RELATIVE STRENGTH INDICATOR (RSI)

The RSI indicator, which was developed in 1978 by Welles and Wilder, reflects price momentum. It does this by comparing the average price gain over a given number of periods (typically values of 9 or 14 are used, but for longer trends, values up to 30 can be used). A recommended online reference for this is in the Chart School section off Stockcharts.com:
http://stockcharts.com/education/IndicatorAnalysis/indic_RSI.html

The formula for the RSI (you only need to know how to use this) is:

$$RSI = 100 - \frac{100}{1 + RS}$$ where: RS = Average Gain (AG)/Average Loss (AL)

After performing a bit of algebraic manipulation, the equation for RSI can be reduced to:

$$\frac{RSI}{100} = \frac{AG}{AL + AG} \quad \Rightarrow \quad AG = \frac{(RSI/100)}{1 - (RSI/100)} \cdot AL$$

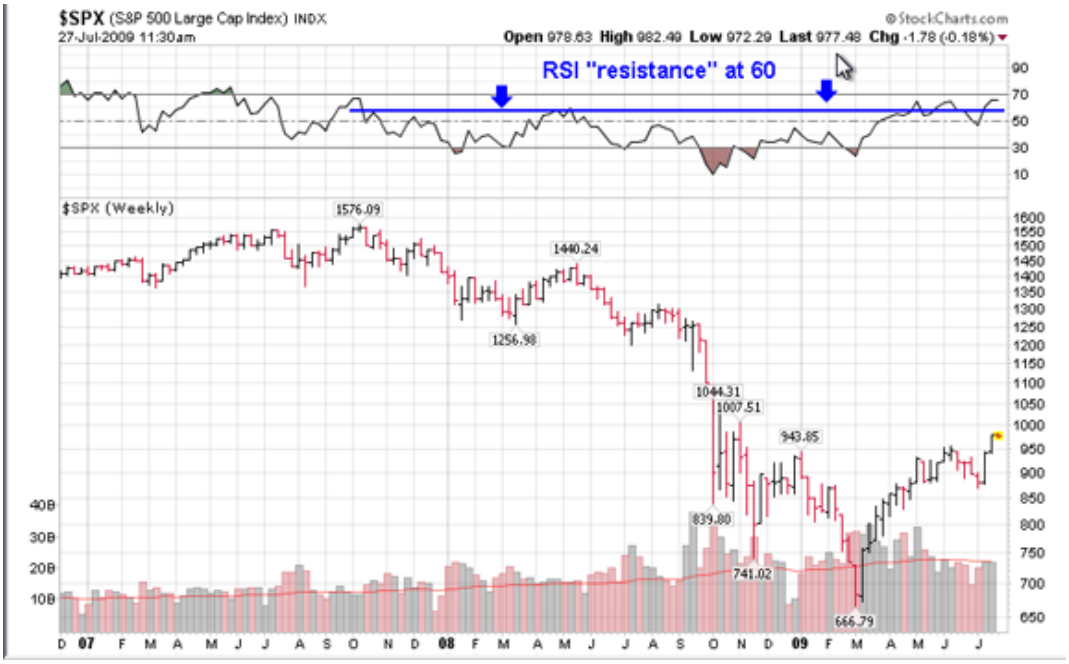
If, RSI = 50, then from the above equation, AG = AL. Other values are given in the table below:

RSI	AG Multiple of AL
10	0.111
20	0.250
30	**0.429**
40	0.667
50	**1.000**
60	1.500
70	**2.333**
80	4.000
90	9.000

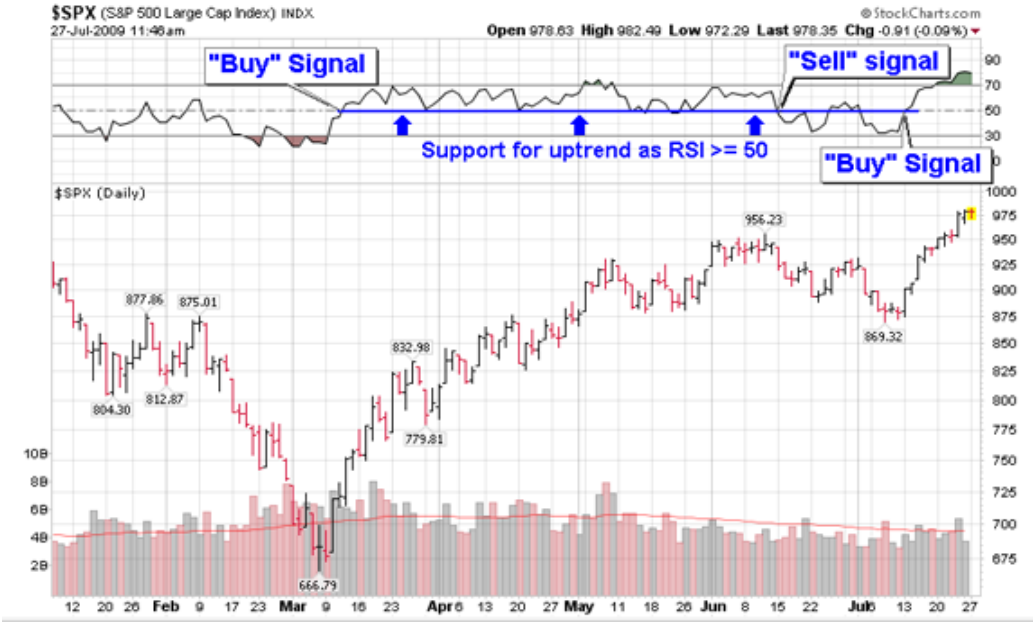
Welles and Wilder consider an RSI of 30 to indicate an *oversold* condition, where values over 70 represent an *overbought* condition. So, if the RSI was below 30 then moves above that value, this might be viewed as bullish. Similarly, if the RSI was above 70 then moves below 70, this is bearish. Since RSI =50 indicates that average gain equals average loss, some wait for the RSI to move above 50 as a “buy” signal, and its falling below 50 to provide a “sell” signal.

I recommend experimenting with RSI periods (don’t just use the default value of RSI(14)) until you find a value where you get overbought readings when the price of what you are tracking gives oversold and overbought readings when price has often been at bottoms and tops. I often use RSI(9), as this generally works well for what I track. The longer the number of periods you use for the RSI, the more you will be tracking a well-defined trend rather than short-term movements, and the fewer “signals” you will see.

YOU CAN APPLY SUPPORT/RESISTANCE TO THE RSI. Doing this, ***an uptrend can be tracked and defined in terms of a time period where the RSI remains at or above 50 ("support")***. Some technicians use "support" for an uptrend as an RSI value of 40. Similarly, a downtrend is sometimes defined as the RSI remaining continually below 50 (others use 60 as "resistance").



This chart shows weekly data for the S&P 500 from 2007 through mid-2009. Using the RSI for resistance, one would have moved from being long in the market around October of 2007, which is very close to its actual peak. If you see an uptrend (using either 50 or 60), switching to 40 as "support" for the RSI would mean that you been close to catching the bottom that occurred in March of 2009.



On the left is a daily S&P price chart. Using the RSI for "long" and "short" determinations, note how well using nothing more than a RSI value of 50 did over this period. One would have gone "long" or bullish in March of 2009, very close to the bottom, and "short" or bearish starting around mid-June when the market began to move sideways.

NOTE: ***THIS TECHNIQUE TENDS TO WORK MUCH BETTER FOR INDEXES AND SECTORS THAN IT DOES FOR INDIVIDUAL STOCKS***.

An important use of the RSI is to indicate bullish or bearish divergences as leading indicators of future price movements. The divergence refers to price peaks or troughs moving in the opposite direction of RSI peaks and troughs. For example, a bullish divergence occurs when the underlying price has lower peaks at the same time the RSI has higher peaks.

APPLICATION: BULLISH DIVERGENCE
HAS THE US DOLLAR REACHED A SHORT-TERM BOTTOM?

The graph below is a weekly chart for the US Dollar Index (symbol **$USD**). Since this is weekly, the moving averages have been adjusted (the 50 day becomes **10** weeks and the 200 day is **40** weeks).

Note how the US Dollar Index broke below its prior support (around 85) in late October of 2004. At about that time, the RSI moved to an overbought condition (below 30) and the US Dollar continued to under-perform the S&P 500 (bottom graph – price relative). In the next few weeks, the RSI displayed rising peaks (bullish) while the US Dollar Index had declining troughs (bearish). *In technical analysis*, this is a bullish divergence, and it leads us to believe that the Dollar has reached a short-term bottom (for now). It would be preferable to supplement this with economic analysis before reaching that forecast.

Note: The StockCharts reference (above) also shows illustrations of these divergences.

APPLICATION: BEARISH DIVERGENCE
HAD OIL PRICE REACHED A SHORT-TERM TOP?

The graph below is a daily chart for the price per barrel of oil (symbol **$WTIC**).

Around mid-October of 2004, oil hit $55 per barrel. Was the price going to keep rising?

To answer this, note the bearish divergence that occurred at that time: the RSI was reaching lower peaks (bearish) and remained in overbought territory (above 70) while oil prices were witnessing rising peaks (bullish). That is a bearish divergence. *According to technical analysis*, we should expect oil price to have reached a short-term peak. Note also that oil price had gotten far above its 50-day moving average, and that its price relative (oil price relative to the S&P 500) had already begun to reverse direction (bottom graph). Further evidence consistent with a short-term top.

As you can see, $55 per barrel was not sustainable. Oil prices fell sharply and tested prior support around $40.

Visual Help: You can also put the RSI in the price chart which allows you to see if higher highs (or lows) are "confirmed" by the RSI (being at higher highs or lows).

To do this, when you select the RSI and its time period, in the next box (for **Position** on the right), select "**Behind Price**." Then press **Update**.

The chart below shows **MSFT** (Microsoft) with the RSI(9) in the price chart. Note that the new high in late June is *not* confirmed by a higher RSI, so price momentum was slowing, producing a bearish divergence. The next day there was a *gap down* (an imbalance of supply and demand often caused by news), based on earnings disappointments.