



**ClearStation Education:
Interactive Graph Tool**

Version 1.0
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Introduction

ClearStation's Interactive Graph Tool is a powerful, flexible means of evaluating stocks' technical health and comparing stocks and indices. With the IGT, you can choose among nine technical indicators to help you choose and time your trades. This article is a primer on the indicators ClearStation covers; if you're interested in learning more about any of these indicators, there's a resource list at the end of the article.

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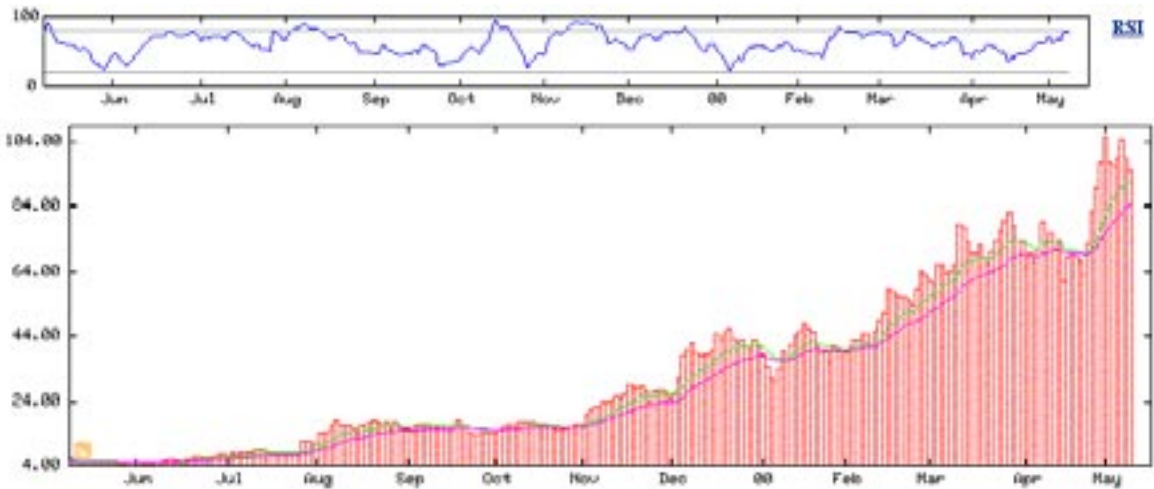
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Relative Strength Index (RSI)

Relative Strength Index (RSI) Most indicators measure a stock's performance by comparing it to that of another stock or index. The Relative Strength Indicator (RSI) is an oscillator that measures a security's price relative to itself and its past performance, thereby indicating its internal strength. This tool is best used in conjunction with the daily price graph. If you compare the downtrend and uptrend of the RSI and price graph below, you will see consistent movement starting in November. As the market became more active, the RSI trending line and the fluctuations in the price graph became more consistent.

RSI is able to quantify price momentum because of its sole dependence on the changes in closing prices. This indicator is less affected by sharp rises or drops in a security's daily price performance and may therefore give a better trend reading than other indicators (much in the way the Williams%R measures the strength of bulls and bears).

RSI is calculated by taking the average of the closing prices of the up days and dividing them by the average of the closing prices of the down days. The time frame specified determines the volatility of the indicator (see formula below). For instance, a 9-day time period under study will be more volatile than a 21-day time span. The RSI ranges between 0 and 100. RSI is said to indicate an "overbought" condition when it is above 80 and an "oversold" condition when it is below 20. However, the buy and sell level varies depending on the number of days used in the calculation. A shorter span of days will result in a more volatile indicator which reaches further extremes. A greater number of days used in the calculation results in a less volatile reading which reaches extremes far less often.



RSI Formula:

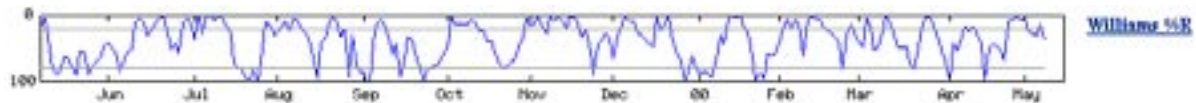
$RS = (\text{average of the net of positive closing prices for 7 days on ClearStation}) \div (\text{average of the net of negative closing prices for 7 days on ClearStation})$

Williams %R

Williams %R The Williams %R is a momentum indicator that attempts to measure overbought (bearish) and oversold (bullish) levels--or exit and entry points--by measuring an index or stock's closing price in relation to its high-low price range for the day. Wm%R is closely related to the Stochastic; both are oscillators that effectively measure over-bought and over-sold points in volatile markets that are also trending.

Although the Wm%R indicator looks like its oversold and overbought numbers are placed on the wrong ends of the oscillator, it was designed to be read this way. When this indicator reaches levels of 80-100, it suggests the security is oversold, and readings in the 0-20 range signal overbought conditions. On the graph, 0 represents the peak of the bulls' power and 100 represents the peak of the bears' power.

Bulls may push prices higher during the day, or bears may push them lower. Wm%R shows which group is capable of closing the market in its favor. If bulls cannot close the market near the top during a rally, they are weaker than they seem; this is seen as a shorting opportunity. If bears cannot close the market near lows during a decline, they are weaker than they appear; this is seen as a buying opportunity. This indicator is most often used to take advantage of a stock's short-term price dips and spikes.



Williams%R Formula:

$$\text{Wm\%R} = 100 \times \frac{\text{times Hr} - \text{C}}{\text{Hr} - \text{Lr}}$$

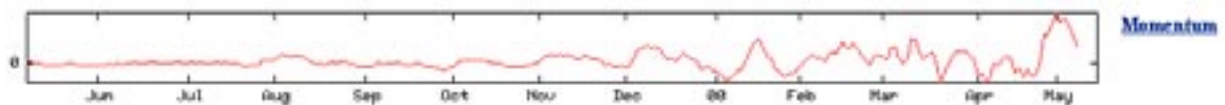
r = the time window selected (7 days on ClearStation)
Hr = the highest high during a 7-day period
Lr = the lowest low in a 7-day period
C = the last close.

Momentum

The Momentum indicator measures the amount that a security's price has changed over a given time span. This display is based on a simple numerical table that compares a stock's closing prices for the last 7 days. In theory, a stock's closing price accurately represents its movement. If the red line is flat, then the indicator is showing 0 momentum and the stock is in a "sleepy market"; any changes in its closing price will affect the stock's momentum. This indicator is most effective in a trending and volatile market.

If used correctly, this indicator provides sell signals. The method of using the Momentum indicator as a leading indicator assumes that market tops are typically identified by a rapid price increase and market bottoms end with price declines. As the market peaks, the Momentum indicator will climb sharply (dramatic movements of this nature typically identify the trading intensity associated with the end of a trend) and then fall off, diverging from the continued upward or sideways movement of the price.

Similarly, at a market bottom, the Momentum indicator will drop sharply and then begin to climb well ahead of prices. The seasoned investor will watch the closing prices inch higher before the stock's momentum propels it into larger price movements. This indicator is most effective when used with Bollinger Bands, because both indicators supply early buy signals.



Momentum Formula:

$M = \text{Momentum } P(\text{today}) = \text{today's closing price}$

$P(\text{today} - N) = \text{closing price of } N \text{ days ago (chosen by trader)}$

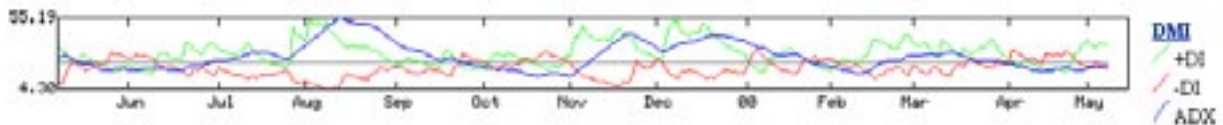
Directional Movement Index

"Directional Movement is the most fascinating concept I have studied. Defining it is like chasing the end of a rainbow."

- J. Welles Wilder

It's important to understand that Directional Movement must be either up or down for one day - it cannot be both. DMI helps provide an indication of how strong the directional movement (trend) is in a stock. It is comprised of three components; the first is the ADX, which rates the directional movement (trend) of a stock on a scale of 0-100. Generally, the higher the number, the more a stock is trending and the more it is a candidate for a trend following system. The next two components help decipher what the trend is showing: DMI + is a measure of upward or positive movement in a stock, and DMI - is a measure of negative or downward movement in a stock. A buy signal is given when DMI + crosses DMI - and a sell signal is given when DMI - crosses over DMI +.

The ADX line is used to measure the strength of these signals. When the market is exhibiting minimal direction, the ADX tends to decline. As the ADX points down it's better not to use the indicator and to wait while the market consolidates. "When the ADX falls below both Directional lines, it identifies a flat, sleepy market. Do not use a trend- following system, but start getting ready, because major trends develop from such lulls" (Elder, Trading For a Living).



Calculating +DI and -DI

+DI = +DM (divided by) TR (True Range)

-DI = -DM (divided by) TR (True Range)

True Range is always a positive number. There are three options:

- A. The distance from today's high to today's low
- B. The distance from today's high to yesterday's close
- C. The distance from today's low to yesterday's close.

The highest of the three becomes the default number used for True Range.

Directional Movement (DM): equals the largest part of today's range outside of yesterday's range.

- A. If today's range extends above yesterday's range, Directional Movement is positive (+DM)
- B. If today's range extends below yesterday's range, Directional Movement is negative (-DM)
- C. If today's range is inside yesterday's range or extends above and below it by equal amounts, there is no Directional Movement (DM = 0).

If today's range extends both above and below yesterday's range, DM is positive or negative, depending on which side of the "outside range" is larger.

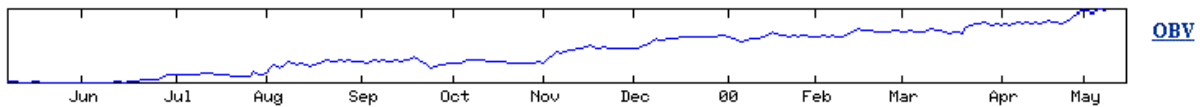
On Balance Volume

"Reading trends accurately involves more art than science, but most technicians believe you must always pay special attention to the average daily volume of trading in your stocks. No market move means anything without volume because the market is essentially a big consensus engine."

- Jon Markman, Online Investing).

On Balance Volume (OBV) is a momentum indicator that relates volume (consensus) to price change. Typically, before the price of a stock goes up, the volume increases. OBV is effective when combined with Bollinger Bands and the price graph, because they together provide early signals that a stock is preparing to break out of a consolidation period along with the confirmation presented by the price graph.

This indicator is a running total of volume calculated by adding the day's volume to a cumulative total when the price closes up, and subtracting the day's volume when the security's price closes down. It shows if volume is flowing into or out of a security. When the security closes higher than the previous close, all of the day's volume is considered "up" volume. When the security closes lower than the previous close, all of the day's volume is considered "down" volume and is subtracted from the OBV. If prices close unchanged, the OBV is unchanged.



OBV Formula:

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: $OBV = \text{yesterday's OBV} + \text{today's volume}$

If today's close is less than yesterday's close, then: $OBV = \text{yesterday's OBV} - \text{today's volume}$

If today's close is equal to yesterday's close, then: $OBV = \text{yesterday's OBV}$

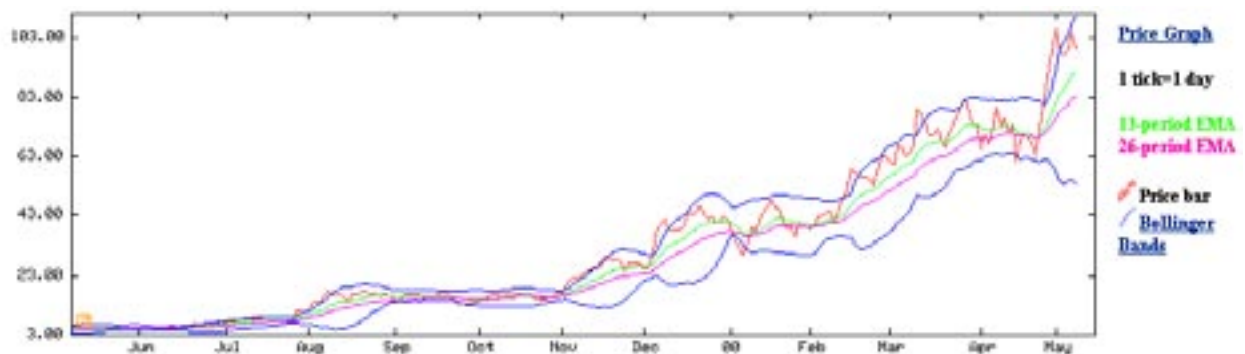
Bollinger Bands

Bollinger Bands, created by John Bollinger, are a type of envelope (or trading band) plotted at standard deviation levels above and below a moving average. Because standard deviation measures volatility, the bands widen during volatile markets and contract during calmer periods.

In Achelis' *Technical Analysis from A to Z* (Chicago: Irwin, 1995), Bollinger has this to say about his indicator:

- Sharp price changes tend to occur after the bands tighten, after volatility lessens.
- When prices move outside the bands, a continuation of the current trend is implied.
- 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. (p. 72)

Bollinger Bands, displayed in two bands plotted at standard deviation levels above and below a moving average, provide a view of the current trading range. They can be used with other indicators to determine when to buy or sell.



Bollinger Band Formula:

$$\text{Middle Band} = \frac{\sum_{j=1}^n \text{Close}_j}{n}$$

The upper band is the same as the middle band, but it is shifted up by the number of standard deviations (e.g., two deviations). In this next formula, "D" is the number of standard deviations.

$$\text{Upper Band} = \text{Middle Band} + \left[D * \sqrt{\frac{\sum_{j=1}^n (\text{Close}_j - \text{Middle Band})^2}{n}} \right]$$

The lower band is the moving average shifted down by the same number of standard deviations (i.e., "D").

$$\text{Lower Band} = \text{Middle Band} - \left[D * \sqrt{\frac{\sum_{j=1}^n (\text{Close}_j - \text{Middle Band})^2}{n}} \right]$$

Parabolic SAR

The Parabolic Time/Price System, developed by Welles Wilder, is used to set price stops and is usually referred to as the stop-and-reversal (SAR) indicator. Once a trade is initiated using Parabolic SAR, a protective stop order has also been initiated. The stop is a function both of price and of time. The stop never backs up; it moves only incrementally on a daily basis in the direction the trade was initiated. This ties into one very good rule: "move your stops only in the direction of the trade and never against it" (Elder, *Trading For a Living*).

Some technical analysts believe that the Parabolic SAR provides excellent exit points. They use this indicator to close long positions when the price falls below the SAR and close short positions when the price rises above the SAR. Indecision is reduced using this indicator because it doesn't allow investors to stay in losing positions.

The Parabolic SAR is most effective when the markets are trending; when the markets are flat, Parabolic SAR is susceptible to being whipsawed, a clear sign that the timing is wrong.

This concept is explained in Wilder's book *New Concepts in Technical Trading Systems* (Trend Research, 1978).

