Accumulation/Distribution over the specified period. The standard CMF period is 21 days. The principle behind the Chaikin Money Flow, is the nearer the close is to the high, the more accumulation has taken place. Conversely the nearer the close is to the low, the more distribution has taken place. If the price action consistently closes above the bar's midpoint on increasing volume then the Chaikin Money Flow will be positive. Conversely, if the price action consistently closes below the bar's midpoint on increasing volume, then the Chaikin Money Flow will be a negative value.

#### Interpretation

- A CMF sell signal occurs when price action develops a higher high into overbought zones and the CMF diverges with a lower high and begins to fall.
- A CMF buy signal occurs when price action develops a lower low into oversold zones and the CMF diverges with a higher low and begins to rise.
- A CMF value above the zero line is a sign of strength in the market, and a value below the zero line is a sign of weakness in the market.
- The Chaikin Money Flow provides excellent breakout confirmation. Wait for the CMF to confirm the breakout direction of price action through trend lines or support and resistance lines. For example, if price breaks upwards through resistance then wait for the CMF to have a positive value, thus confirming the break out direction.

#### Calculation

$$CMF = n\text{-day Sum of } (((C - L) - (H - C)) / (H - L)) \times Vol / n\text{-day Sum of Vol}$$

where,

n = number of periods, typically 21

H = high  
L = low  
C = close  
Vol = volume

## Chande Momentum Oscillator (CMO)

### Description

The Chande Momentum Oscillator is similar to RSI or Stochastics. It is calculated by dividing the sum of up day and down day activity into the difference of up day and down day activity. The result is then multiplied by 100 to arrive at an indicator that oscillates between -100 and 100. A typical value for number of periods, *Period*, for the CMO is 20.

### Interpretation

- CMO reaches extreme levels at 50 for overbought and -50 for oversold. You can also look for signals based on the CMO crossing above and below a signal line composed of a 9 period moving average of the 20 period CMO.
- CMO measures the trend strength, the higher the CMO value the stronger the trend, whereas low CMO values indicate sideways trading ranges.
- If underlying prices make a new high or low that isn't confirmed by the CMO this divergence can signal a price reversal.
- CMO often forms chart patterns which may not show on the underlying price chart, such as double tops and bottoms and trend lines. Also look for support or resistance on the CMO.

### Calculation

$$\text{CMO} = 100 * ((\text{Su} - \text{Sd}) / (\text{Su} + \text{Sd}))$$

where,

Su = Sum of prices on up days for the specified *Period*

Sd = Sum of prices on down days for the specified *Period*

## Cup with Handle

### Description

William O'Neil's Cup with Handle is a bullish continuation pattern that marks a consolidation period followed by a breakout. There are two parts to the pattern: the cup and the handle. The cup forms after an advance and looks like a bowl or rounding bottom. As the cup is completed, a trading range develops on the right hand side and the handle is formed. A subsequent breakout from the handle's trading range signals a continuation of the prior advance.

### Interpretation

- Base should occur over at least 8 weeks but can last a year or longer. The stock corrects 20-30% from its peak (left side of the cup), but can correct as much as 50%.
- Handle is the shakeout period. Handle lasts at least a week and drifts downward 10-15% in normal markets but can drift as much as 20-30% in severe markets.
- Handle should drift sideways or preferably downward and volume should dry up during this period.
- Handle should occur in the upper half of the cup, preferably starting within 15% of the previous high (left side of the cup).
- Handle should also form above the stock's 200-day moving average.
- The "pivot point" or buy point occurs when the stock breaks out or moves upward through the old point of resistance (right side of the cup). This breakout should occur on at least a 50-60% increase.

Note: ATP displays Cup with Handle regardless of a breakout. This was done to display as many Cup patterns as possible and allow the user to track the subsequent breakout.

### Calculation

The left and right "lips" of the cup portion must be "high" pivot points. That is, the high prices on those days must be higher than the five previous and following high prices. The difference between the high prices on the "lips" be no more than 10% different than their average price. The number of periods (i.e. days or weeks) between the lips must be greater than or equal to 8 or less- than or equal to 251. The lowest low within the cup must be at least 50% of the average high price of the lips. The highest high within the cup must be less than 110% of the average high price of the lips. The slope of a least-squares fit to the 8 prices (average of high and low) prior to the cup be above .005 times the average price of the lips. This means that each of the preceding 8 prices increases, on average .5% of the average lip price. The R<sup>2</sup> of the least-squares fit to the 8 prices must be at least .5. This means that the prices must form a reasonably identifiable trend. The handle ends with the next price after the cup that is equal to or greater than the average lip price. The length of the handle must be at least .1 times the width of the cup and less than 2 times the width of the cup. A parabola fit to the prices within the cup portion must have a minimum value that is at most 90% of the average lip price. If any cup pattern overlaps another, the longer of the two is preserved and the shorter is eliminated.

## Exponential Moving Average (EMA)

### Description

EMA returns the Exponential Moving Average of the specified *Period*. EMA is similar to Simple Moving Average (SMA), in that it averages the data over a period of time. However, whereas SMA just calculates a straight average of the data, EMA applies more weight to the data that is more current. The most weight is placed on the most recent data point. Because of the way it's calculated, EMA will follow prices more closely than a corresponding SMA.

### Interpretation

- Use the same rules that we apply to SMA when interpreting EMA. Keep in mind, though, that EMA is generally more sensitive to price movement. This can be a double-edged sword. On the one hand, it can get you into trends a bit earlier than an SMA would. On the other hand, the EMA will probably experience more whipsaws than a corresponding SMA.
- Use the EMA to determine trend direction, and trade in that direction. When the EMA rises, then buy when prices dip near or a bit below the EMA. When the EMA falls, then sell when prices rally towards or a bit above the EMA.
- Moving averages can also indicate support and resistance areas. A rising EMA tends to support the price action and a falling EMA tends to provide resistance to price action. This reinforces the idea of buying when price is near the rising EMA or selling when price is near the falling EMA.
- All Moving Averages, including the EMA are not designed to get you into a trade at the exact bottom and out again at the exact top. They tend to ensure you're trading in the general direction of the trend, but with a delay at the entry and exit. The EMA has a shorter delay than the SMA with the same period.

### Calculation

You should notice how the EMA use the previous value of the EMA in its calculation, this means the EMA includes all the price data within its current value. The newest price data has the most impact on the Moving Average and the oldest prices data has only a minimal impact.

$$EMA = (K \times (C - P)) + P$$

where,

C = Current Price

P = Previous periods EMA (A SMA is used for the first periods calculations)

K = Exponential smoothing constant

The smoothing constant K, applies appropriate weight to the most recent price. It uses the number of periods specified in the moving average. With wealth Lab you have a choice of two methods for calculating the smoothing constant.

Formula for calculating the exponent; Wealth-Lab's original method:

$$K = 2 / (1 + \text{Periods})$$

## Fibonacci Indicators

Fibonacci numbers are a sequence of numbers in which each successive number is the sum of the two previous numbers:

- 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 610, and so on.

## Fibonacci Arc

### Description

Fibonacci Arcs are displayed by first drawing a trend line between two extreme points. Three arcs are then drawn, centered on the second extreme point, so they intersect the trend line at the Fibonacci levels of 38.2%, 50.0%, and 61.8%.

## Fibonacci Fan

### Description

Fibonacci Fan Lines are displayed by drawing a trend line between two extreme points. Then an "invisible" vertical line is drawn through the second extreme point. Three trend lines are then drawn from the first extreme point so they pass through the invisible vertical line at the Fibonacci levels of 38.2%, 50.0%, and 61.8%.

## Fibonacci Retracement

### Description

Fibonacci Retracements are displayed by first drawing a trend line between two extreme points. A series of nine horizontal lines are drawn intersecting the trend line at the Fibonacci levels of 0.0%, 23.6%, 38.2%, 50%, 61.8%, 100%, and 161.8%.

## Fibonacci Time Zones

### Description

Fibonacci Time Targets (or Fibonacci Time Zones) are a series of vertical lines. They are spaced at the Fibonacci intervals of 1, 2, 3, 5, 8, 13, 21, 34, etc. The interpretation of Fibonacci Time Targets involves looking for significant changes in price near the vertical lines.

## Keltner Channel (Upper and Lower)

### Description

Keltner Bands are a type of price channel first described by Chester W. Keltner in his book *How to Make Money in Commodities*. They are fixed bands that are plotted above and below a simple moving average of average price.

The Keltner indicators in Wealth-Lab take two parameters. *Period1* specifies the period to smooth highs - lows, and *Period2* specifies the period to use to smooth Average Price in the calculation (see below). Note that because Keltner Bands are defined to use average price, and highs minus lows, the indicator does not take a Price Series parameter like many other indicator functions.

### Interpretation

- The classic interpretation of Keltner band is to go long when the upper band is penetrated, and reverse position and enter short when the lower band is penetrated.
- Keltner Bands can also be used to define "normal" trading ranges for markets. Price movement outside of the bands can be considered an anomaly, and therefore a trading opportunity.

### Calculation

Average Price (AP) = (Close + High + Low) / 3

Band Moving Average = *Period1* bar Simple Moving Average (SMA) of the True Range

Center Line = *Period2* bar SMA of AP

Upper Band = Center Line + 2\*Band MA

Lower Band = Center Line - 2\*Band MA

The True Range for today is the greatest of the following:

- . Today's high minus today's low.
- . The absolute value of today's high minus yesterday's close.
- . The absolute value of today's low minus yesterday's close.

## Linear Regression

### Description

The Linear Regression Line indicator in ATP gathers the prices for the number of specified periods and finds a straight line which best fits all the prices using a linear regression model. This model uses every point on the chart to determine a trend line that gives a good estimation of the entire chart with a single line.

### Interpretation

- Since the Linear Regression indicator displays the statistically-predicted price value, you can look for cases where price veers sharply from the predicted line through that period.

### Calculation

Linear Regression is a rather complex statistical calculation. It uses the least square method to fit a trend line to the data by minimizing the distance between the price and the Linear Regression trend line. It is not simply a trend line, but rather a best-fit linear regression line, using a formula similar to the standard deviation.

## MACD

### Description

MACD returns the Moving Average Convergence Divergence indicator. MACD is a momentum oscillator, yet its primary use is to trade trends. Although it is an oscillator is not used as an over bought or oversold indicator. It appears on the chart as two lines which oscillates without boundaries. The crossover of the two lines give trading signals similar to a two moving average system.

The two lines are called, MACD Line or fast line and MACD Signal or slow line. The MACD line is displayed as a solid line on the chart, and the MACD signal line is displayed as a dashed line on the chart.

### Interpretation

- MACD crossing above zero is considered bullish and crossing below zero bearish. Secondly, when MACD turns up from below zero it is considered bullish. When it turns down from above zero this is considered bearish.
- Enter a long position and close any short positions when the MACD fast line crosses from below to above the signal line. The further below the zero line the stronger the signal.
- Enter a short position and close any long positions when the MACD fast line crosses from above to below the signal line. The further above the zero line the stronger the signal.
- Divergence between the MACD and the price action is a strong signal when it confirms the crossover signals.
- During trading ranges the MACD will whipsaw, the fast line crosses back and forth across the signal line. Avoid trading or cut your losses very quickly.

### Calculation

An *approximated* MACD can be constructed by subtracting the value of a 26 day Exponential Moving Average (EMA) from a 12 period EMA. The shorter EMA is constantly converging toward, and diverging away from, the longer EMA. This causes MACD to oscillate around the zero level. This is the method used in

Active Trader Pro.

MACD line = EMA (12, close) - EMA (26, close), and  
MACD Signal = EMA (9, MACD Line)

where,

EMA= Exponential Moving Average

MACD line = MACD fast line, displayed as a solid line on the chart

MACD Signal = MACD signal line or slow line, displayed as a dashed line on the chart

The classical MACD calculation, Wealth-Lab's MACD indicator, is based on 2 EMAs with exponents 0.075 and 0.15. A 26 period EMA has an exponent of 0.074074 and the 12 has 0.153846.

## Money Flow Index

### Description

Money Flow Index measures the flow of money into and out of a security over the specified *Period*. Its calculation is similar to that of the Relative Strength Index (RSI), but takes volume into account in its calculation. The indicator is calculated by accumulating positive and negative Money Flow values (see Money Flow indicator), then creating a Money Ratio. The Money Ratio is then normalized into the MFI oscillator form.

### Interpretation

- Look for oversold levels below 20 and overbought levels above 80. These normally occur before the underlying price chart forms a top or a bottom. Levels may change depending on market conditions. Ensure that the level lines cut across the highest peaks and the lowest troughs. During strong trends the MFI may remain in overbought or oversold for extended periods.
- If underlying price makes a new high or low that isn't confirmed by the MFI, this divergence can signal a price reversal. MFI divergences from price indicates very strong buy or sell signal.
- The mid point level of 50 will often act as support or resistance if the FMI bounce off the 50 level. Crosses of the 50 level can be used as a buying or selling signal. When MFI cross above then buy, when FMI crosses below then sell.

### Calculation

The Money Flow Index requires a series of calculations. First, the period's Typical Price is calculated.

$$\text{Typical Price} = (\text{High} + \text{Low} + \text{Close}) / 3$$

Next, Money Flow (not the Money Flow Index) is calculated by multiplying the period's Typical Price by the volume.

$$\text{Money Flow} = \text{Typical Price} * \text{Volume}$$

If today's Typical Price is greater than yesterday's Typical Price, it is considered Positive Money Flow. If today's price is less, it is considered Negative Money Flow.

Positive Money Flow is the sum of the Positive Money over the specified number of periods. Negative Money Flow is the sum of the Negative Money over the specified number of periods.

The Money Ratio is then calculated by dividing the Positive Money Flow by the Negative Money Flow.

$$\text{Money Ratio} = \text{Positive Money Flow} / \text{Negative Money Flow}$$

Finally, the Money Flow Index is calculated using the Money Ratio.

## Momentum

### Description

Momentum is the difference between current price and the price a specified number of bars ago, *Period*. The momentum indicator shows the speed at which price changes from one period to another. It gives an excellent indication of the market participant's commitment to the current trend. When the momentum begins to slow or turn, it indicates diminishing commitment and a loss of momentum. This indicator is a leading or coincidental indicator. A momentum value above zero indicates that prices are moving up, and below zero moving down.

The momentum indicator has overbought and oversold zones. These zones are defined by lines that are placed so the Momentum indicator spends about 5% of its time within the zones. The lines should be adjusted according to market conditions.

### Interpretation

- In ranging markets, go long when the indicator falls below the oversold line then rises back above the oversold line.
- In ranging markets, go short when indicator rises above the overbought line then falls back below the overbought line.
- In ranging markets, go long on bullish divergences, if the indicator's first trough is in the oversold zone.
- In ranging markets, go short on bearish divergences, if the indicator's first peak is in the overbought zone.
- An uptrend can be confirmed using a trend following indicator. Go long when the momentum indicator turns up from below the center line. Exit using the trend following indicator. Divergences of the momentum and price in during the trend can be misleading.
- A downtrend can be confirmed using a trend following indicator. Go short when the indicator turns down from above the center line. Exit using the trend following indicator. Divergences of the momentum and price in during the trend can be misleading.

### Calculation

Momentum = (Price today) - (Price n periods ago)

Typically, the closing value of the Price Series is used.

## Money Flow

### Description

Money Flow returns the average price multiplied by volume. Money Flow is the core component of the Money Flow Index (MFI) indicator. This is not really an indicator, but a mathematical function used to construct other indicators.

### Interpretation

See the Money Flow Index (MFI) indicator and the example script application below.

### Calculation

Money Flow is the average price multiplied by Volume.

Average Price = #AverageC = (High + Low + Close) / 3

Money Flow = Volume x Average Price

## Moving Average Envelope

### Description

Moving average envelopes are lines plotted a certain percentage (default is 5%) above and below a moving average of price. They are also known as trading bands, moving average bands, price envelopes and percentage envelopes.

### Interpretation

The logic behind envelopes is that overzealous buyers and sellers push the price to the extremes (i.e., the

upper and lower bands), at which point the prices often stabilize by moving to more realistic levels. This is similar to the interpretation of Bollinger Bands. When the security's price touches the upper band and turns down, the security might be at an overbought level. Conversely, when the security's price touches the lower band and turns up, the security might be at an oversold level.

## Negative Volume Index (NVI)

### Description

The Negative Volume Index was created by Norman Fosback, and its purpose is to expose where "smart money" investment action is occurring. The assumption is that smart money, mostly floor traders, will produce moves in price with less volume than the rest of the crowd.

### Interpretation

Fosback compared the NVI with its one year (255 bar) moving average. When NVI is above the moving average, he calculated that there is a 96% chance that a bull market is in progress, and when it is below the average a 53% chance of a bear market.

### Calculation

If today's volume is less than yesterday's volume then:

$$NVI = Previous\ NVI + \left( \frac{Close - Previous\ Close}{Previous\ Close} * Previous\ NVI \right)$$

If today's volume is greater than or equal to yesterday's volume then:

$$NVI = Previous\ NVI$$

Because falling prices are usually associated with falling volume, the NVI usually trends downward.

## NYSE TRIN

### Description

The Trin is a breadth oscillator which aids in the measurement of internal market strength or weakness. Also known as The Arms Index (it was invented by Richard Arms), the Trin is an acronym that stands for The Trading Index.

### Interpretation

The Trin measures volatility within the stock market. The Trin represents the relationship between advancing and declining issues by measuring their volume flow. The Trin is commonly used as a short term trading tool. A rising Trin depicts a weak market and a falling Trin depicts a strong market.

### Calculation

Advancing Issues / Declining Issues

-----  
Advancing Volume / Declining Volume

The Trin will read under 1.0 when advancing stocks are the major source of volume and above 1.0 when declining stocks are the predominant source of volume flow in the market.

## On Balance Volume (OBV)

### Description

On Balance Volume developed by Joseph Granville and described in his "New Key to Stock Market Profits", uses volume to gauge the strength of a market. If prices close up, the current bar's volume is added to OBV, and if prices close down, it is subtracted. The result is an indicator that depicts the flow of volume into and out of a security. It either confirms the quality of the current trend or warns of an impending reversal.

You can often spot divergences between price action and the OBV indicator. For example, if prices make a new high but the move is not accompanied by sufficient volume, OBV will fail to make a new high. Such divergences can be a sign that a trend is nearing completion.

### Interpretation

The actual value of the OBV is unimportant, concentrate on its direction.

- When both price and OBV are making higher peaks and higher troughs, the up trend is likely to continue.
- When both price and OBV are making lower peaks and lower troughs, the down trend is likely to continue.
- When price continues to make higher peaks and OBV fails to make higher peak, the up trend is likely to stall or fail.
- When price continues to make lower troughs and OBV fails to make lower troughs, the down trend is likely to stall or fail.
- If during a trading range, the OBV is rising then accumulation may be taking place and is a warning of an upward break out.
- If during a trading range, the OBV is falling then distribution may be taking place and is a warning of a downward break out.

### Calculation

On Balance Volume is calculated by adding the day's volume to a cumulative total when the security's price closes up, and subtracting the day's volume when the security's price closes down.

If today's close is greater than yesterday's close then:

$$OBV = \text{Yesterday's } sOBV + \text{Today's } sVolume$$

If today's close is less than yesterday's close then:

$$OBV = \text{Yesterday's } sOBV - \text{Today's } sVolume$$

If today's close is equal to yesterday's close then:

$$OBV = \text{Yesterday's } sOBV$$

## Parabolic SAR

### Description

Welles Wilder's Parabolic SAR is actually a type of trailing stop-based system, but it's often used as an indicator. The SAR (Stop And Reverse) uses a trailing stop level that follows prices as they move up or down. The stop level increases speed based on an "Acceleration Factor". When plotted on the chart, this stop level resembles a parabolic curve, thus the indicator's name. The Parabolic function accepts 3 parameters. The first two control the Acceleration during up and down moves, respectively. The last parameter determines the maximum Acceleration.

The Parabolic assumes that you are trading a trend and therefore expects price to change over time. If you are long the Parabolic SAR will move the stop up every period, regardless of whether the price has moved. It moves down if you are short.

### Interpretation

- The Parabolic SAR trading system uses the parabolic level as a Stop and Reverse point. This stop is calculated for the next period. When the stop is hit, this signals to close the trade and take a new trade in the opposite direction. The system is typically always in the market.
- When price movement trades in a narrow trading range, the Parabolic SAR will whipsaw.
- The Parabolic is a trend following indicator, it is useless in the absence of a trend. Use another indicator, such as ADXR, to determine trend strength.
- The Parabolic excels in fast moving trends that accelerate as they progress. The stops are also calculated to accelerate, hence you need to have the correct "Acceleration Factor" to match the market you are trading. Up and down accelerations parameters maybe different.

- The indicator is usually shown as a series of dots above or below the price bars. The dots are the stop levels. You should be short when the stops are above the bars and long when the stops are below the bars. When a stop is hit then trade in opposite direction.

#### Calculation

$SAR_t = SAR_c + AF * (EP - SAR_c)$ , where

SAR<sub>t</sub> = the stop for the next bar

SAR<sub>c</sub> = the stop for the current bar

AF = Acceleration Factor

EP = Extreme Point for current trade

The AF used by Wilder is 0.02. This means move the stop 2 percent of distance between EP and the original stop. Each time the EP changes, the AF increases by 0.02 up to the maximum acceleration, 0.2 in Wilders' case.

If long then EP is the highest high since going long, if short then EP is the lowest low since going short.

### Percent B

#### Description

The Percent B indicator reflects closing price as a percentage of the lower and upper Bollinger Bands.

#### Interpretation

If the closing price is the same as the upper Bollinger Band value, Percent B would be 100 (percent), if the closing price is above the upper Bollinger Band, Percent B would be greater than 100. If the close is equal to the moving average, Percent B is 50 percent, and if the close is equal to the lower Bollinger Band, Percent B would be zero. If the close is below the lower band, Percent B would be negative.

### Pivot Point (High and Low)

#### Description

Pivot Points are used to show the potential reversal in chart patterns. Points are displayed based on a new high or low resulting from the previous and/or preceding 5 periods. Points are displayed for the time frame selected and the periods are defined by the current frequency setting.

#### Interpretation

- 11 bars are needed to form a pivot point
- The 6<sup>th</sup> bar of the 11 has a high (or low) price that is greater (or less) than all other 10 bars. This will plot the pivot point image (red or green arrow) on the tip of each bar.

An example that would cause a High Pivot Point to be displayed:

Bar 1	2	3	4	5	6	7	8	9	10	11
5.02	5.04	5.00	5.04	5.09	5.11	5.04	5.00	5.00	5.01	5.05

In this example, a red arrow would appear at the tip of the 6<sup>th</sup> bar.

### Positive Volume Index (PVI)

#### Description

The Positive Volume Index ("PVI") focuses on days where the volume increased from the previous day. The premise being that the "crowd" takes positions on days when volume increases.

#### Interpretation

Interpretation of the PVI assumes that on days when volume increases, the crowd-following "uninformed" investors are in the market. Conversely, on days with decreased volume, the "smart money" is quietly taking positions. Thus, the PVI displays what the not-so-smart-money is doing. (The [Negative Volume Index](#), displays what the smart money is doing.) Note, however, that the PVI is not a contrarian indicator. Even though the PVI

is supposed to show what the not-so-smart-money is doing, it still trends in the same direction as prices.

The following table summarizes NVI and PVI data from 1941 through 1975 as explained in [Stock Market Logic](#), by Norman Fosback.

Indicator	Indicator Relative to One-Year Moving Average	Probability that Bull market is in Progress	Probability that Bear market is in Progress
NVI	Above	96%	4%
PVI	Above	79%	21%
NVI	Below	47%	53%
PVI	Below	33%	67%

As you can see, NVI is excellent at identifying bull markets (i.e., when the NVI is above its one-year moving average) and the PVI is pretty good at identifying bull markets (when the PVI is above its moving average) and bear markets (i.e., when the PVI is below its moving average).

#### Calculation

If today's volume is greater than yesterday's volume then:

$$PVI = \text{Yesterday's PVI} + \left( \frac{\text{Close} - \text{Yesterday's Close}}{\text{Yesterday's Close}} \times \text{Yesterday's PVI} \right)$$

If today's volume is less than or equal to yesterday's volume then:

$$PVI = \text{Yesterday's PVI}$$

Because rising prices are usually associated with rising volume, the PVI usually trends upward.

## Price/Earnings Ratio

#### Description

P/E Ratio is a valuation ratio where a company's current share price is divided by its per-share earnings.

#### Interpretation

P/E Ratio is one of the most widely watched measures of valuation for both the stock market as a whole and individual stocks. Many use it to determine whether the market (or a stock) is "expensive" or "cheap". In general, a high P/E suggests that investors are expecting higher earnings growth in the future compared to companies with a lower P/E. P/E is sometimes referred to as the "multiple", because it shows how much investors are willing to pay per dollar of earnings. If a company is trading at a P/E of 15, an investor would be paying \$15 for \$1 of earnings.

#### Calculation

The P/E ratio is calculated as follows:

$$= (\text{Market Value per Share}) / (\text{Earnings per Share (EPS)})$$

Where EPS is the summation of the last four quarters (TTM - Trailing Twelve Months).

To increase the accuracy of the charted P/E ratio indicator, the following parameters are used in determining if a P/E ratio indicator should be created for a given timeframe:

- The most recent quarterly earnings figure must be less than 151 days old. This ensures the indicator is not created with today's prices using old earnings data.
- Each of the remaining three quarterly earnings figures must be between 70-115 days apart. This will help to ensure that restated earnings are used and not the originally released earnings, as well as verify that only 1 years worth of quarterly figures are used. If there are multiple earnings announcements within a particular window, the most recent will be used.

The P/E ratio indicator is displayed for a given timeframe, or part of the timeframe, only if the earnings data is complete enough to chart the indicator for at least 50% of the requested time frame.

## Price Oscillator

### Description

The Price Oscillator displays the difference between two moving averages of a security's price and is expressed as a percentage. The Price Oscillator is almost identical to the MACD, except that the Price Oscillator can use any two user-specified moving averages. (The MACD always uses 12 and 26-day moving averages, and always expresses the difference in points.)

### Interpretation

Moving average analysis typically generates buy signals when a short-term moving average (or the security's price) rises above a longer-term moving average. Conversely, sell signals are generated when a shorter-term moving average (or the security's price) falls below a longer-term moving average. The Price Oscillator illustrates the cyclical and often profitable signals generated by these one or two moving average systems.

### Calculation

$$PO = \left( \frac{SMA_{first} - SMA_{second}}{SMA_{first}} \right) \times 100 \qquad SMA = \frac{\sum_{j=1}^n (ClosingPrice)_j}{n}$$

## Price Rate-of-Change

### Description

The Price Rate of Change (ROC) indicator provides a percentage that the security's price has changed over the specified *Period*. The Rate of Change shows the speed at which price changes from one period to another. Sometimes this is referred to as momentum. It gives an excellent indication of the market participants' commitment to the current trend. When the ROC begins to reverse or turn, it indicates diminishing commitment and a loss of momentum. ROC is a leading or coincidental indicator.

Like other momentum indicators, ROC has overbought and oversold zones. These zones are defined by lines that are placed so that ROC spends about 5% of its time within the zones. The lines should be adjusted according to market conditions.

### Interpretation

- In ranging markets, go long after ROC falls below the oversold line then rises back above it.
- In ranging markets, go short after ROC rises above the overbought line then falls back below it.
- In ranging markets, go long on bullish divergences if ROC's first trough is in the oversold zone.
- In ranging markets, go short on bearish divergences if ROC's first peak is in the overbought zone.
- In an up trend confirmed by a trend-following indicator, go long when ROC turns up from below the center line. Exit using the trend following indicator. Divergences of ROC and price during a trend can be misleading.
- In a down trend, confirmed by a trend-following indicator, go short when the ROC turns down from above the center line. Exit using the trend following indicator. Divergences of ROC and price during a trend can be misleading.

### Calculation

ROC is the percentage change between the current price with respect to an earlier closing price n periods ago.

$$PROC = \left( \frac{\text{CurrentClosingPrice} - \text{PreviousClosingPrice}}{\text{PreviousClosingPrice}} \right) \times 100$$

## Relative Strength Comparison

### Description

Relative Strength Comparison compares two securities to show how the securities are performing relative to each other.

### Interpretation

Relative Strength Comparison compares a security's price change with that of a "base" security. When the Relative Strength Comparison indicator is moving up, it shows that the security is performing better than the base security. When the indicator is moving sideways, it shows that both securities are performing the same (i.e., rising and falling by the same percentages). When the indicator is moving down, it shows that the security is performing worse than the base security (i.e., not rising as fast or falling faster).

Relative Strength Comparison is often used to compare a security's performance with a market index. It is also useful in developing spreads (i.e., buy the best performer and short the weaker issue).

### Calculation

The Relative Strength Comparison indicator is calculated by dividing one security's price by a second security's price (the "base" security). The result of this division is the ratio, or relationship, between the two securities.

## Relative Strength Index (RSI)

### Description

The RSI function returns the Relative Strength Index indicator. RSI is one of the classic momentum indicators and was developed by Wells Wilder. RSI measures a market's internal strength by dividing the average of the sum of the up day closing prices by the average of the sum of the down day closing prices over a specific period of time. It returns a value within the range of 0 to 100. The RSI is a leading or a coincidental indicator. Popular averaging periods for the RSI are 9, 14 and 25. Wilder used 14 periods. Use the *Period* that works best for you. The indicator becomes more volatile and amplitude widens with fewer periods used.

### Interpretation

- The classic way to interpret RSI is to look for oversold levels below 30 and overbought levels above 70. These normally occur before the underlying price chart forms a top or a bottom. Note you should change the levels depending on market conditions. Ensure the level lines cut across the highest peaks and the lowest troughs. During strong trends the RSI may remain in overbought or oversold for extended periods.
- RSI also often forms chart patterns which may not show on the underlying price chart, such as double tops and bottoms and trend lines. Also look for support or resistance on the RSI.
- If underlying prices make a new high or low that isn't confirmed by the RSI this divergence can signal a price reversal. RSI divergences from price indicates very strong buy or sell signal.
- Swing Failures. If the RSI makes a lower high followed by a downside move below a previous low, then a Top Swing Failure has occurred. If the RSI makes a higher low followed by an upside move above a previous high, then a Bottom Swing Failure has occurred.
- The mid point level of 50 will often act as support or resistance if the RSI bounces off the 50 level. Crosses of the 50 level can be used as a buying or selling signal. When RSI crosses above then buy, when RSI crosses below then sell.
- RSI can be used to find dips in strong trends. Use trend indicator to determine a strong up trend then if the RSI is below 50, you have a dip in the up trend. In strong down trends use RSI above 50 to detect small rallies. Buy the dip and sell the small rally.

### Calculation

The RSI is a fairly simple formula, but is difficult to explain without pages of examples. Refer to Wilder's book for additional calculation information. The basic formula is:

$$RSI = 100 - \left( \frac{100}{1 - \left( \frac{AverageUpClose}{AverageDownClose} \right)} \right)$$

## Simple Moving Average (SMA)

### Description

SMA returns the **Simple Moving Average** indicator. Moving averages are one of the core indicators in technical analysis, and there are a variety of different versions. SMA is the easiest moving average to construct. It is simply the average price over the specified *Period*. The average is called "Moving" because it is plotted on the chart bar by bar, forming a line that moves along the chart as the average value changes.

### Interpretation

- SMAs are often used to determine **Trend Direction**. If the SMA is moving up, the trend is up, moving down and the trend is down. A 200 bar SMA is common proxy for the long term trend. 60 bar SMAs are typically used to gauge the intermediate trend. Shorter period SMAs can be used to determine shorter term trends.
- SMAs are commonly used to **smooth** price data and technical indicators. Applying an SMA smooths out choppy data. The longer the period of the SMA, the smoother the result, but the more lag that is introduced between the SMA and the source.
- **SMA Crossing Price** is often used to trigger trading signals. When prices cross above the SMA go long, when they cross below the SMA go short.
- **SMA Crossing SMA** is another common trading signal. When a short period SMA crosses above a long period SMA, go long. Go short when the short term SMA crosses back below the long term.

### Calculation

SMA is simply the mean, or average, of the values in a *Series* over the specified *Period*.

## Standard Deviation

### Description

Standard Deviation is the statistical measure of market volatility. If prices trade in a tight narrow trading range then the standard deviation will return a low value indicating volatility is low. Conversely if prices swing wildly up and down then standard deviation returns a high value indicating volatility is high. What it does is measure how widely prices are dispersed from the average or mean price.

### Interpretation

- Standard deviation rises as prices become more volatile. As price action calms, standard deviation heads lower.
- Market tops accompanied by increase volatility over short periods of time, indicate nervous and indecisive traders. Or market tops with decreasing volatility over long time frames, indicate maturing bull markets.
- Market bottoms accompanied by decreased volatility over long periods of time, indicate bored and disinterested traders. Or market bottoms with increasing volatility over relatively sort time periods, indicate panic sell off.

### Calculation

In Wealth-Lab you can choose between standard deviation *of a sample* (compatible with Excel STDEV) or *of a population* (compatible with Excel STDEVP) in the *Indicator Calculations* section of the Options dialog.

See the User Guide in Wealth-Lab for details. ATP uses the STDEVP.

## Standard Error

### Description

Returns the Standard Error of the estimate for a Linear Regression line of the specified *Period*. Standard Error measures the difference between actual price and the estimated price of the Linear Regression line at every point along the line. The lower the standard error, the closer actual prices have met the estimate. If all the closing prices matched the Linear Regression values for the specified period, then the Standard Error would be Zero.

### Interpretation

- The larger the error the less reliable the trend. As the price has greater variance around the Linear Regression line, prices are volatile. This can be caused by the changes in the prevailing trend within the specified number of periods.
- The smaller the error the more reliable the trend, as prices are congregating around the Linear Regression Linear line.
- If RSquared and Standard Error are at extreme levels and then they begin to converge then expect a change in the trend.

### Calculation

Standard Error is a fairly complex statistical calculation. It uses the least square fit method to fit a trend line to the data by minimizing the distance between the price and the Linear Regression trend line. This is used to find an estimated of the next period's price. The Standard Error indicator returns the statistical difference between the estimate and the actual price.

## Stochastics Oscillator

### Stochastics Fast

#### Description

The Stochastic Oscillator measures how much price tends to close in the upper or lower areas of its trading range. The indicator can range from 0 to 100. Values near 0 indicate that most of the recent price action closed near the days lows, and readings near 100 indicate that prices are closing near the upper range.

The Stochastic is a momentum indicator. The closing price tends to close near the high in an uptrend and near the low in a downtrend. If the closing price then slips away from the high or the low, then momentum is slowing. Stochastics are most effective in broad trading ranges or slow moving trends.

Two lines are graphed, the fast oscillating %K and a moving average of %K, commonly referred to as %D.

Two parameters are entered as follows:

- Periods: the number of data points upon which to calculate the %K
- %K Smoothing: the number of periods for the simple moving average of %K – this produces %D

#### Interpretation

The classic way to interpret the Stochastic is to wait for %K to reach an extreme level. A level above 70 typically indicates an overbought condition, while below 30 indicates an oversold level. While these penetrations of extreme levels indicate a warning, the actual buy/sell signals occur when %K crosses %D

- %D is used as a signal line for %K: A buy is triggered when %K crosses above %D from a level typically below 30. A sell is triggered when StochK crosses below StochD from typically above 70.
- Ranging markets: go long on bullish divergences, especially where the first trough is below 30.
- Ranging markets: go short on bearish divergences, especially where the first peak is above 70.
- Trending markets: when either Stochastic line crosses below 30 (signal day), place a stop order to go long if prices rise above the high of the signal day or any subsequent day with a lower low. Place stop order below the low of the same day.

- Trending markets: when either Stochastic line crosses above 70 (signal day), place a stop order to go short if prices falls below the low of the signal day or any subsequent day with a higher high. Place a stop loss order above the high of the same day.
- Trending markets use trend following indicators to exit. Take profits on divergences, if confirmed by the trend following indicator.

#### Calculation

$\%K = ((\text{Price today} - \text{lowest low for } n \text{ days}) / (\text{highest high for } n \text{ days} - \text{lowest low for } n \text{ days})) / 100$

n = number of periods, normally 14

$\%D = \text{Simple Moving Average of } \%K$

#### Stochastics Slow

##### Description

Stochastics Slow displays two lines, %D from the Stochastics Fast and smoothed version of the %D. In other words, it is a simple moving average of %K and a simple moving average of the simple moving average of %K. The second moving average is referred to as %D-Slow.

Three parameters are entered as follows:

- Periods: the number of data points upon which to calculate the %K
- %K Smoothing: the number of periods for the simple moving average of %K – this produces %D
- %D Smoothing: the number of periods for the simple moving average of %D – this produces %D-Slow

The indicator can range from 0 to 100. Values near 0 indicate that most of the recent price action closed near the day's lows, and readings near 100 indicate that prices are closing near the upper range.

The Stochastic Oscillator is a momentum indicator. The closing price tends to close near the high in an uptrend and near the low in a downtrend. If the closing price then slips away from the high or the low, then momentum is slowing. Stochastics are most effective in broad trading ranges or slow moving trends.

##### Interpretation

- %D is used as a signal line for %K. A buy is triggered when %K crosses above %D from a level typically below 30. A sell is triggered when %K crosses below %D from typically above 70.
- Ranging markets: go long on bullish divergences, especially where the first trough is below 30.
- Ranging markets: go short on bearish divergences, especially where the first peak is above 70.
- Trending market: when either Stochastic line crosses below 30 (signal day), place a stop order to go long if prices rise above the high of the signal day or any subsequent day with a lower low. Place stop order below the low of the same day.
- Trending markets: when either Stochastic line crosses above 70 (signal day), place a stop order to go short if prices falls below the low of the signal day or any subsequent day with a higher high. Place a stop loss order above the high of the same day.
- Trending markets, Use trend following indicators to exit. Take profits on divergences, if confirmed by the trend following indicator.

#### Calculation

$\%K = ((\text{Today's Close} - \text{Lowest Low in } n \text{ Periods}) / (\text{Highest High in } n \text{ Periods} - \text{Lowest Low in } n \text{ Periods})) * 100$

$\%D = \%K \text{ smoothed over } n \text{ periods (SMA of } \%K)$

$\%D \text{ slow} = \text{SMA of } \%D$

n = number of periods, normally 14

#### Typical Price

##### Description

The Typical Price indicator is simply an average of each day's price.

##### Interpretation

The Typical Price indicator provides a simple, single-line plot of the day's average price. Some investors use the Typical Price rather than the closing price when creating moving average penetration systems.

The Typical Price is a building block of the Money Flow Index.

### Calculation

Typical Price is calculated by adding the high, low, and closing prices together, and then dividing by three. The result is the average, or typical price.

$$TP = \frac{(CurrentHigh + CurrentLow + CurrentClose)}{3}$$

## Ultimate Oscillator

### Description

Williams' Ultimate Oscillator uses weighted sums of three oscillators, each using a different time period (7, 14, and 28), which represent short, medium, and long term market trends. The Ultimate Oscillator moves within the range of 0 to 100.

### Interpretation

Williams recommends that you initiate a trade following a divergence and a breakout in the Ultimate Oscillator's trend. The following text summarizes these rules.

Buy when:

1. A bullish divergence occurs. This is when the security's price makes a lower low that is not confirmed by a lower low in the Oscillator.
2. During the bullish divergence, the Oscillator falls below 30.
3. The Oscillator then rises above the highest point reached during the span of the bullish divergence. This is the point at which you buy.

Close long positions when:

1. The conditions are met to sell short (explained below), or
2. The Oscillator rises above 50 and then falls below 45, or
3. The Oscillator rises above 70.

Sell short when:

1. A bearish divergence occurs. This is when the security's price makes a higher high that is not confirmed by a higher high in the Oscillator.
2. During the bearish divergence, the Oscillator rises above 50.
3. The Oscillator then falls below the lowest point reached during the span of the bearish divergence. This is the point at which you sell short.

Close short positions when:

1. The conditions are met to buy long (explained above), or
2. The Oscillator rises above 65, or
3. The Oscillator falls below 30.

## Volatility

### Description

Chaikin's Volatility indicator compares the spread between a security's high and low prices. It quantifies volatility as a widening of the range between the high and the low price.

### Interpretation

- High values indicate that intraday prices have a wide high to low range. Low values indicate that intraday prices have relatively constant high to low range.
- Market tops accompanied by increase volatility over short periods of time, indicate nervous and indecisive traders. Or market tops with decreasing volatility over long time frames, indicate maturing bull markets.
- Market bottoms accompanied by decreased volatility over long periods of time, indicate bored and disinterested traders. Or market bottoms with increasing volatility over relatively sort time periods, indicate panic sell off.

### Calculation

Chaikin's Volatility is calculated by first calculating an exponential moving average of the difference between the daily high and low prices. Chaikin recommends a 10-day moving average.

Next, calculate the percent that this moving average has changed over a specified time period. Chaikin again recommends 10 days.

$$V = \frac{(CurrentDeltaAverage - DeltaAverageNPeriodsAgo)}{DeltaAverageNPeriodsAgo} \times 100$$
$$DeltaAverage = ExponentialMovingAverage(High - Low)$$

## Volume Adjusted Moving Average

### Description

A Volume Adjusted Moving Average identifies or confirms a trend by weighting the day's volume using every time period in the chart.

### Interpretation

### Calculation

- Calculate the average volume using every time period in the entire price series being studied (note that this means that the exact value of the moving average will vary depending on which periods you use).
- Calculate the volume increment by multiplying the average volume by 0.67.
- Calculate each period's volume ratio by dividing each period's actual volume by the volume increment
- Starting at the most recent time period and working backwards, multiply each period's price by the period's volume ratio and cumulatively sum these values until the user-specified number of volume increments is reached. Note that only a fraction of the last period's volume will likely be used.

## Volume Oscillator

### Description

The Volume Oscillator displays the difference between two moving averages of a security's volume. The difference between the moving averages is expressed in points.

### Interpretation

You can use the difference between two moving averages of volume to determine if the overall volume trend is increasing or decreasing. When the Volume Oscillator rises above zero, it signifies that the shorter-term volume moving average has risen above the longer-term volume moving average, and thus, that the short-term volume trend is higher (i.e., more volume) than the longer-term volume trend.

There are many ways to interpret changes in volume trends. One common belief is that rising prices coupled with increased volume, and falling prices coupled with decreased volume, is bullish. Conversely, if volume increases when prices fall, and volume decreases when prices rise, the market is showing signs of underlying

weakness.

The theory behind this is straight forward. Rising prices coupled with increased volume signifies increased upside participation (more buyers) that should lead to a continued move. Conversely, falling prices coupled with increased volume (more sellers) signifies decreased upside participation.

### Calculation

Shorter Moving Average – Longer Moving Average

## Williams %R

### Description

Williams %R is a momentum indicator developed by Larry Williams. Like Stochastic Oscillators (StochK, StochD), %R is used to gauge overbought and oversold levels, and ranges between 0 and 100. However, unlike most other momentum oscillators, the low end of the scale represents an overbought area, and the high end an oversold condition. For this reason Williams %R is often multiplied by -1 and plotted on a negative scale.

Williams %R measures the latest closing price relative to high low range within the past data, thus it reflects buyers and sellers commitment to close the price within that range. At the peak of the buyer's power the oscillator reaches zero, and at the peak of the seller's power, it reaches 100. The overbought region is below 10 percent and the oversold region is over 90 percent.

### Interpretation

A reading of above 80 or 90 indicates oversold levels, and below 20 or 10 indicates overbought. Williams %R has a tendency to peak ahead of price, so it can be a good tool in identifying trend reversals. During strong trends, the Williams %R can remain in the oversold or overbought regions for extended periods of time.

- In ranging markets, go long when the indicator falls below the oversold line then rises back above the oversold line.
- In ranging markets, go short when indicator rises above the overbought line the falls back below the overbought line.
- In ranging markets, go long on bullish divergences, if the indicator's first trough is in the oversold zone.
- In ranging markets, go short on bearish divergences, if the indicator's first peak is in the overbought zone.
- In a up trend or rally, go short if the indicator fails to reach the oversold region and begins to fall. This is a swing failure; it shows the buyers are weakening.
- In a down trend, go long when the indicator fails to reach the overbought region and begins to rise. This is a swing failure; it shows the sellers are weakening.

### Calculation

The formula used to calculate Williams' %R is similar to the Stochastic Oscillator:

$$WR = \left( \frac{HighestHigh - CurrentClose}{HighestHigh - LowestLow} \right) \times (-100)$$

**Note:** it is also common to multiply the above formula by -1, which is an exact inverse. Both are acceptable calculations for this indicator.

## Weighted Moving Average

### Description

WMA returns a linearly-Weighted Moving Average of the Price *Series* over the specified *Period*. Whereas a Simple Moving Average (SMA) calculates a straight average of the data, WMA applies more weight to the data that is more current. The most weight is placed on the most recent data point. Because of the way it's calculated, WMA will follow prices more closely than a corresponding SMA.

### Interpretation

- Use the same rules that we apply to SMA when interpreting WMA. Keep in mind, though, that WMA is generally more sensitive to price movement. This can be a double-edged sword. On the one hand, it can get you into trends a bit earlier than a WMA would. On the other hand, the WMA will probably experience more whipsaws than a corresponding SMA.
- Use the WMA to determine trend direction, and trade in that direction. When the WMA rises, then buy when prices dip near or a bit below the WMA. When the WMA falls, then sell when prices rally towards or a bit above the WMA.
- Moving averages can also indicate support and resistance areas. A rising WMA tends to support the price action and a falling WMA tends to provide resistance to price action. This reinforces the idea of buying when price is near the rising WMA or selling when price is near the falling WMA.
- All Moving Averages, including the WMA are not designed to get you into a trade at the exact bottom and out again at the exact top. They tend to ensure you're trading in the general direction of the trend, but with a delay at the entry and exit. The WMA has a shorter delay than the SMA.

### Calculation

WMA is a *linearly-weighted* moving average that is calculated by multiplying the first data point (oldest in time) by 1, the second by 2, the third by 3, etc. The final result is then divided by the sum of the weights. More recent data is thus more heavily weighted, and contributes more to the final WMA value. WMA excludes price data outside the length of the moving average, *Period*.

$$WMA = (P1 * n + P2 * (n-1) + P3 * (n-2) + \dots) / (n + (n-1) + (n-2) + \dots)$$

where,

P1 = Current Price

P2 = price one bar ago, etc....

n = number of periods