

The MACD or The Moving Average Convergence Divergence was by Gerald Appel, It is one of the most popular indicators. It is a very simple reliable Indicator. Also it is an Indicator a TA enthusiast gets introduced to first. The MACD is constructed by subtracting the longer moving average from the shorter moving average. The resulting plot forms a line that oscillates above and below zero, without any upper or lower limits. The MACD is considered to be a momentum oscillator though it is widely used by Trend followers.

The most popular formula for the MACD is the difference between the 26-day and 12-day exponential moving averages. I will use this standard setting and later if time permits I will try to present other combinations. A 9-day EMA of the MACD line is used as the signal line.

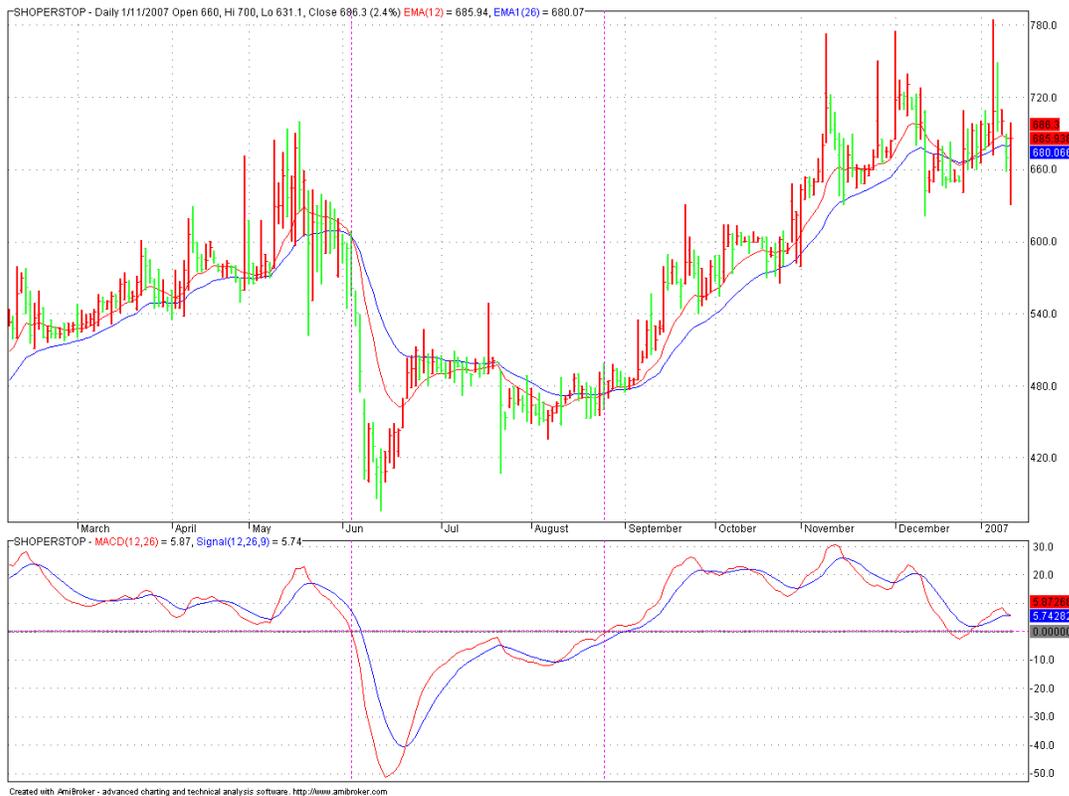


Chart -1

A positive MACD indicates that the shorter EMA is greater than the longer EMA indicating that momentum is positive. A rising MACD indicates the difference between the short EMA and the long EMA is increasing and in other words indicates a rising momentum. In the same way a negative MACD indicates that momentum is negative and a falling MACD indicates an increasing negative Momentum.

## Three common signals

1. MA cross over or signal line crossover. The basic and the most common is the signal line cross over. Buy when the MACD line crosses above the signal line and Sell when the MACD line crosses below the signals line.

2. Zero Line crossover. Some use only the zero line cross over as signals. Buy when the MACD line crosses the zero line and Sell when the MACD line crosses below the zero line.

3. Divergences

Let us see in a little detail what happens when the moving average cross over and zero line cross over occurs.

Let us assume that the stock is in a downtrend and the MACD is below the zero line and below the signal line. Then when the Bullish moving average cross over (MACD crossing the signal) occurs the shorter EMA has started converging towards the long EMA indicating the negative momentum is waning. It does mean that the bullishness will continue. It may or may not. So a Buy when the Bullish cross over occurs does not always produce a good trade.

Now consider when the stock is in an up trend and the MACD is above zero and the signal line. If a Bearish cross over occurs (MACD crossing below the signal line) the short EMA has started to converge towards the long MA indicating that the positive momentum is waning. It again does not indicate that bearishness has set in. It may be just a pull back. The stock may dip and then continue its journey upwards.

When the MACD cross above the zero line it mean that the short EMA has actually crossed over the long EMA indicating that the momentum has indeed reversed from negative to positive. In the same manner the when the MACD crosses below the zero line it means the momentum has turned negative. The Bullish zero line cross over generally gives better trades. But many times it will notice you are entry is much delayed. The Bearish zero line cross over gives too much of your profits and some time one loses money too.

To summarize

1. Buying based on Bullish MA cross over ~~does~~ always produce good trades. However in many cases this does helps in early entry points. How to distinguish is the problem. Combining with other Indicators may help. We will explore this later.

2. Selling based on Bearish MA cross over may take you out of the trade too soon. Again combining with other Indicator may be of help in deciding if it is time to get out.
3. Bullish zero line cross over generally prove profitable. The drawback again the entry point may be delayed in many cases.
4. Selling based on Bearish zero line cross over may give away too much of your profit. A trailing stop may help in over coming this issue

Chart-2 illustrates some of these points.



One of the most important signals based on the MACD is DIVERGENCE. We will postpone discussion on this till little later.

Now Let us take a deeper look at the MACD charts and try to learn a little more about the additional signals that we get and how to trade them.

So far we were talking about Bullish crossover after a downtrend. In this case the Bullish crossover occurred below the zero line. However the Bullish crossover can occur above the zero line. Such crossover occurs when the stock dips temporarily before proceeding with the up trend. Such crossovers above the zero line produce some excellent trades.

Bearish crossovers occurring above the zero line generally acts as warning signals as it indicates waning of the positive momentum. Bearish crossover below the zero line indicates strong bearishness.

For the making the discussion more interesting we will first make a system with the following criteria.

BUY when there is a Bullish MA crossover.

SELL when there is a Bearish MA crossover.

Additionally the zero line bullish crossovers will be marked with an encircled number 1 with an arrow pointing upwards in order to indicate that the momentum has indeed reversed.

Bullish crossovers above the zero line will be marked an encircled number 2 and arrow pointing upwards indicating good trade opportunities.

Similarly bearish crossover above the zero line will marked 3 and bearish crossover of the zero line will be marked 4.

A chart and an Indicator with these signals enclosed

Next we will see if we can find more signals...

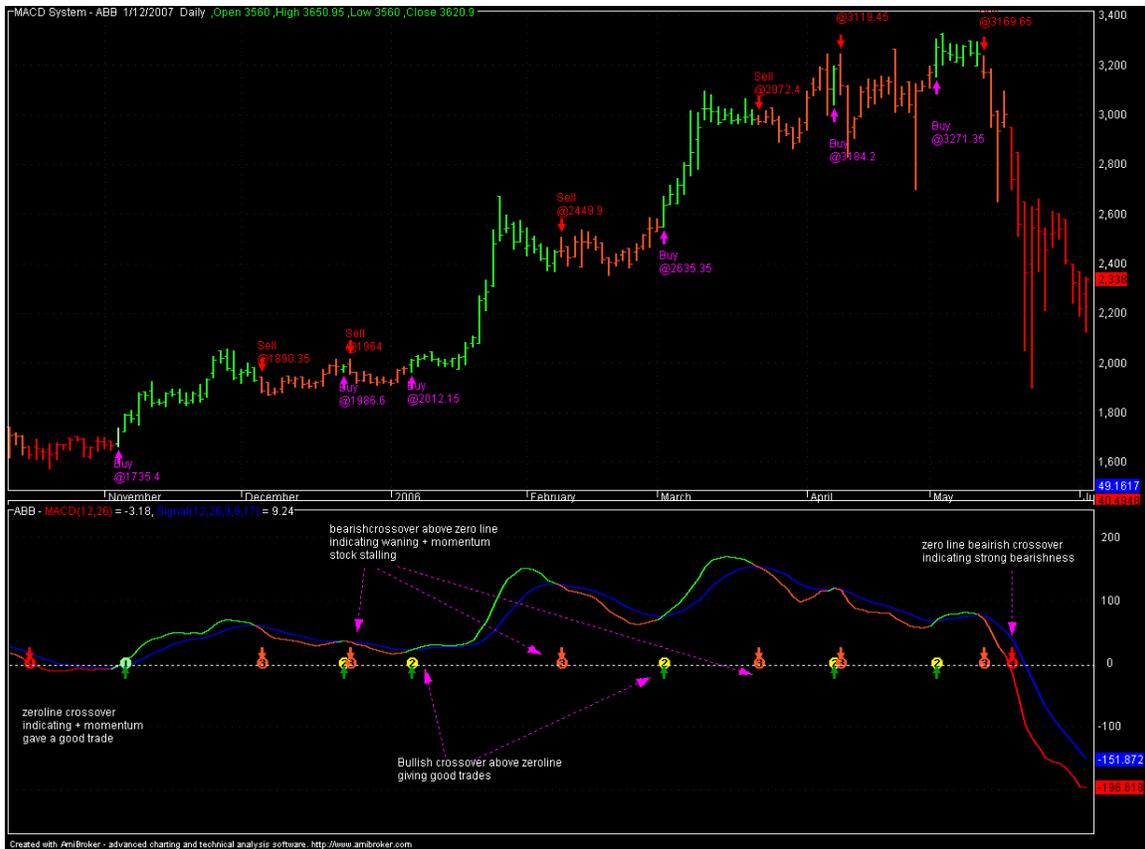


Chart-3

## DIPS and HOOKS

Let us look at a situation when the stock is in an up trend and the MACD line is above the signal line. You will notice that the MACD line temporarily converges towards the signal line and diverge again. We will call them DIPS.

Some times the MACD line even briefly dips below the signal line and bounce back. We will call these HOOKS.

The DIPS and HOOKS normally indicate brief pullbacks in the up trend and provide good add-on or pyramiding opportunities.

In the same manner DIPS and HOOKS occur during the downtrend when the MACD line is below the signal line. These indicate temporary pull up during down trends and present good shorting opportunities.

Chart-4 present examples of the “Dips” and “Hooks” during a up trend.

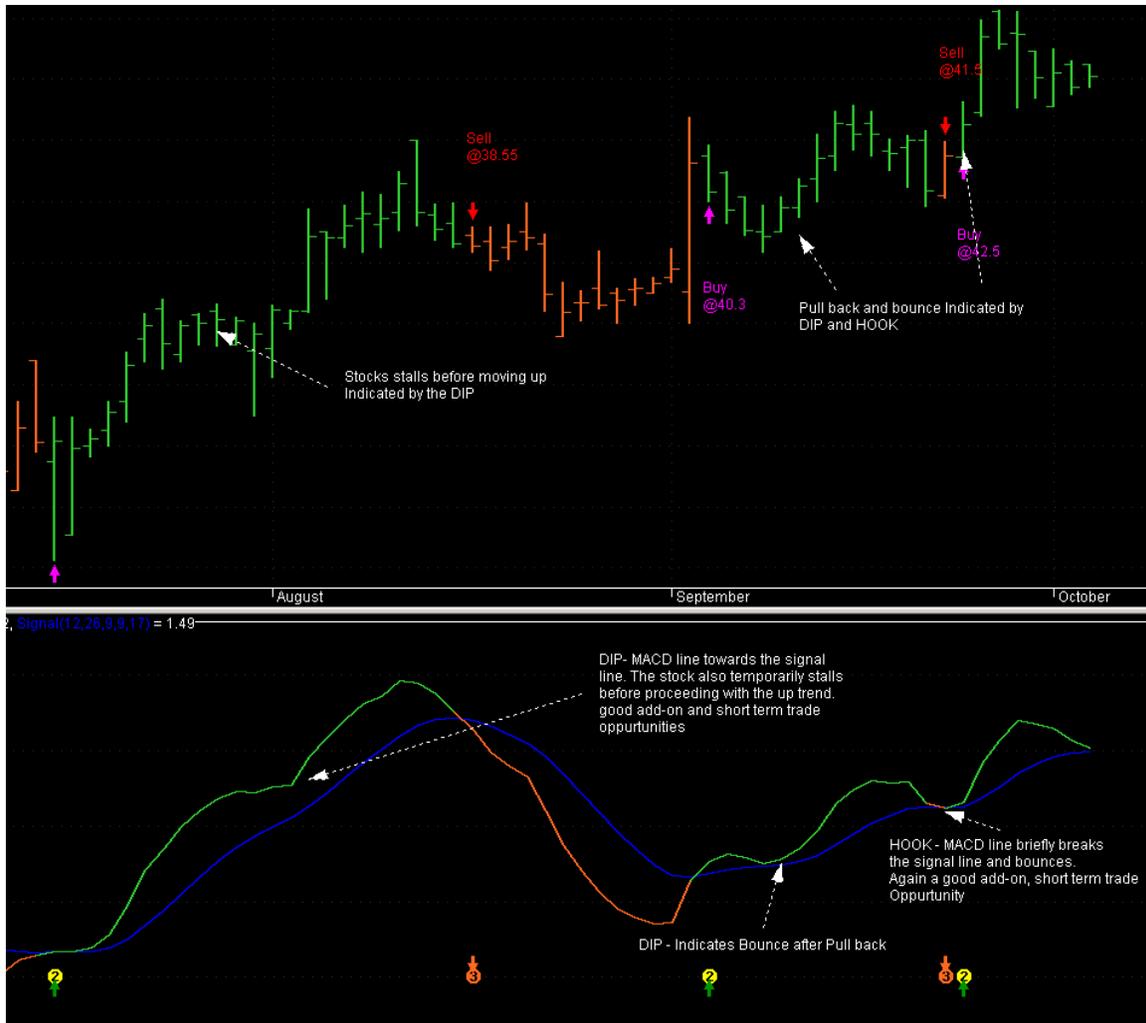


Chart-4

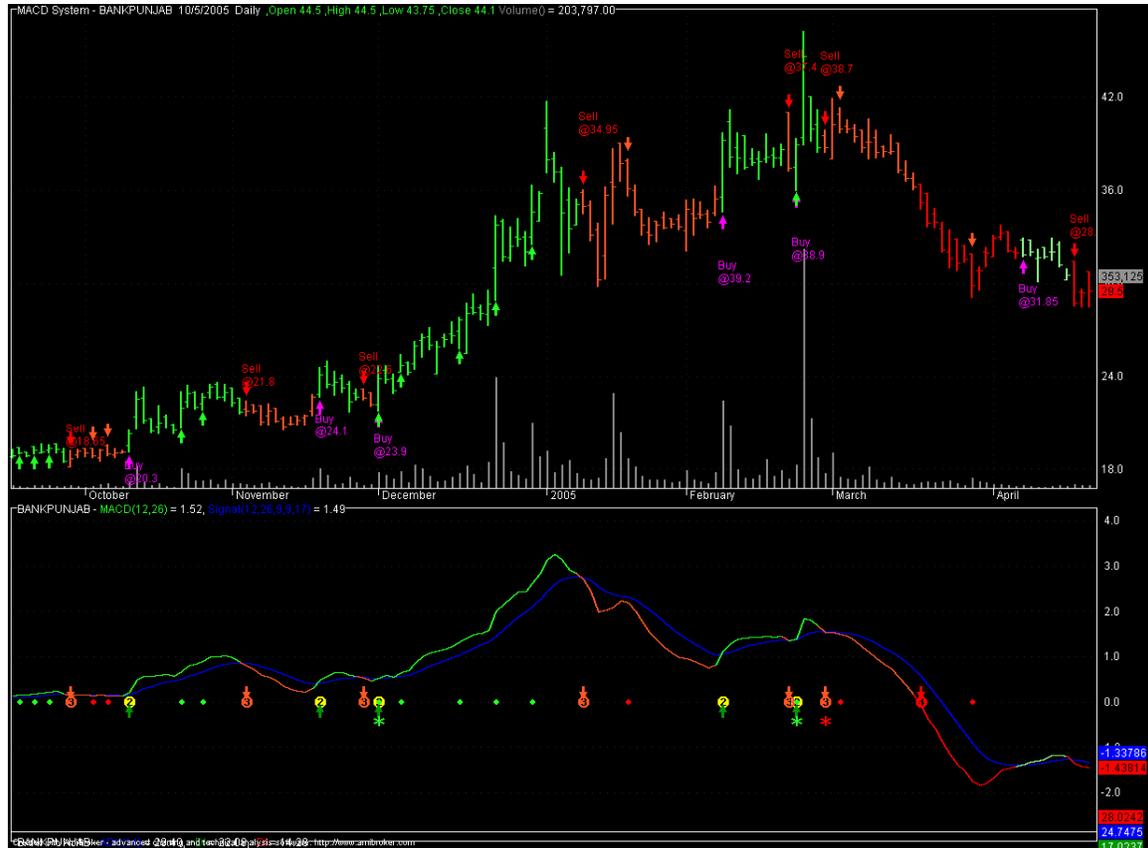
It will be nice if we can indicate the “Hooks” on the Indicator and the chart. We will represent the DIPs during the up trend as green dots on the Indicator and green up arrows on the charts. Green stars will represent the HOOKs. On the Chart the HOOKs will be coincide with a BUY.

In the same way DIPs during a downtrend will be represented by an orange dot on the Indicator and an orange down arrow on the chart. The HOOKs will be represented by a orange star and will be accompanied by a sell signal on the chart.

The DIPs are good add-on/short term trade opportunities during the up trend and good warning points during the downtrend.

The HOOKS represent a stronger Buy/Short opportunities if we combine with other indicators. Sideways markets produce lot of alternating Hooks

Of course we have to have a lot of discretion when we used the Dips and Hooks. Later we will take some example to see how we can use these additional signals.



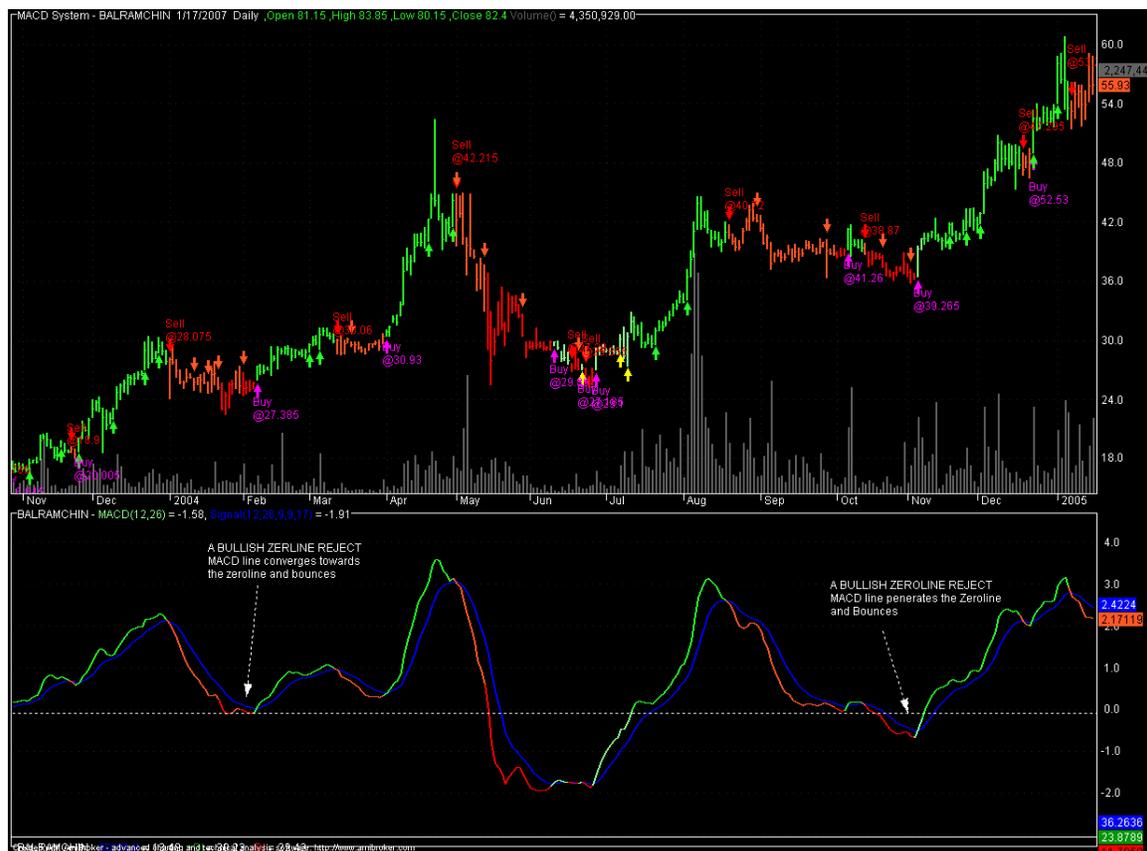
## Zero line Rejects

Finally we will look at what is commonly known as “ZERO LINE REJECT” or ZLR.

Take a situation when the MACD Line starts converging from top above the Zero line towards the zero line. At times the MACD line reverses and just near the zero line and starts climbing up again. At times the MACD line penetrates the zero line a little and starts reversing. These reversals many times produce excellent trades. These reversals just above the zero line or after just penetrating the zero line are called the Zero line rejects. The situation described above will be Bullish ZLR. A bearish ZLR occurs when the MACD line climbs from the bottom towards the zero line and reverses just below the zero line or after just penetrating it.

Of course one should be quite careful trading the ZLR as it may be a temporary reversal. Working with tight stop losses can produce some excellent trades.

Chart-6 shows some Bullish ZLR.



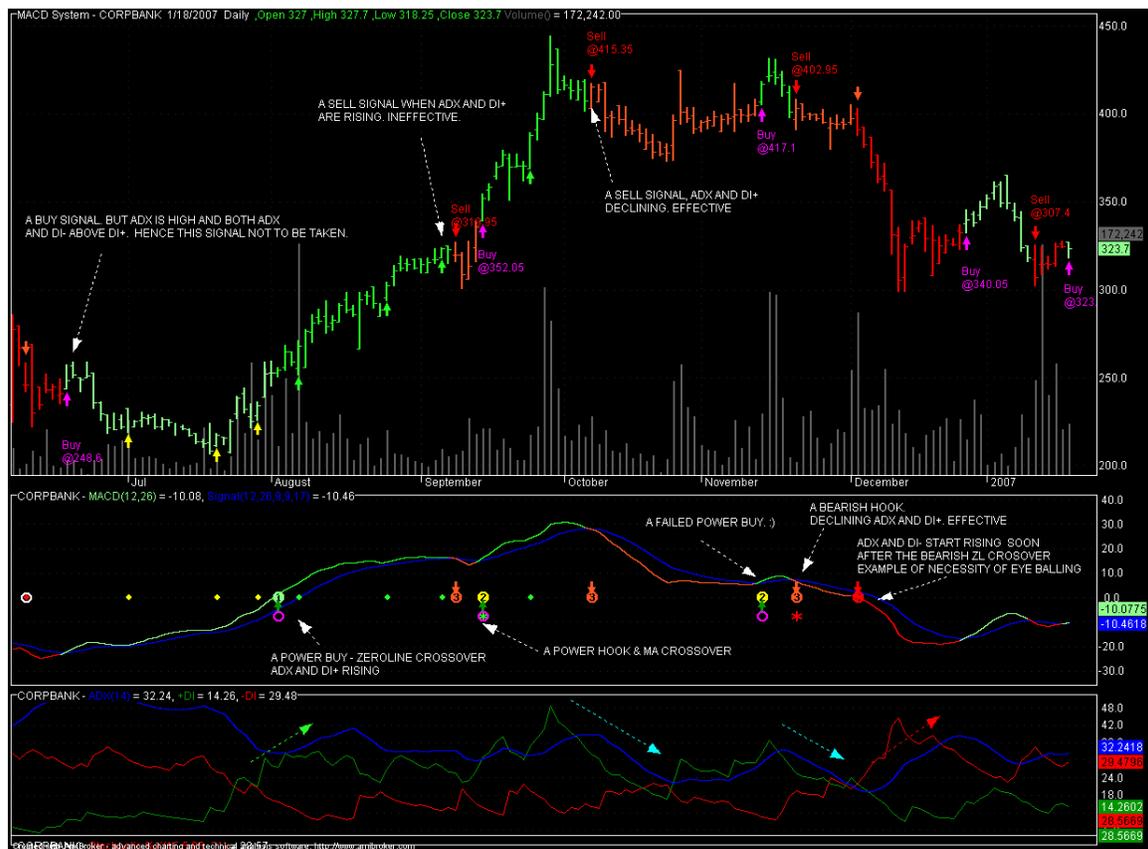
Now we have some basic tools like Zero line crossovers, MA crossovers, Dips and Hooks. Without complicating further with Histograms we will see how to trade better these signals.

## Trading MACD better combining with other Indicators

Well, we have many signals now. How do we differentiate which are better signals? Trading just with the MACD does not provide much clue. If we combine with some other indicators we may get some more clues.

Combining with ADX provides some good additional clues and we can differentiate which are better signals. I call these signals Power Buys, Power Dips and Power shorts. We will take up some example and define some basic rules, which can be consistently followed.

**RULE :** All Bullish signals Buys, Dips, Hooks, Zero line crossover are generally good when the Both the ADX and DI+ are rising. To differentiate these from other signals we will call then Power Buys, Power Dips etc.



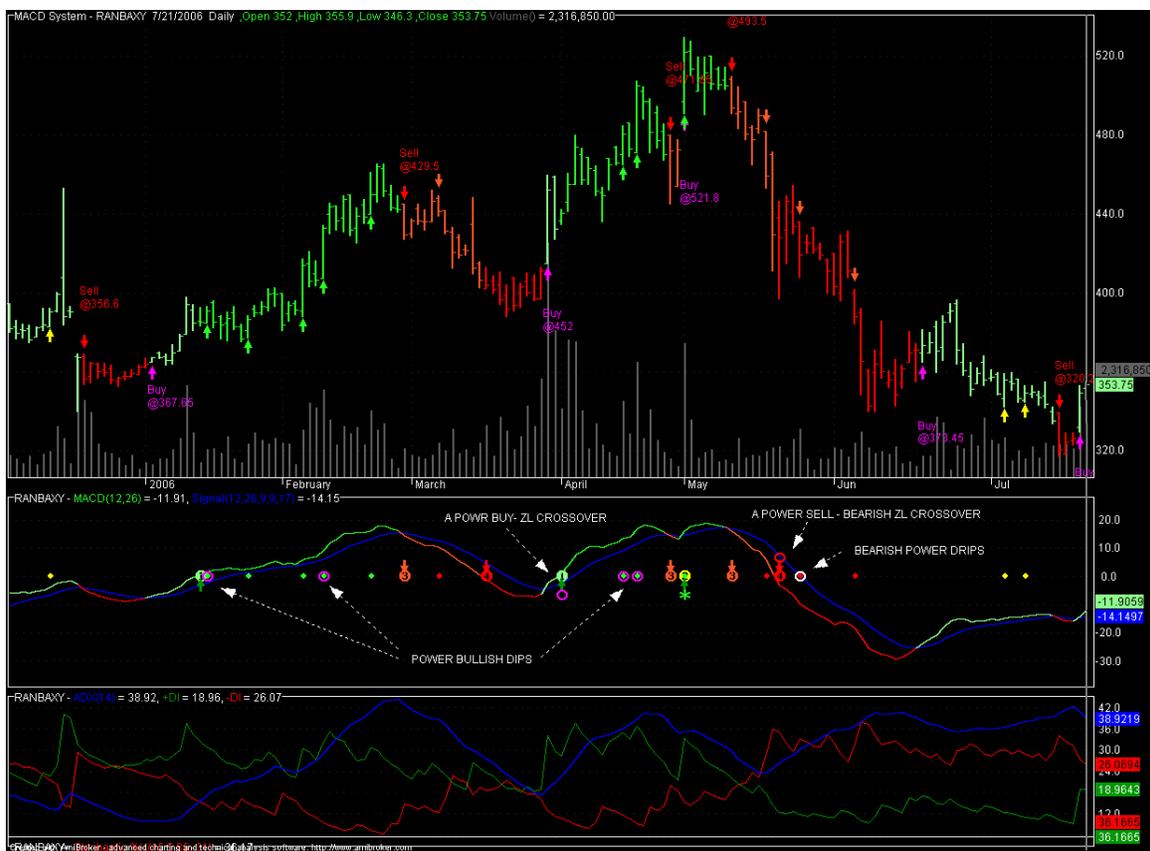
Example -1

The Afl draws small hollow circles in Magenta color when these power signals occur. A point to be noted here is that though most of the time the Afl does pick up the signals, times the Afl misses these points (I have tried many methods to code the rising AD and DI+ and each had its own drawback) or the ADX and DI+ starts rising soon after the signals occurs. So eyeballing becomes necessary.

**RULE:** Generally sell signals like bearish ZL crossover, Dips and Hooks are in effective when Both ADX and DI+ are rising or high above the DI-.

Check out Example –1

We will the standard ADX(14) here along with the MACD.



Example –2

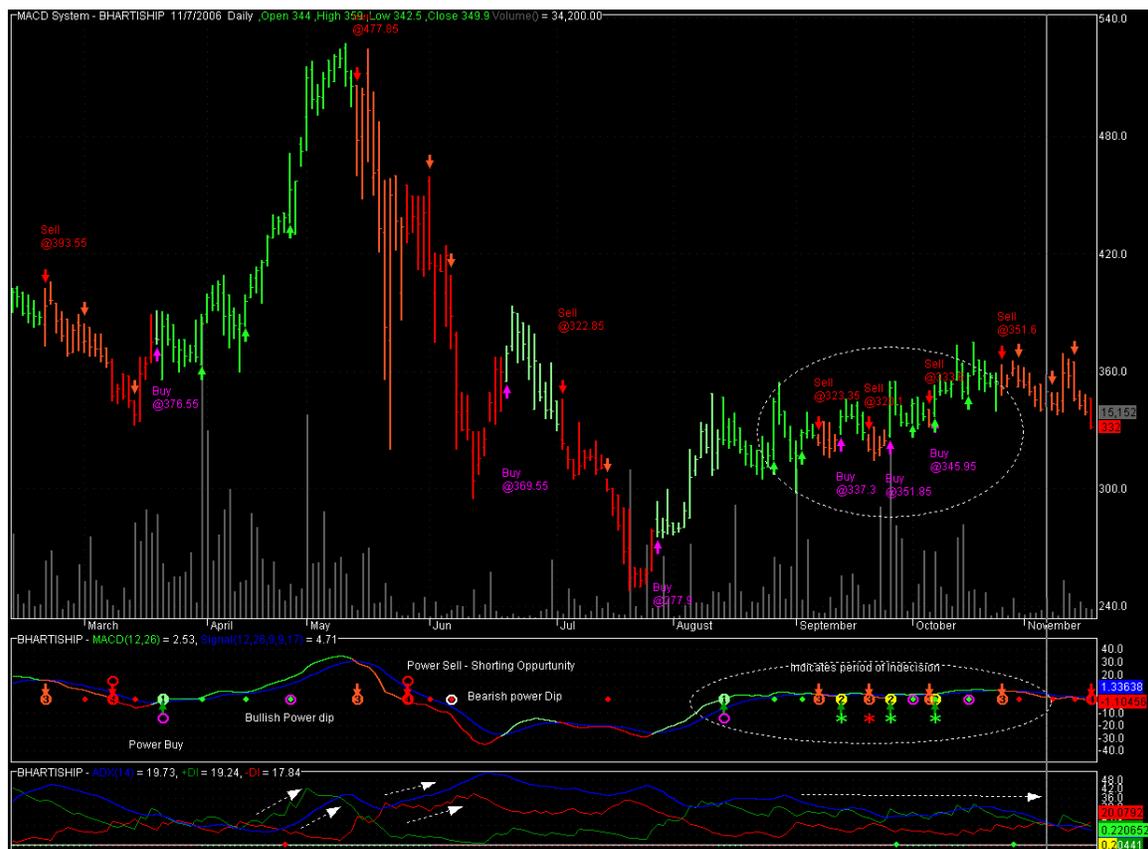
**RULE:** Bearish signals like ZL crossover, MA Crossover, Dips and Hooks are effective when the ADX is rising and DI- is also rising and both ADX and DI- are above D+.

RULE: Bullish signals are ineffective when the ADX are ineffective when the ADX is rising along with DI- and both are above D+.

RULE: When Bullish and Bearish signals are appearing alternately in quick succession it shows period of indecision and better to stay away .

Since ADX is a lagging indicator many times the ADX reacts only after a BUY or SELL condition occurs. In such case it is better to eye ball the charts and enter/exit a few days after the Buy/Sell condition. Many times a Power dips comes after a BUY condition indicating good entry opportunity.

Check out Example –2



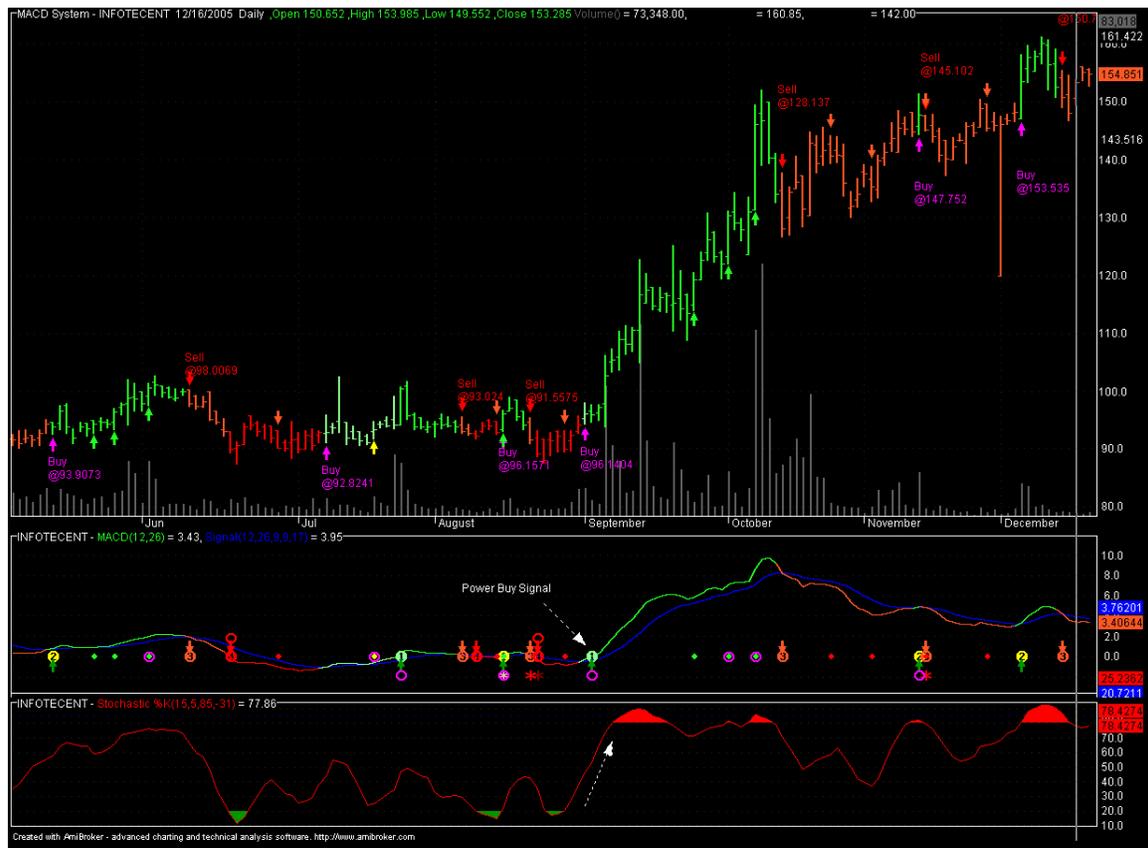
Example –3

## Combining Stochastic with MACD

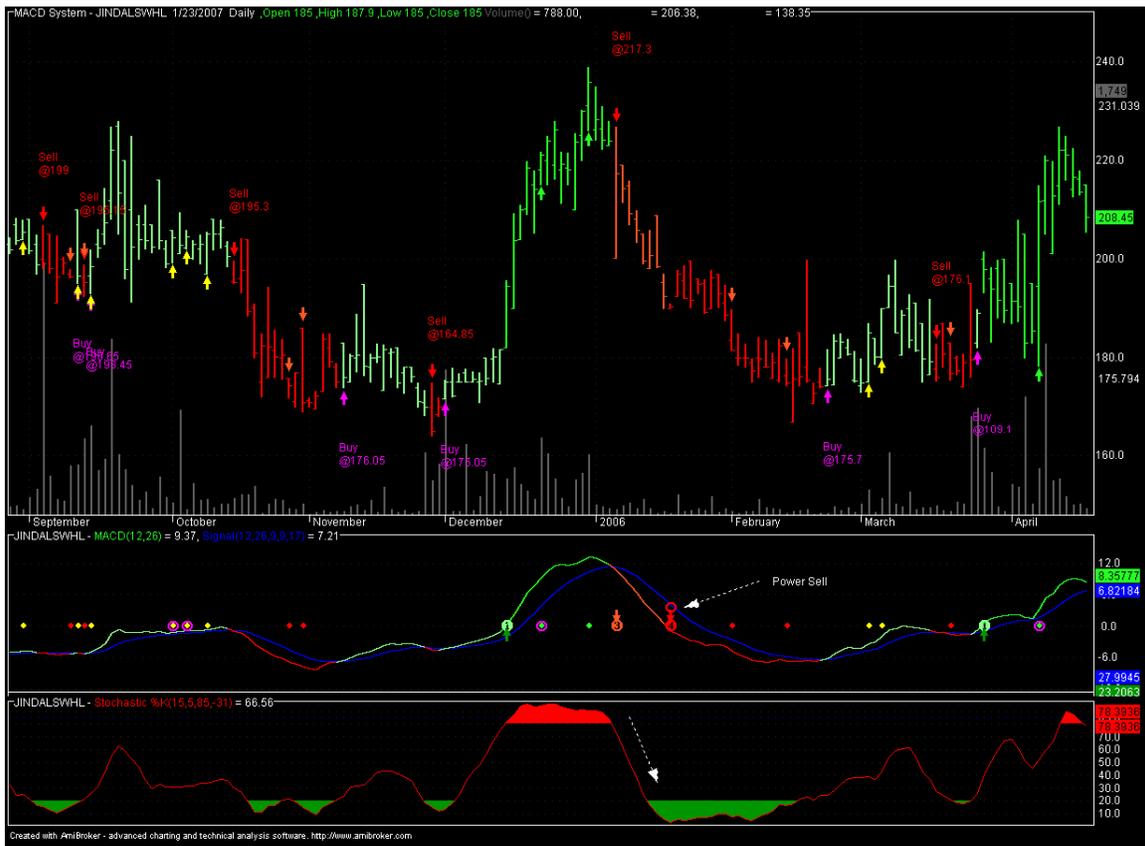
Stochastic unlike the ADX does not provide Definite clues to aid trading with the MACD. However it does give some indications regarding the strength of a move. I will just briefly describe them here and leave it you to experiment further.

We will use a stochastic K (15,5)

The stochastic rising from the oversold region quickly reaching the over bought region in few trading session (5 or 6) and this is accompanied by a power Buy signal indicates a bullish move is ahead. In the same manner a swift move from the over bought region to the oversold region and accompanied by a power Sell signal will indicate a strong bearish move. Example -4 shows a bullish move. Example-5 shows a Bearish move.



Example- 4

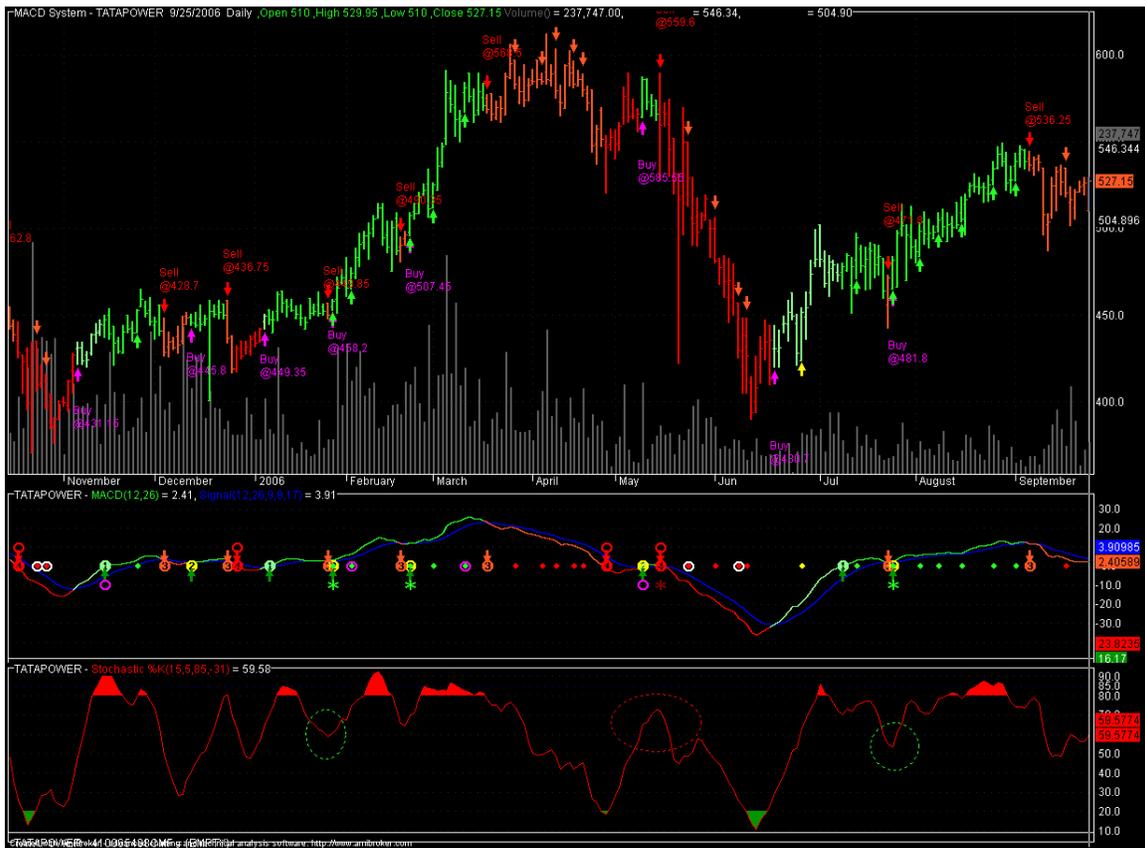


Example- 5

Another good use of the Stochastic with MACD is it helps in finding good entry/pyramiding or add on opportunities.

When the stochastic is coming down from over bought region and turn back and if the MACD is positive it represents good bullish moves.

In a similar way when the stochastic is rising from the over sold region and then turns back and if the MACD is negative it represents strong bearish moves. This provides good shorting opportunities. See Example 6.



Example- 6

## Multiple Time Frames

Next we will discuss how we can use the weekly MACD to assist our analysis of the daily charts.

For this first we will have to compare the weekly charts with the daily charts. Changing time frames again and again to check is not a bright thing to do and it is cumbersome. So we have to have the Weekly MACD overlaid with the Daily MACD. Two MACD plot on the same can be confusing. So we will plot the Weekly MACD as a ribbon on the daily MACD (Here is where metastock gets a beating). This can be easily done in AB. We will color code the ribbon for easy understanding as follows

- Weekly MACD above signal line but below zero. Pale green
- Weekly MACD above signal line and zero. Lime
- Weekly MACD below signal line but above zero. Orange
- Weekly MACD below signal line and zero. Red

The colors can be changed as per your Liking.

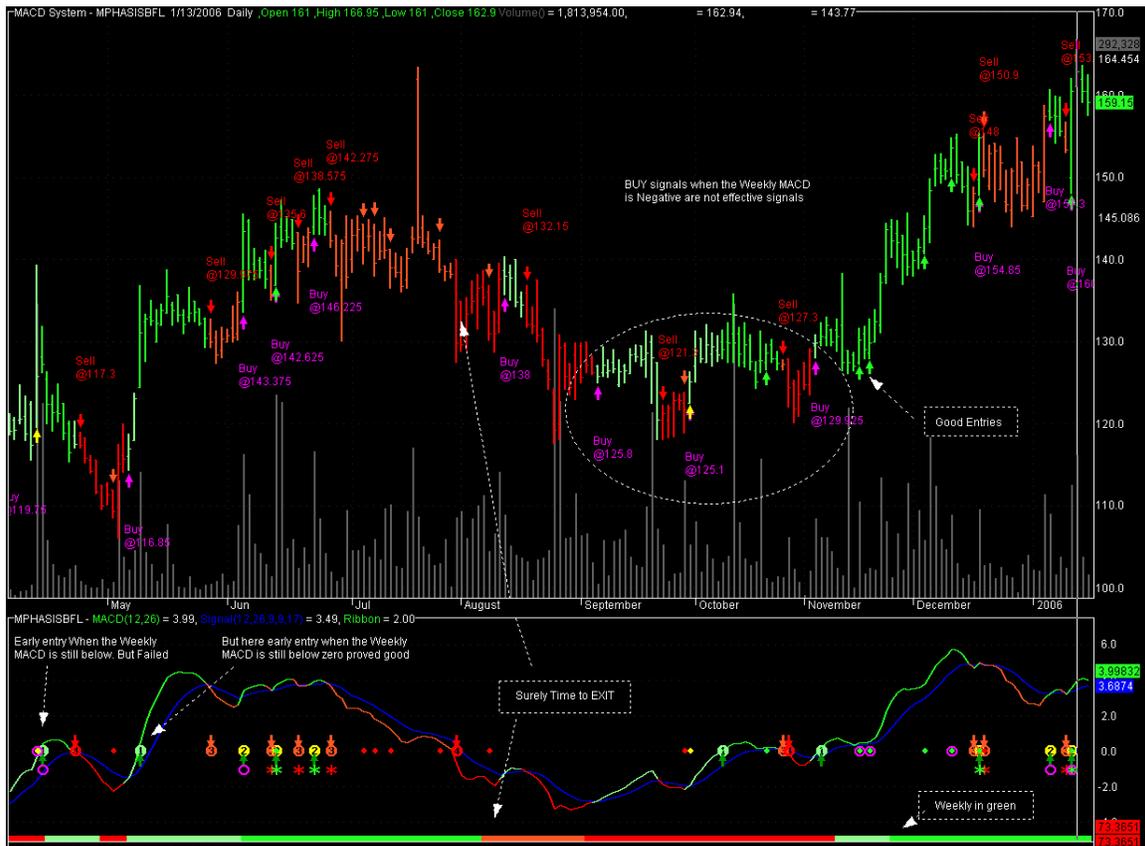
Now let us define the Basic rules

Rule : Buy signals on the Daily MACD when the Weekly MACD is above the signal and zero gives entry into good bullish moves.

Buy signals on the Daily MACD when the Weekly is above the signal line but still below zero do provide early entry but are not very reliable. See the Chart enclosed.

(In our charts Daily buy signals when the Weekly is in green will be a good Entry)

Naturally the weekly MACD is more lagging to catch up with the Daily Signals. Weekly MACD becomes Bullish only after many weeks after the daily becomes bullish. So how can we still get an early entry? The Weekly Histogram can be used to provide some early signals. We will discuss this later.



Rule: When the Weekly MACD falls below the signal line it is time to consider exiting if you are still in.

Earlier we saw that when the Daily MACD is below the signal line but still above zero is not a matter of serious concern. That time the stock may be actually moving sideways. But then if the Weekly MACD also moves below the signal line then it is time to exit.

(In our charts weekly in orange is a clear sign to exit)

One thing to remember there are clear-cut rules in TA. There s no certainty of these signals. We are talking of probability. These rules provided here are only high probabilities.

## MACD HISTOGRAMS

Another way to plot the MACD is as a Histogram. The MACD Histogram is nothing but the difference between the MACD line and the signal line plotted as a Histogram. The Histogram line oscillates above and below the zero line rising above the zero line to make a positive peak and then falls below the zero line to make a negative peak.

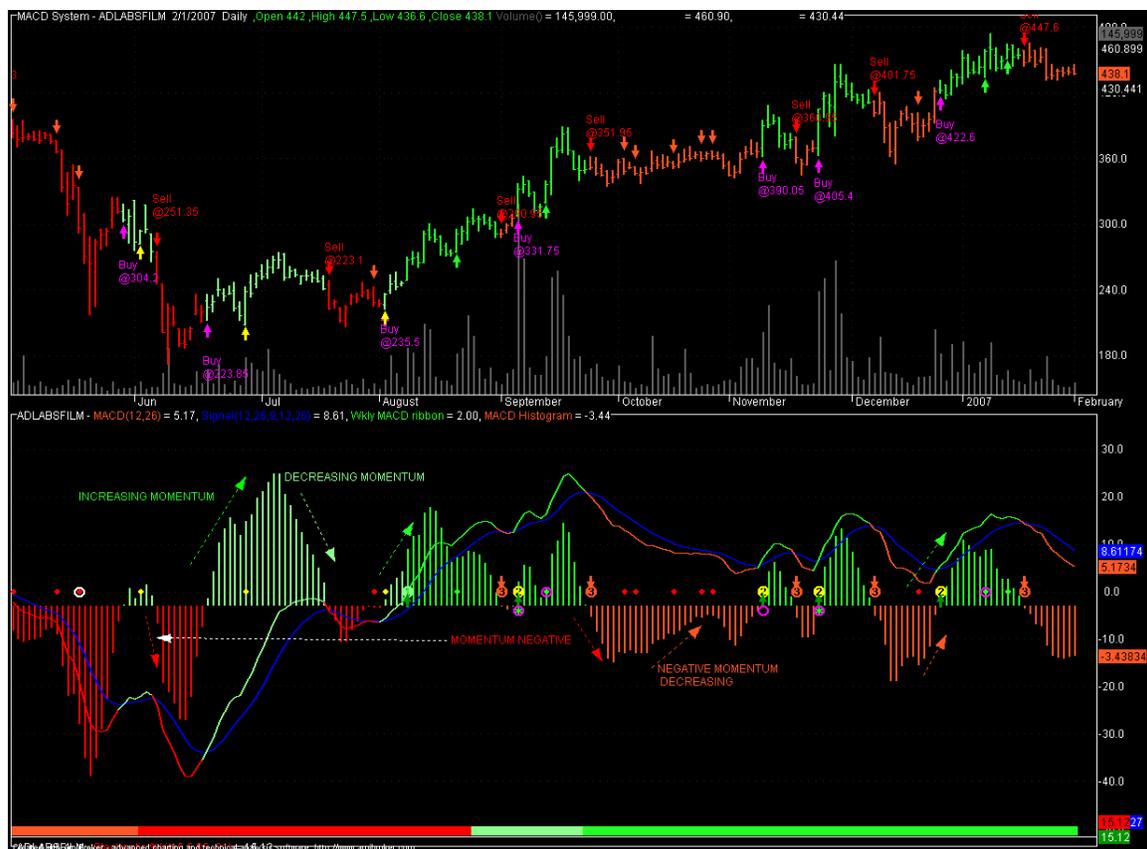


Chart -8

The Histogram depicts the momentum increasing becomes positive (crossing above the zero line) reaches a peak and then wanes to turn negative (falling below the zero line) and reaches a negative peak and then turn positive again.

Ideally an entry just when the momentum turn from negative and exit when the momentum wanes should give ideal results. Unfortunately stocks don't behave in an ideal way. But catching the negative peaks when the MACD is increasing does provide good entry points in a trending market.

Chart- 8 provides a chart with MACD and MACD Histogram. Next we will see how to use the Histogram with other signals to get good entries.

Let us look at the clues that can be got from the Histogram that will aid our trades. Histograms are very useful for looking at divergences. We can also use the histogram to judge the strength of the impending move. For example the zero line cross over signals are much more effective when the Histogram is positive and rising.

Also entries when the histogram turns positive (zero line cross over) when the weekly MACD is positive normally result in a good trade.

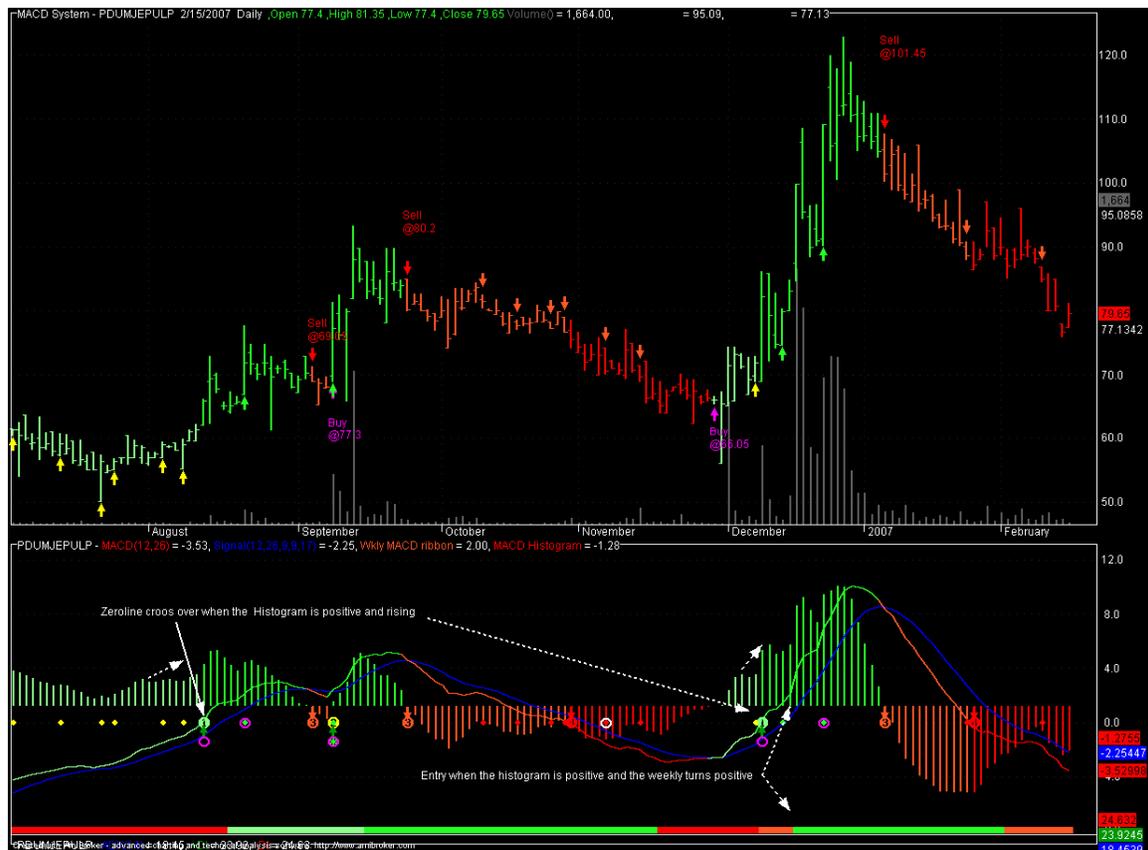


Chart - 9

In the same way zero line cross over to negative side are more effective when the histogram is also negative and falling. Also the shorting when the histogram is negative and the weekly MACD turns negative. Chart – 9 Provides some Examples.

### WEEKLY MACD HISTOGRAMS

Next we will see how to use the Weekly Histogram with our daily MACD chart. Amibroker is wonderful software, which enables plotting of the weekly Histogram in our daily chart. Again we will plot the weekly MACD Histogram as a ribbon. We will color code it for easy understanding.

The color-coding will be as follows

Histogram above zero and rising – Dark yellow

Histogram Above zero and declining - Yellow

Histogram below zero and declining - Blue

Histogram below zero and rising - Sky blue

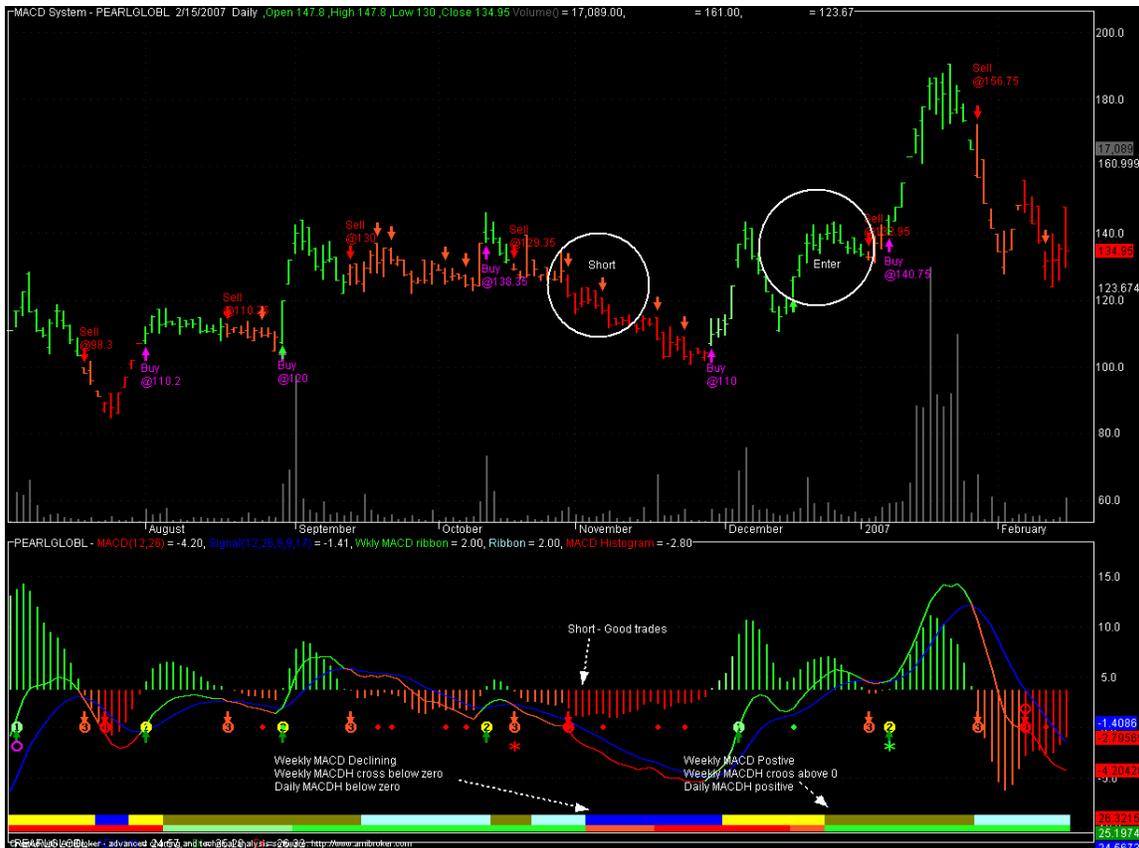
Trading clues:

Entries when the weekly MACD is positive, the Weekly Histograms turns positive and the daily Histogram is positive gives good trades.

Shorts when the Weekly Histogram goes below zero, weekly MACD declines / turn negative and the daily Histograms is negative gives good trades.

One can define many rules in combining the Weekly MACD and MACD Histograms with the daily MACD and Daily Histograms. I will leave that to you. Chart –10 provides some examples.

You would have noticed that it would be difficult to put these rules into a definite mechanical Trading system. It takes a bit of eyeballing and with a keen eye it is easy to pick some good trades. Of course one can run a scan to get a short list of stocks with zero line crossover, power dips and power hooks etc. Then it becomes necessary to eyeball the charts. I will post a scan afl towards the end of this discussion. The expert programmers can definitely come up with much better scans.



## DIVERGENCE

Next we will look at Divergences in the MACD. In technical Analysis Divergence is said to occur when an Indicator movement does not agree with the price movement. Divergence can be Bullish or bearish. If the indicator is making lower highs when the price is making a higher high there is supposed to be a bearish divergence. In the same way when the Indicator makes higher lows when the price makes lower lows there is a Bullish divergence. Divergence indicates a reversal in the current trend.

We can use Divergence in the MACD itself or in the MACD histogram. Dr. Elder considered Divergences in the MACD Histograms as one of the most powerful signals available to the Technical Analyst.

However in case of Divergence one has to wait for a confirmation. Convergences are known to fail frequently. Such failures were quite evident on the Nifty in the recent past.

An example of a Bearish Divergence shown in the chart of Apollo tyre (Chart-11) clearly forewarn the impending weakness

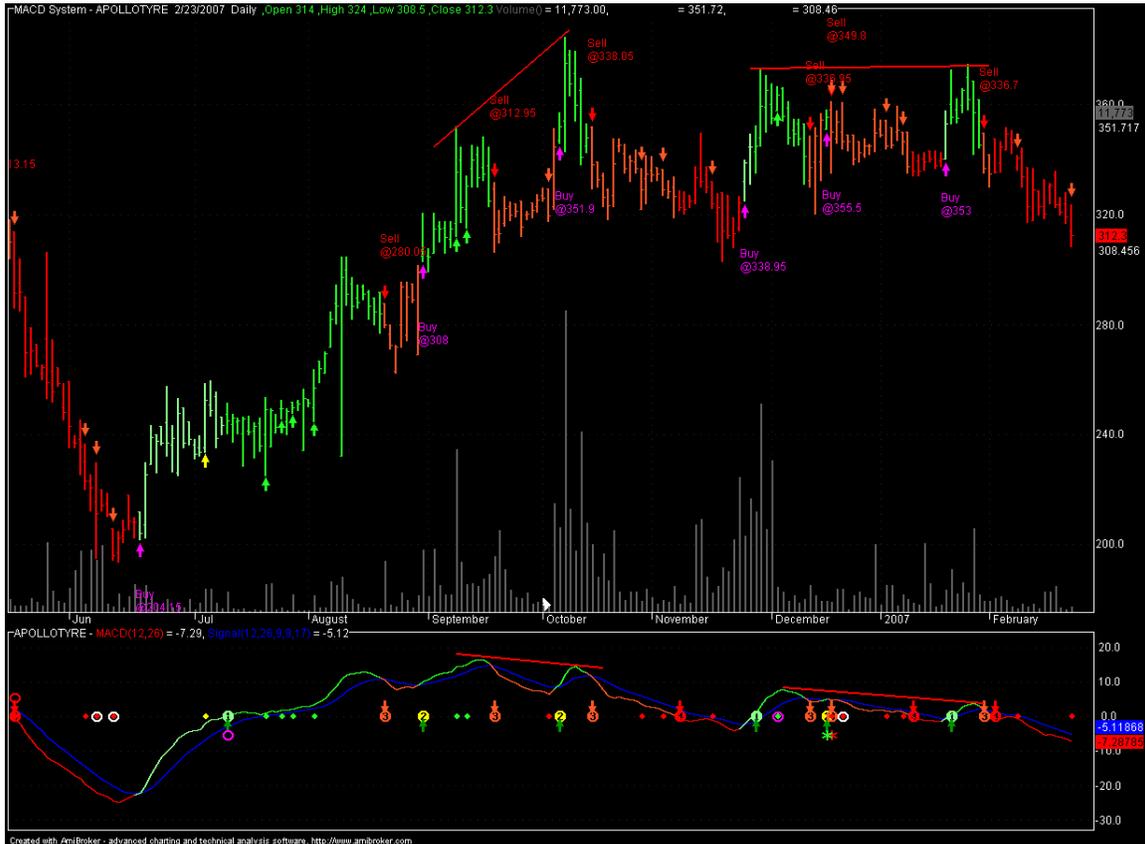


Chart-11

An Example of Bullish Divergence is given in the chart of Asian Electric (Chart-12). When the stock was making a lower low the MACD made a Higher Low in July last.

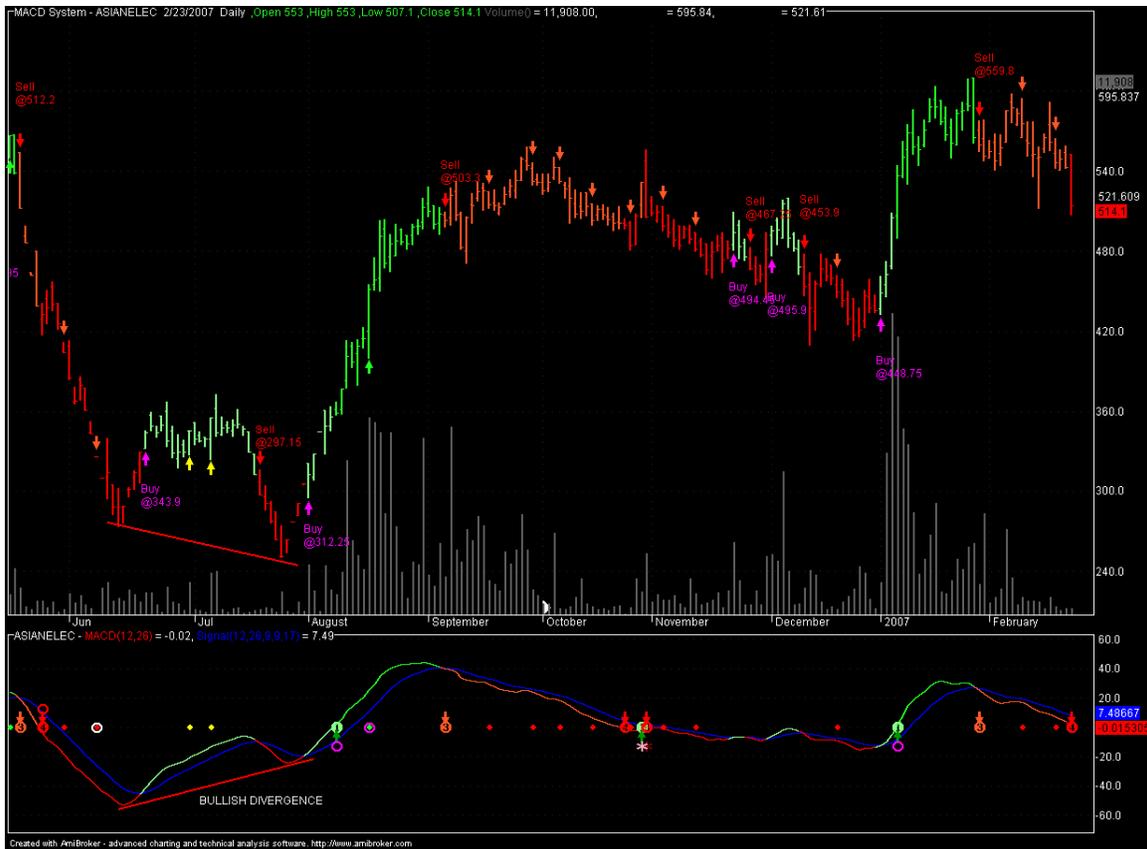


Chart -12

Now let us look at the Divergences in MACD Histogram. I find divergences in Histogram more useful than divergence in the MACD itself. It is also one of the favorite tools for Dr.Elder.

Many items the Histogram throws up divergence even there is no divergences detected in the MACD. Similar to the MACD divergence when the peaks do not correlate to the stock peaks and troughs. A bullish Divergence occurs when the histograms makes a negative peak smaller than the previous one when the stocks make a lower low. In the same manner a Bearish divergence occurs when the histogram makes a positive peak smaller than the previous one and the stock make a higher high.

Chart -13 and Chart -14 provides some examples.

# A GUIDE TO TECHNICAL ANALYSIS - MACD

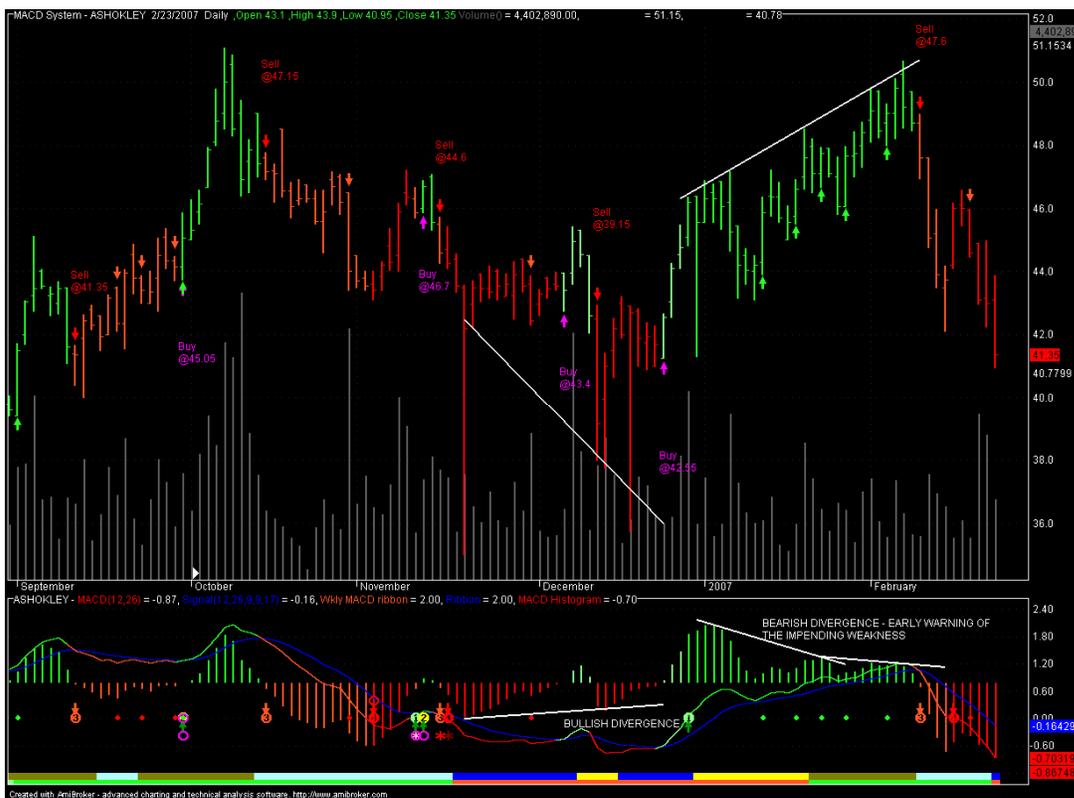
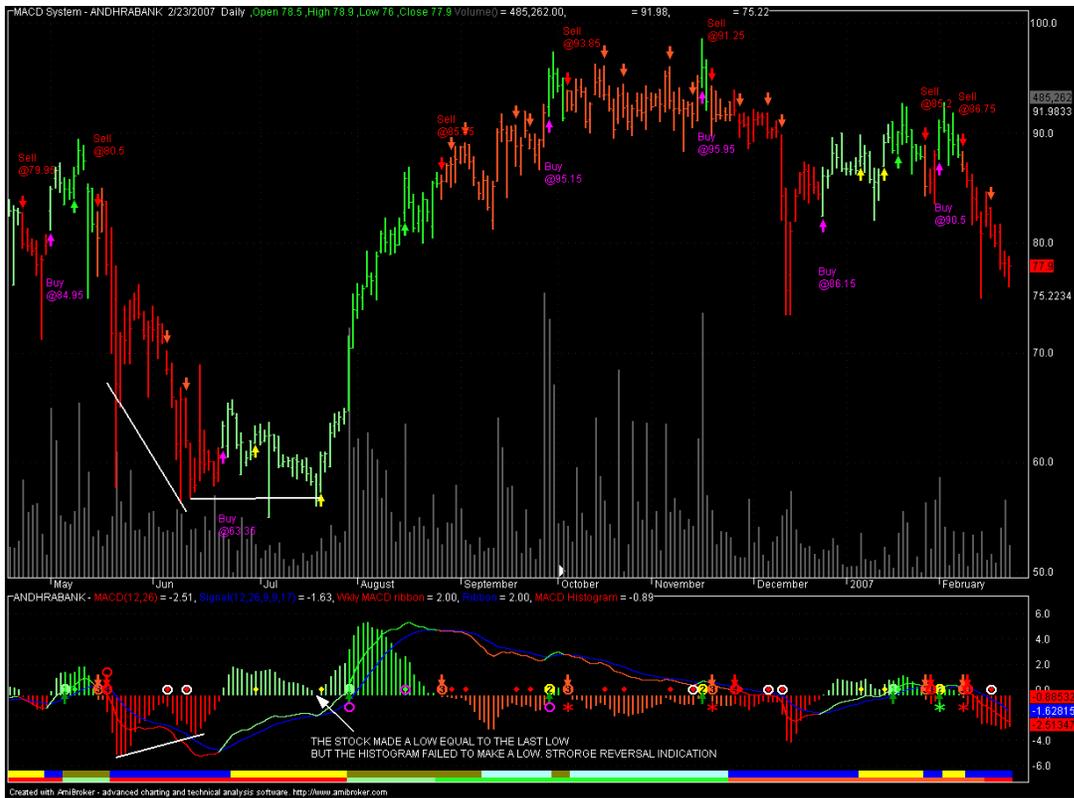


Chart -13 and chart 14

Finally it always good to look at the volume while looking at the MACD. Combing Volume with MACD helps us to get onto some really good moves. There could be many ways to combine this. One could just use a simple moving average of the volume or look at some volume-based indicator. OBV indicator with a 30 day moving average of the same does work as a good confirmatory Indicator.

We can also derive a MACD with a volume bias. There are many ways to do that. I will not go into the details of these here. I will provide a simple example here.

Create a new variable  $V = \frac{\sum(C*V)_n}{\sum(V)_n}$

Now create a MACD of this variable with  $n=12$  and  $n=26$ .

I will leave the experimentation to you. Just enclosing the chart of this volume biased MACD with the normal MACD

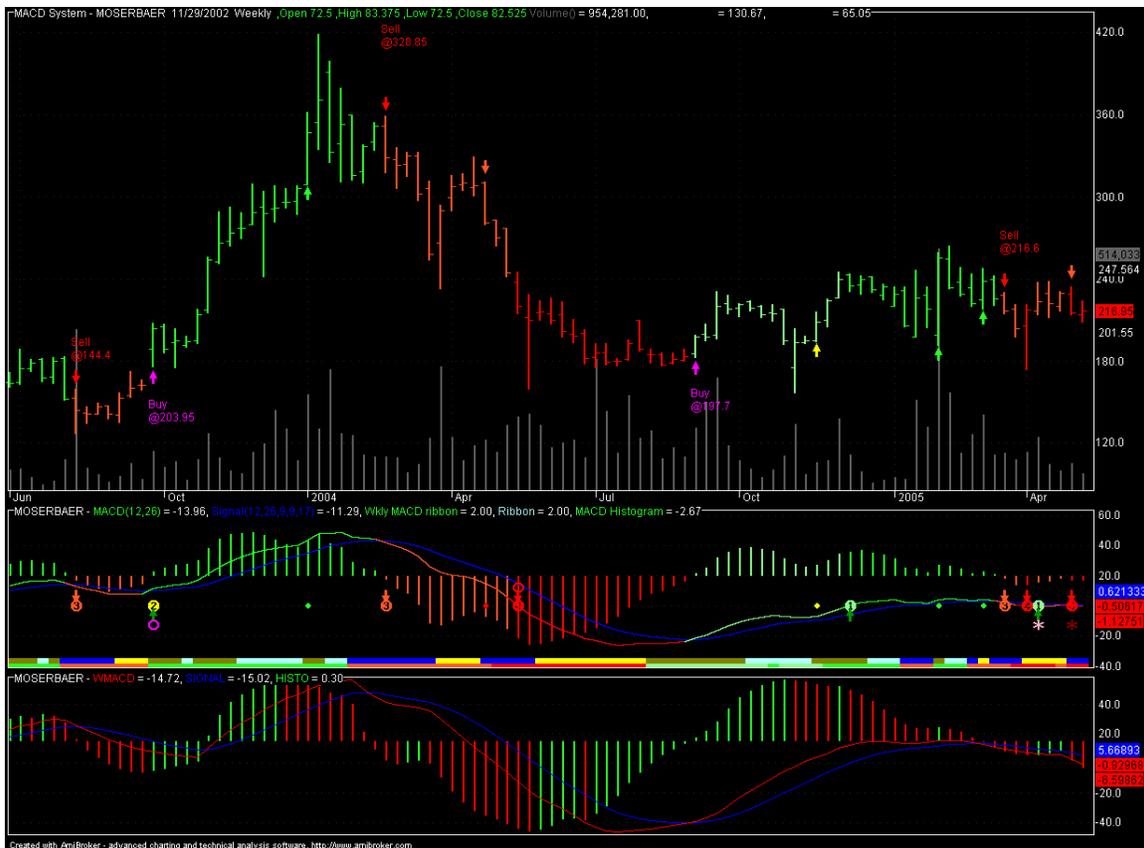


Chart-15

Now it is time to conclude this discussion on trading the MACD. Before that we will just look at the pros and cons of the MACD.

### MACD-PROS

MACD can be a trend following as well as a momentum Indicator. Since we are using two moving averages it makes a good trend following Indicator. As a momentum Indicator it captures the underlying momentum and that is the reason divergences are very effective in case of MACD. Divergence forewarns the traders of the impending weakness and reversals. MACD can be used on any time frame effectively. MACD is one of the most widely followed Indicators and that makes it self-fulfilling and effective.

### MACD- CONS

Since MACD is based on moving averages the inherent qualities of lag and whipsaws are also reflected in the MACD. MACD as a momentum Indicator does not work well as a indicator of over bought and oversold levels.

### END NOTE

MACD used properly can be one of the simplest and rewarding tool for the Technical Analyst. However it does have drawbacks and combining it with other Indicators makes it very effective.

One can try the MACD with different combination of the moving averages instead of the standard 12, 26. Many people use a shorter period for example 8,17,9 for Buy and longer ones 12,26,9 for sell.

Also one can experiment with MACD of other types of moving averages like weighted Moving averages, Adaptive moving averages like KAMA, VIDYA, and MAMA etc.