Staff Paper Series

USING SOME TECHNICAL ANALYTICAL TOOLS ON SOYBEAN FUTURES PRICES 1984-1993

by

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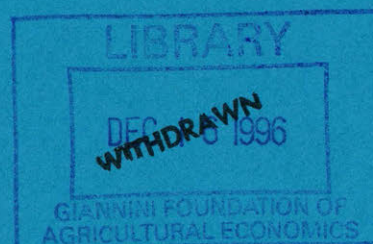
Using Some Technical Analytical Tools on Soybean Futures Prices 1984-1993.

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Abstract

This paper describes working with some simple technical tools on ten years of daily soybean futures prices. It emphasises the significance of volume and open interest on bar charts and underlines the importance of trends. It concludes with some moving average analysis. It's main thrust, however, is to emphasise the usefulness of technical analysis in indicating when to buy and sell.

Objective

The objective of this paper is to provide an introduction to technical analysis using historical soybean prices. The paper covers some of the similar concepts of technical analysis that we identified by a simple bar chart. The topics to be covered are:

1. How to construct a bar chart given general price data

2. How to interpret volume and open interest

3. How to identify trends

4. How to identify trend reversals

5. How to identify continuation patterns

6. Using moving averages

7. Using oscillators

These 7 topics provide a general understanding of technical analysis that might be used as a stepping stone for future work. The paper is written in simple enough terms so that a neophyte on technical analysis should be able to understand the main concepts behind the topics listed above.

Data Used

The soybean price data used in this paper is consisted of daily prices between January 3, 1984 and December 2, 1993. The methodology exposed a continuous contract using the nearby futures price and rolling over to the next contract on the first of the delivery month. The information provided was the date, the open, high, low and closing prices, contract and total volume as well as contract and total open interest.

Procedures Used

Several procedures were used to access the data and make it applicable to a typical personal computer spreadsheet. The original data disk came in the form of ASCII text. ASCII is a neutral computer language that can be imported into any computer program equipped with the import/export feature. This ASCII text was first saved in WordPerfect. Once the ASCII text is saved into a computer program it is saved in that particular language. Since each computer program has a different language, the data could not be brought into a spreadsheet program. Eventually, however, the data was imported into the spreadsheet program Quattro pro.

The original data provided daily information for ten years. This was too much detail and so an approach has to be taken to narrow the focus. Instead of daily data, monthly data was used in order to fit the information on to one graph using a standard PC. One effective approach for using monthly data is to provide the high price, low price and closing price for each month. Prices usually vary in a wide range over the course of a month. If a random day was picked for the month it probably would not fully represent the price action for the month. The high, low and closing prices do provide a better representation of price action because there is more continuity in the graph over the ten year period.

In order to analyze the data, an approach had to be taken that could put the data in proper form. Typically price information is presented in a three part graph. The top of the graph has price information in a bar chart with high, low and closing prices. The second

part shows total open interest figures which are usually plotted as a horizontal line. The third part on the bottom of the graph shows total volume figures which are typically plotted as vertical bars.

Instead of the typical form, another approach was used to try to find a new useful system. Price was plotted in the usual way but instead of total volume and total open interest, contract volume and contract open interest was used. These data wee presented by taking the monthly highs, the low and the closing value for both volume and open interest figures. So the final graph had three separate high-low graphs, one for price, one for open interest and one for volume.

Analysis follows graph construction. The first part of the analysis began with the interpretation of volume and open interest. The second and final part of the analysis used moving averages.

Results

(1) Price trends

At first glance it is easy to see that the graph on Diagram 1 shows a good representation of the price and open interest movement for the ten year period. This main graph was broken down into four different phases:

1. Phase one depicts a downtrend where prices decline from January of 1984 to August of 1986 (Diagram 2).

2. Phase two was in an up trend where prices increase from September of 1986 to August of 1988 (Diagram 3).

Open Interest
(Thousands)

Rate

400 500 600 700 800 900 1000 1100

1943 1992 1991 1990 1989 1988 1987 1986 1985 1984 1983

6
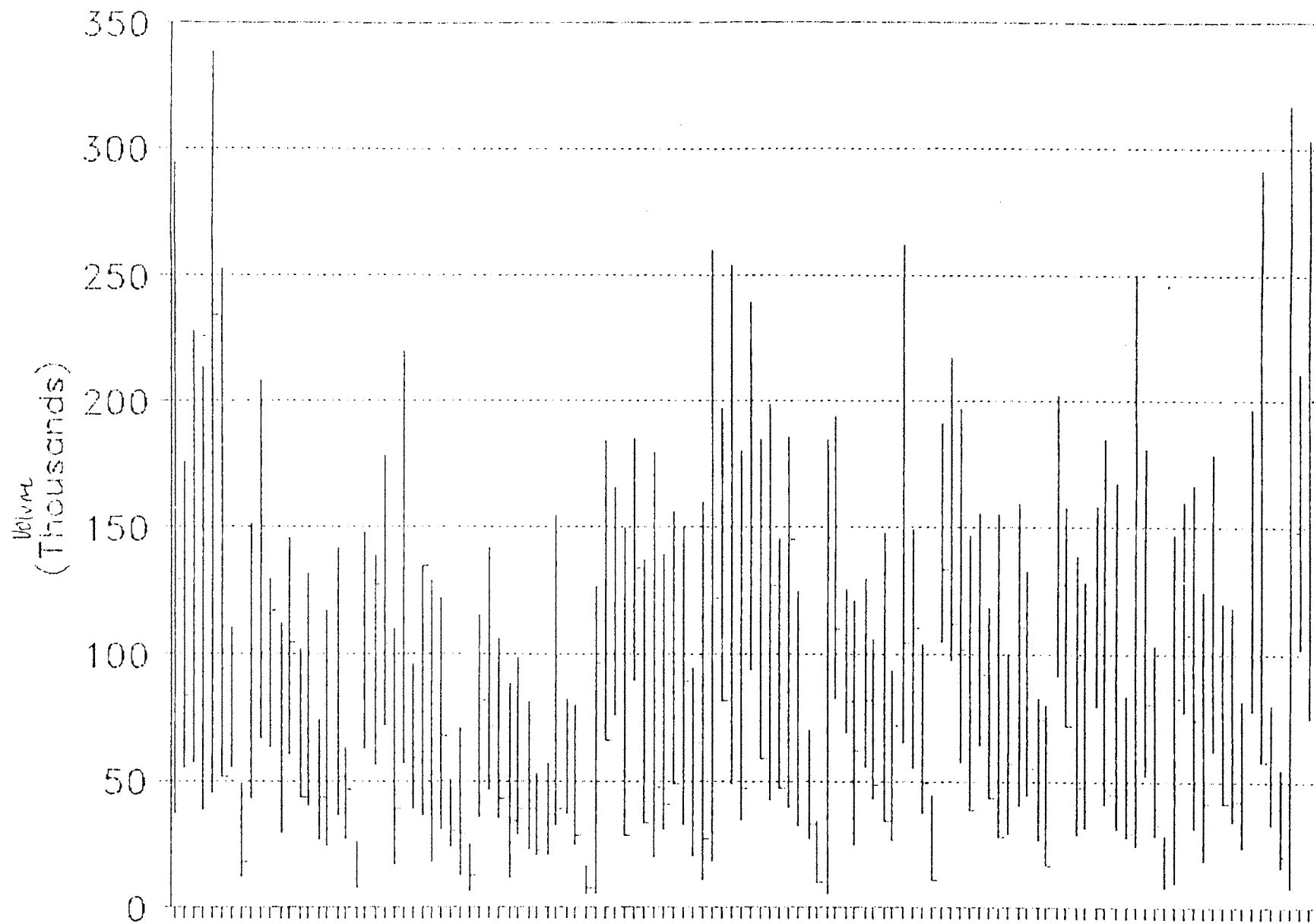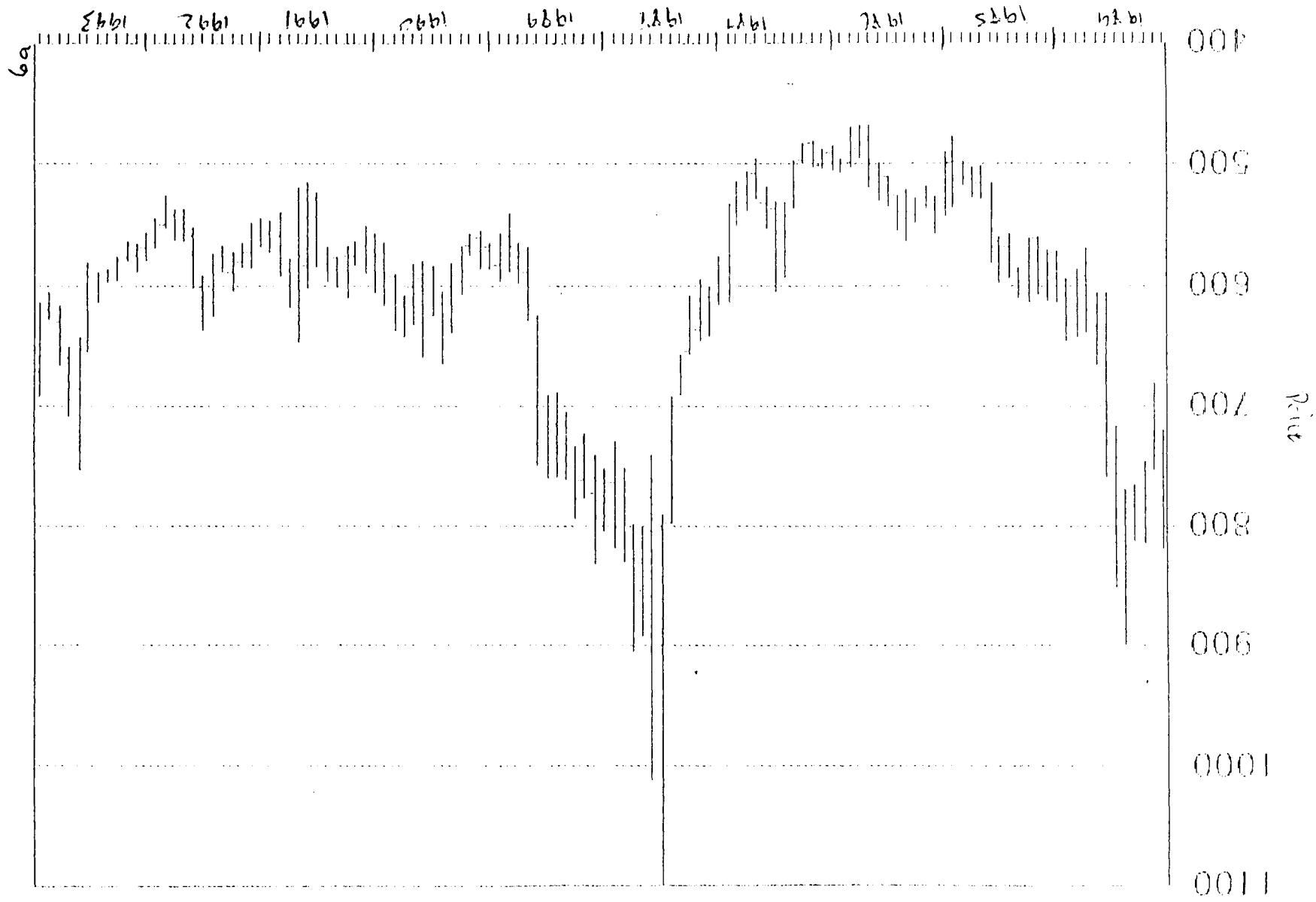
SOYBEANS
1984–1987

DIAGRAM 2 (Phase I)

Soybeans
Sept. 1986–Aug. 1988
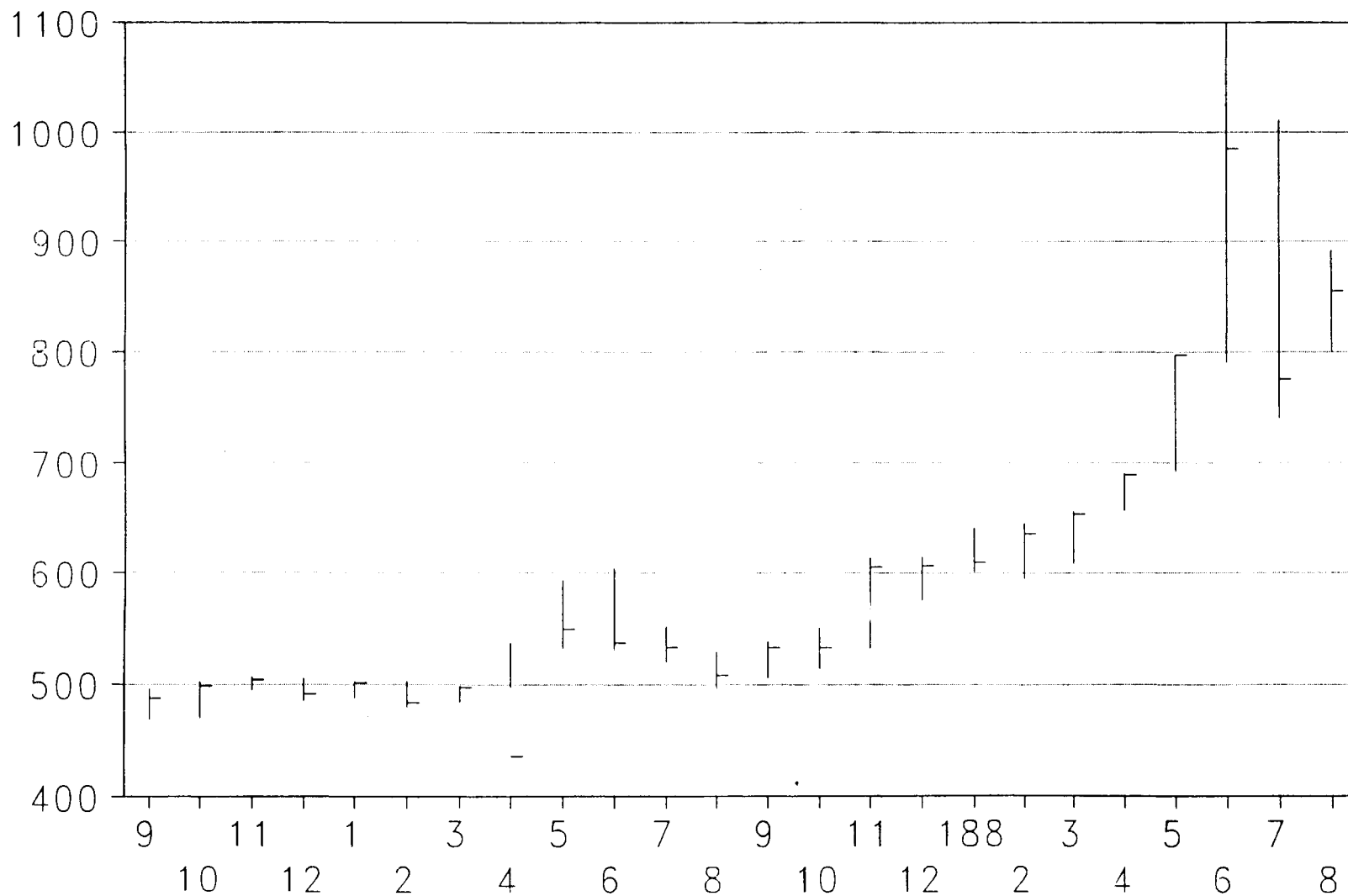
DIAGRAM 3 (Phase II)

3.   Phase three was in another downtrend where prices decline from September of 1988 to November of 1989 (Diagram 4).

4.   Phase four and last phases was in a sideways market where prices stayed in a narrower range from December 1989 to December 1993 (Diagram 5).

(2) Volume

The next step was to examine the data and interpret volume. These two pieces of information give good indications of the importance of price movement. Volume is simply the number of contracts traded at a certain time period. A good way to measure the force behind a price move is to look at the volume. A sizeable price move on light volume is relatively insignificant where as the same move on high volume is significant. Think of volume as the mood of the market. A sizeable move up or down, should mean that people are confident in the direction of the market. The key element to remember is a noticeable change in volume.
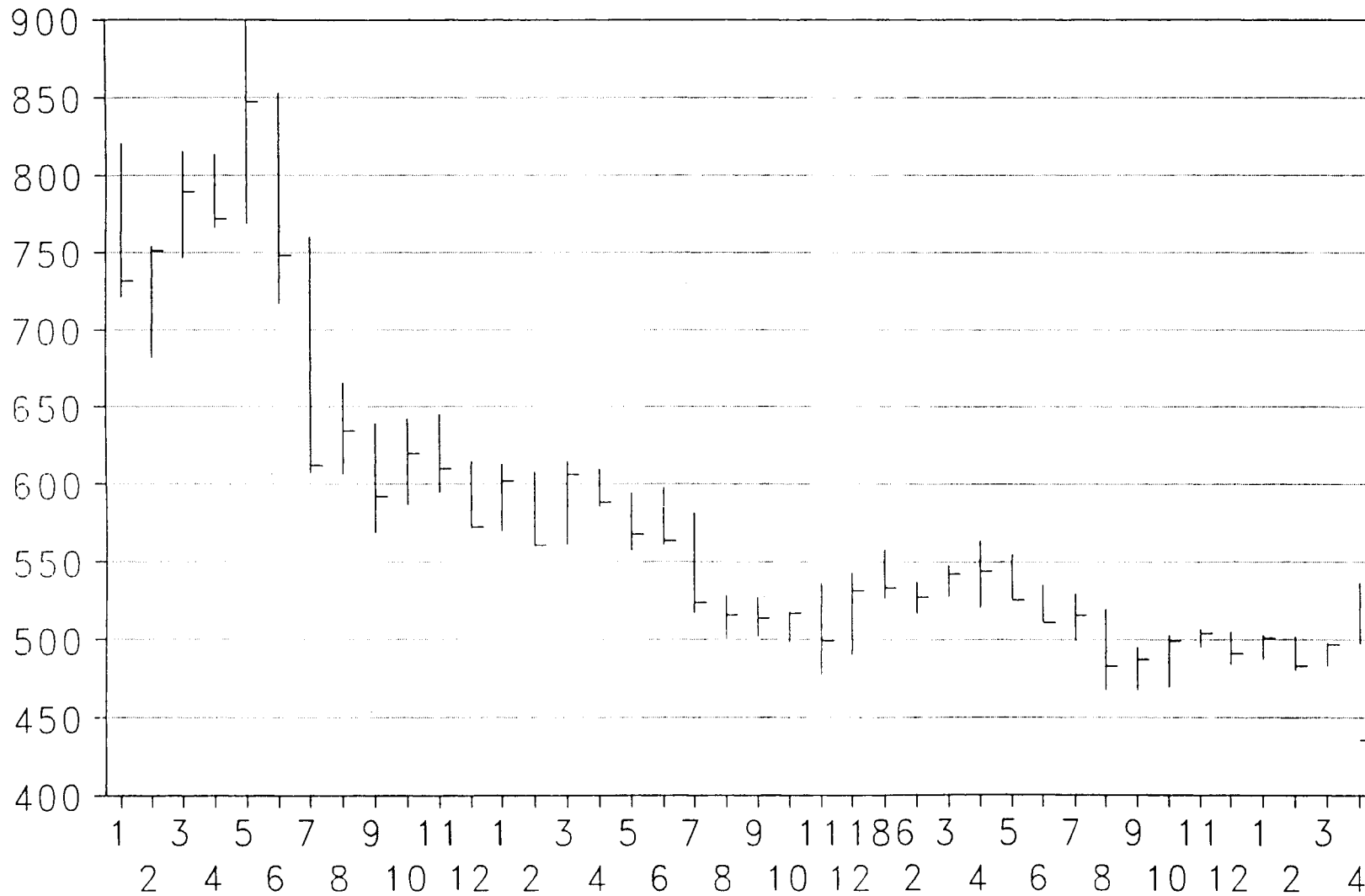
It is important to determine what is above average volume and what is below average volume for a period. Take a series of time, say fifteen periods and examine the vertical volume bars. Draw two horizontal lines somewhere in the middle of the series. One-third of the periods or 5 periods should fall below the lower line, 5 periods in the middle of the two line and 5 periods above the top line. Anything above the top line would be considered above average volume and anything below the lower line would be considered below average volume. Naturally one would have to change this procedure regularly to keep up with changing market conditions.

Volume is very important in determining chart formations like the head and

Soybeans
Sept. 1988–Nov. 1989
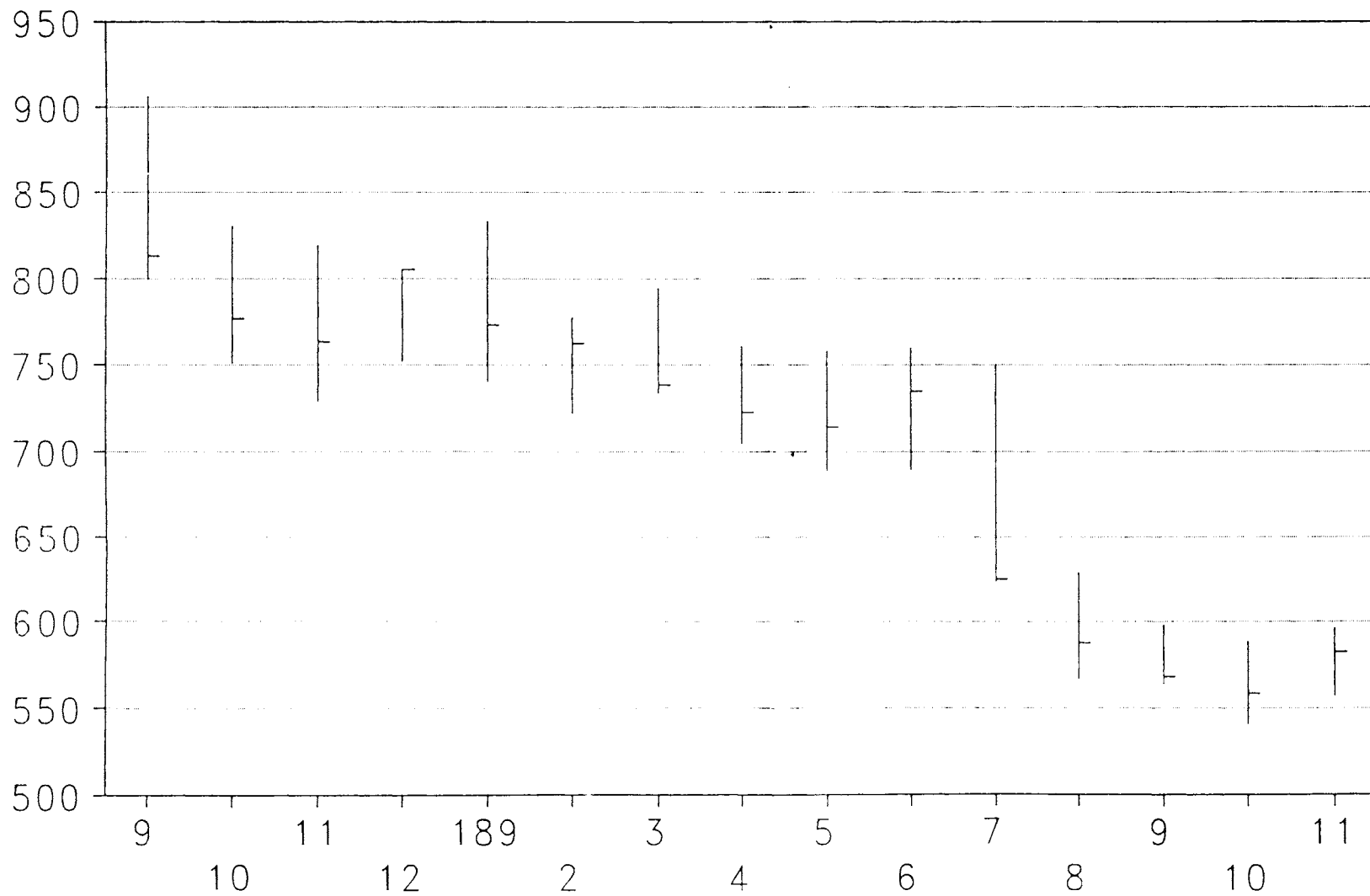
DIAGRAM 4 (Phase III)

Soybeans
Dec. 1988–Dec. 1993

DIAGRAM 5 (Phase IV)
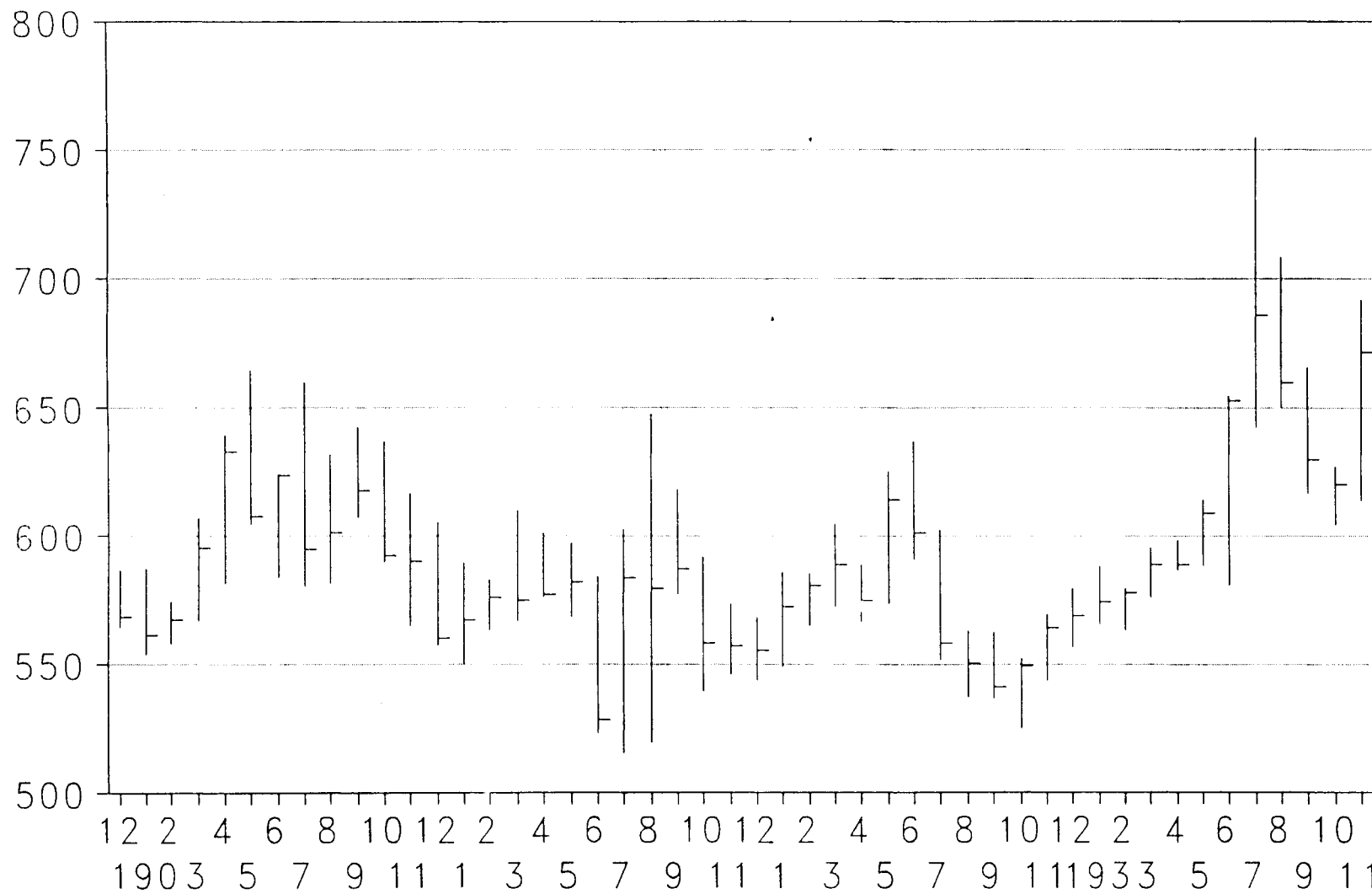
shoulders formation double tops and bottoms, and other formations. These

patterns need above average volume to complete their formations. In a head

and shoulders formation, the head is determined when prices reach a new

high on light volume. The neckline is reached on heavier volume.

(3) Open Interest

Open interest is the number of contracts that are still outstanding. Put

another way, it is the number of longs or shorts that are still in the market.

One of the keys to following open interest is to distinguish seasonal patterns

of a certain commodity. In soybeans open interest is at a low point for the

years just before the harvest of a new crop. It gradually increases and peaks at

about the time that the peak in storage ceases. An increase in seasonal open

interest is due to a large increase in hedging. Once the hedges are lifted,

open interest will decrease. One way to compensate for the seasonal

tendencies is to include a five year moving average of open interest. This acts

as a seasonal norm. If open interest is above or below the seasonal norm, it

warrants further attention.

In this analysis, a ten year monthly average was used as a comparison

point. In other words, an average was taken for each January over the ten

year period. This produced one number and served as a reference point for

January. This w not quite as effective as the five year moving average but provided some sort of a guideline.

An increase or decrease in open interest helps identify whether traders in a commodity are willing to follow prices higher or lower. Open interest is shown as an increasing amount of interest in that commodity as prices move up or down. In bull moves there are more traders who are willing to buy at higher prices and sellers will be less willing to sell. This diminished efforts to sell plus a greater desire to buy creates more pressure on the market and prices move to higher levels.

Another key fact to recognize about open interest is that after an up trend has been underway for sometime, the open interest expands rather rapidly. This larger open interest creates more vulnerability to the price structure and is usually a warning signal of a change in trend.

Detailed Price Volume and Open Interest Analysis

In the first 5 months of this analysis, prices rose 16% on increasingly higher volume and open interest. This tells us that traders are willing to follow prices higher. The high OI signifies that the shorts are covering and that there are more longs entering than shorts (graph 6a).

In June, July and August we see a substantial pull back in volume and OI which

describes a weak bear market or just a price dip in a bull market. This is something that needs further attention a closer look.

In September we see a sizeable increase in volume with a 6.5% decrease in price. This is the nearby month which is usually associated with a more liquid market. The high OI tells us that the newly entered longs now have losing positions and more shorts than longs are entering the market.

From there closing prices rise 2.8% on an increase of 9,535 in OI telling us that there might be a consolidation period ahead. Traders are preparing or a breakout and are establishing their positions. When OI rises like this during a consolidation period, it intensifies the market move after the breakout. During this period volume tapers off a bit suggesting that this is just a minor bounce in a downtrend.

In December prices follow downward with a drop in volume suggesting that the market might be in another consolidation period. Open interest also drops below the 10 year average telling us that there is some profit taking and the longs are covering their positions. This confirms the idea that we are still in a downtrend.

The nearby contract of January of 1985, open interest closed 12.7% below that of November. This suggests that money is flowing out of the market. Prices bounce upward 5% on above average volume. This implies that the market might be weakening because volume is high in the opposite direction of the trend. Trend is down but prices bounce on high volume, which is something to look out for.

Open interest continues to drop off until July when it is above the 10 year average by 11,100 contracts. Prices during this period continue in a downtrend and volume has

been in a sideways range. In March we see a reversal in volume to the upside and prices trade near the 4 month resistance point at 614.

From there prices resume their downtrend move until July when prices break the 5 month support at 560. This takes place on a su7bstantial increase in OI, suggesting that money is flowing into the market and more shorts are entering the market. Volume however, gives us a different signal. This penetration of the support line takes place on weak volume which suggests that the penetration is not significant.

Prices continue to fall into new lows on higher volume an OI. In November, prices reach a bottom on a decrease of 11,660 contracts in OI. This tells us that money is flowing out of the market, and we might be due for a change in trend. Volume is very high, and needs to be watched carefully.

In December and January, prices rally and reach a 5 month high in January. The high in January takes place on extremely high volume which suggests that we may be in an up trend. Open interest increases which implies that there is some short covering.

In February of 1986, prices fall on weak volume which confirms the direction of the trend. OI is above the 10 year average by 14.5% which suggests that we have a liquid market and the longs are covering their positions.

From there prices tick up until they reach a peak in April. Open interest trends lower while volume trends up and closes below average. This suggests that the market doesn't want to follow prices higher and we may be due for a correction.

In May prices begin a fourth month decline which takes place on consistently weaker volume. Here again volume confirms the trend. Open interest is also below their

respective ten year averages. These all indicate that we are in a retracement in a bull market.

In August of 1986, we reach a bottom on below average volume. In September prices begin their upward trend on high volume. What we have just experienced was a double bottom reversal formation. It took twelve months to complete, and we reached the first low in November at 470 on high volume. We reached the second bottom in August at 467.5 on light volume. In October we break through the neckline of 500 on high volume.

From October to March of 1987 prices trade in a narrower range. OI is also declining which tells us that money is flowing out of the market and there is some skepticism. Volume is also in a declining mode which signifies that traders are hesitant and prices are due for a breakout.

This breakout occurs to the upside in May with a leap in volume and OI. They both suggest that we have a strong bull market. The high volume indicates that traders are willing to follow prices higher. The increase in OI suggests that the shorts now have losing positions and are exiting wile more longs are entering the market.

Prices reach a top in June and start a downtrend in July. This all comes about on decreasing volume and below average OI. This low volume describes a 5% price dip in a strong up trend. The low OI suggests that the rally is being caused primarily by longs covering their positions and is considered bullish.

In September prices breakou7t of the downtrend on a huge jump in volume. Open interest on the other hand is below its ten year average which suggests that the breakout is caused by short covering. Volume suggests that the move is justified.

In November prices jumped 13.7% on high volume at a high increase in OI. These signals are all bullish and suggest that the up trend is still in effect.

In January we see prices surge to new highs on high volume and above average OI. This confirms a strong up trend, and the market is willing to follow prices higher.

In the following months we see prices rise to extremely high levels while volume trades higher but within a narrow range. While volume is steady, open interest is steadily increasing. This could be a warning signal that a market top is close by.

In May and June we see a blow off which takes place at major or market tops. We see prices advance tremendously, 37.7% in May and June on heavy volume and a decline in OI. In June OI falls dramatically off the high of 295,720 to close above the ten year average at 62,805. This is a strong warning signal that a trend reversal is near.

In July of 1988, closing prices fell 21.2% on below average volume and open interest. This significant drop in OI tells us that the market may be due for a trend reversal. the longs are covering their positions.

In August, prices rally on a decrease of 9,835 contracts on OI. This tells us that the shorts are covering their positions, which indicates that the price rally is weak.

In the initial stages of a bear market, OI usually declines. this is true for soybeans because this is usually traded from the long side. We have witnessed a decline in OI while prices have dropped significantly.

In September, we see prices decline 4.8% on a gigantic increase in OI and volume. In fact, these numbers are the largest in the 10 year period. This implies that we may have entered a strong bear market. Volume and open interest both point in the direction of a

strong market.

From there prices continue their downward trek until December, where the close was at the high of the month. This took place on a 69% drop in volume and average open interest.

In the next month we see prices rise above the close of December but close 3.9% below December. We see a large surge in volume suggesting that we have experienced an intense month. It seems that we had some short covering and volume was low but picked up when we resumed in the direction of the downtrend. Open interest also had a wide range, with an extreme high for the month. This describes that we had an active month but OI is now increasing with the downtrend which signals a health downtrend.

Prices continue downward for the next few months, about 3.6%. Open interest is also in an up trend which indicates that traders feel that the downtrend is justified. Volume for the most part, is an up trend, following the major price move which is down.

In July we see prices break out of the downward channel by 15% to the downside on above average OI and low volume. The high OI suggests that the shorts are right and are addition their positions. The low volume for this breakout is questionable. Typically volume on a breakout of this magnitude should be higher. This could be an indication that the market could running out of energy and is weak.

The next couple of months show that prices continue down and reach a bottom at 540. Volume however, continues lower and peaks in October. The low for the month looks like a key reversal. It reaches a bottom and closes above that low on high volume. This is a bullish signal and could indicate that prices are due for a rally. Open interest for

these months is also trending lower than the 10 year averages. This adds to the position

that the soybeans are due for a rally. This marks the beginning of phase IV.

In November of 1989, prices rally and close just below the 598 resistance set in

September. This takes place on moderate volume and below average OI. This suggests

that we have a weak bull market and could be in for a decline in prices.

From there the next couple of months show a 2.7% slide in prices. This takes place

on declining volume which indicates that the price trend should be up. Open interest is

also declining confirming that we are in a weak bull market.

After the bottom set in February 1990, we see a large 19.5% jump in prices. First,

after 3 months of declining open interest March marks the stat of an up trend in OI. this is

good for the longs because traders are willing to follow prices higher and the shorts are

existing out of their losing positions. Volume follows and reaches "Blowoff Volume"

status, which could be a warning signal that prices are due for a correction.

In June prices fall 12% but close at a high for the month. Volume has above

average activity for the month which suggests that prices should continue to move higher

in the near future. OI is also up which adds to the bullish mood of the market.

Prices continue to rally on declining volume and above average open interest. This

gives a conflicting signal and suggests that the longs are adding to their positions and the

shorts are not ready to bailout of the market just yet.

In November of 1990, prices break out of the year long up trend. The OI in

November is 25% above its seasonal average which suggests that all of the new longs had

to bailout and the shorts were right. Volume in November was very active which justifies

the downside breakout.

Prices continue downward and hit a bottom of 549.5 in January 1991. From there prices bounce up on above average volume and OI. the above average figures verify that a bottom had been established and traders are willing to follow prices higher.

Prices trend up about 5.8% in May where open interest is 19% above its seasonal average. This is important because the lows of May just break through the up trend line. Volume in May is also very high which suggests that traders are weary about the recent price gains.

In June prices fall 9.2% on below average OI and moderate volume. This action carries over because the new longs that entered the market at the beginning of the up trend now have loses and it also triggered computer generated sell signals which put the market on a lot of downside pressure.

Prices rally in July and move in a 19.8% range in August. Volume and open interest for August are at very low levels. Prices rise to the highest levels in a year but close just below the close for July. this is very questionable considering the low figures for volume and OI. There had to have been some kind of exogenous shock to the market.

Soybean prices rally 6.6% in September and close just above the low for the month and the close of August. This takes place on extremely high open interest which suggests that the market tried to test the recent high but was not capable. There was some profit taking by the shorts which propelled the market higher but the low close indicates that the market didn't have the power. Volume surged to very high levels which suggests that there was quite a bit of activity and since prices bounced off the highs, the market should

slide in the next month.

In October prices fall 8.9% on the slide in OI and a drop in volume. The volume did not follow the price movement which implies that prices should not slip to much more. The OI indicates that there was some short covering and prices should rally in the coming months.

After the bottom set in October, prices begin in a nice up trend. The price up trend is validated by a healthy up trend in both open interest and volume. Both increase in the direction of prices which suggests that we have a healthy bull market.

This up trend is in the form of a pennant in that prices trade in an increasingly narrower range. Prices breakout on the upside of the triangle on blowoff volume conditions. Volume for May of 1992 is extremely high wile open interest should drop off. There is a wide range in OI with a very low price for the month and so we should expect prices to decline.

In the next four months, prices rally on the downside about 17.6%. In the beginning of the decline, prices fall on increasingly lower levels of OI, which indicates a weak market. As prices begin to bounce back, volume begins to increase which suggests that the direction of prices should up or will soon be up.

In October prices reach a bottom and close just below the high of the month. This happens with above average OI and moderate volume. The high OI is a good sign for the longs because more new longs are entering than exiting shorts.

Prices stay in a bull market for the remainder of the study. The market stays in a narrow up trend and breaks out of that range on the upside by 7.2% in June. Volume

however, has also broken out of the up trend on the upside. Here again we encounter another blowoff volume scenario where prices rise to new highs.

In July the market rises another 15.6% to reach new 4 year resistance. This takes place on very low volume which is a very bearish signal. The weak volume is not in the direction of the big price advance and is questionable. After the blowoff volume in June, prices are due for a large decline.

In September we see another big surge in volume as well as a 41.7% increase above the 10 year average in open interest. Prices fall but close above the low for the month. With these extremely high figures for volume and open interest, this can be interpreted as a bullish signal.

Prices fall in October and rally big in November. OI is 36% above its 10 year average which is a good bullish sign coupled with the large price advance. Volume is also high in the direction of the price move which suggests that we have entered a healthy bull market.

Analysis Using Moving Averages

The second and final part of this analysis deals with moving averages. A moving average is simply an average of a certain specified period of data, say 10 days. After receiving a value for the 10-day average, the first day will be replaced by the eleventh day. As the name implies, the average moves on a day by day basis. The moving average is one of the easiest methods for following trends. it is also beneficial to use because there is little problem with the interpretation. One acts on what the signals tell us to do.

Using the computer spreadsheet Quattro Pro, it is easy to perform a moving average. By using the formula @avg(block), it will give the average of the specific block. The typical moving average is an average of the closing prices. The next step is to use the /Edit/Copy command to copy the average formula for however long one wants the moving average.

The benefits of using a couple of averages such as 10-day and a 30-day moving average is that it gives buy and sell signals when the averages cross each other (Diagram 6). About in the middle of August on the graph, the 10-day meets the 30-day. Notice how the 10-day follows the price trend much closer than the 30-day. In the middle of September the 10-day crosses the 30-day on the down side which would generate a sell signal.

It is usually beneficial to allow a two or three day filter before entering a position. This prevents some of the whipsaws that occur from bad signals. Most bad signals usually reverse themselves very quickly. The requirement that the signal remains in force an additional day or two helps weed out some bad signals.

In October the 10-day crosses above the 30-day generating a buy signal. After waiting one to three days it would still allow profit to be made. In late November, the 10-day crosses below the 30-day suggesting that the short term trend is changing. This also signals one to exit the long side of the market, change position and go short.

The next graph shows the short term relationship of the same time period. In this analysis a 5-day and a 20-day moving average is used (Diagram 7). Notice how the 5-day follows the trend rather closely and generates a few more signals than that of the 10-

Soybeans
July 84 – December 84
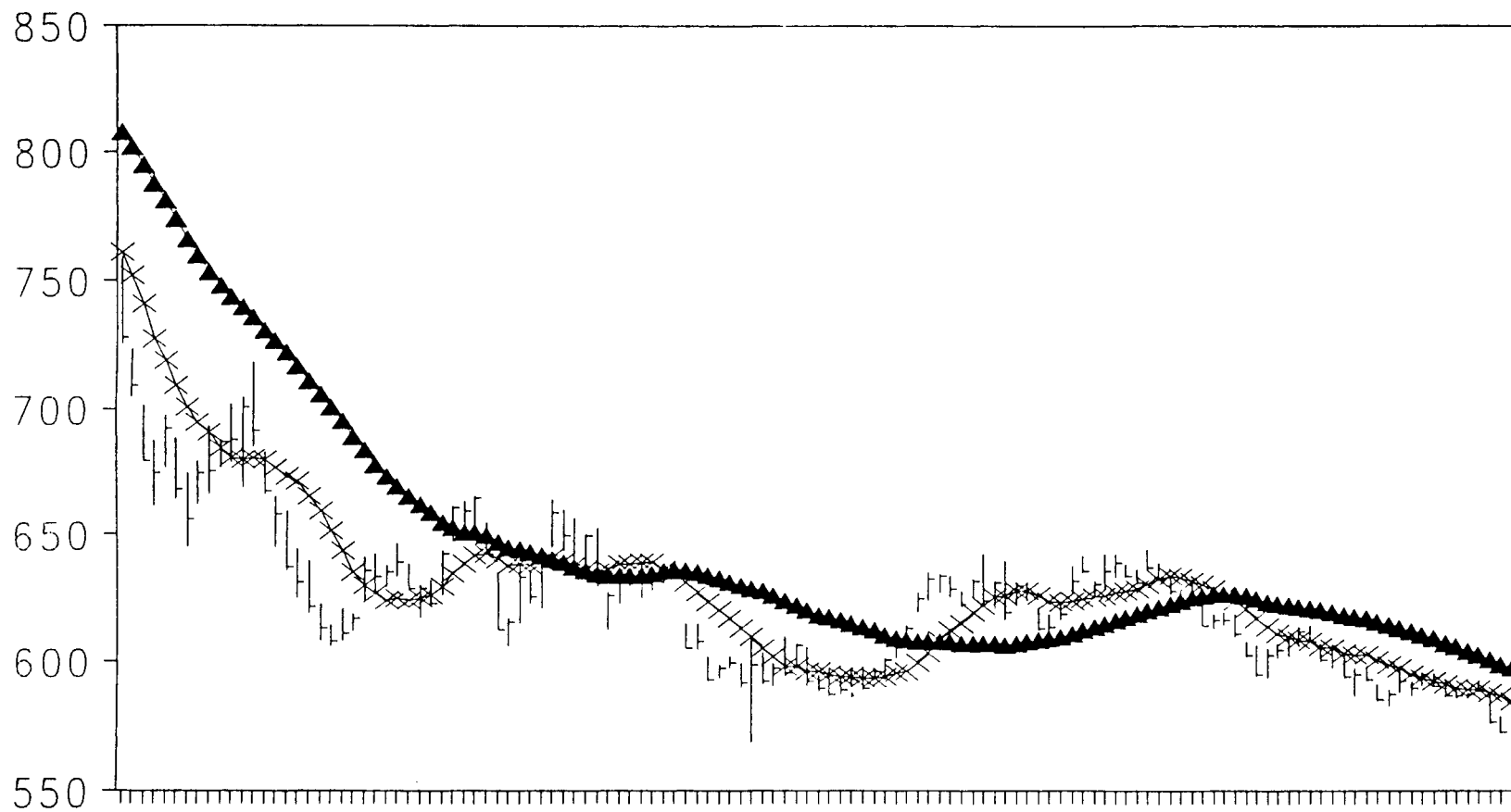
DIAGRAM 6

Legend: —✕— 10 Day MA —▲— 30 Day MA

DIAGRAM 7

Soybeans
July 84 – December 84
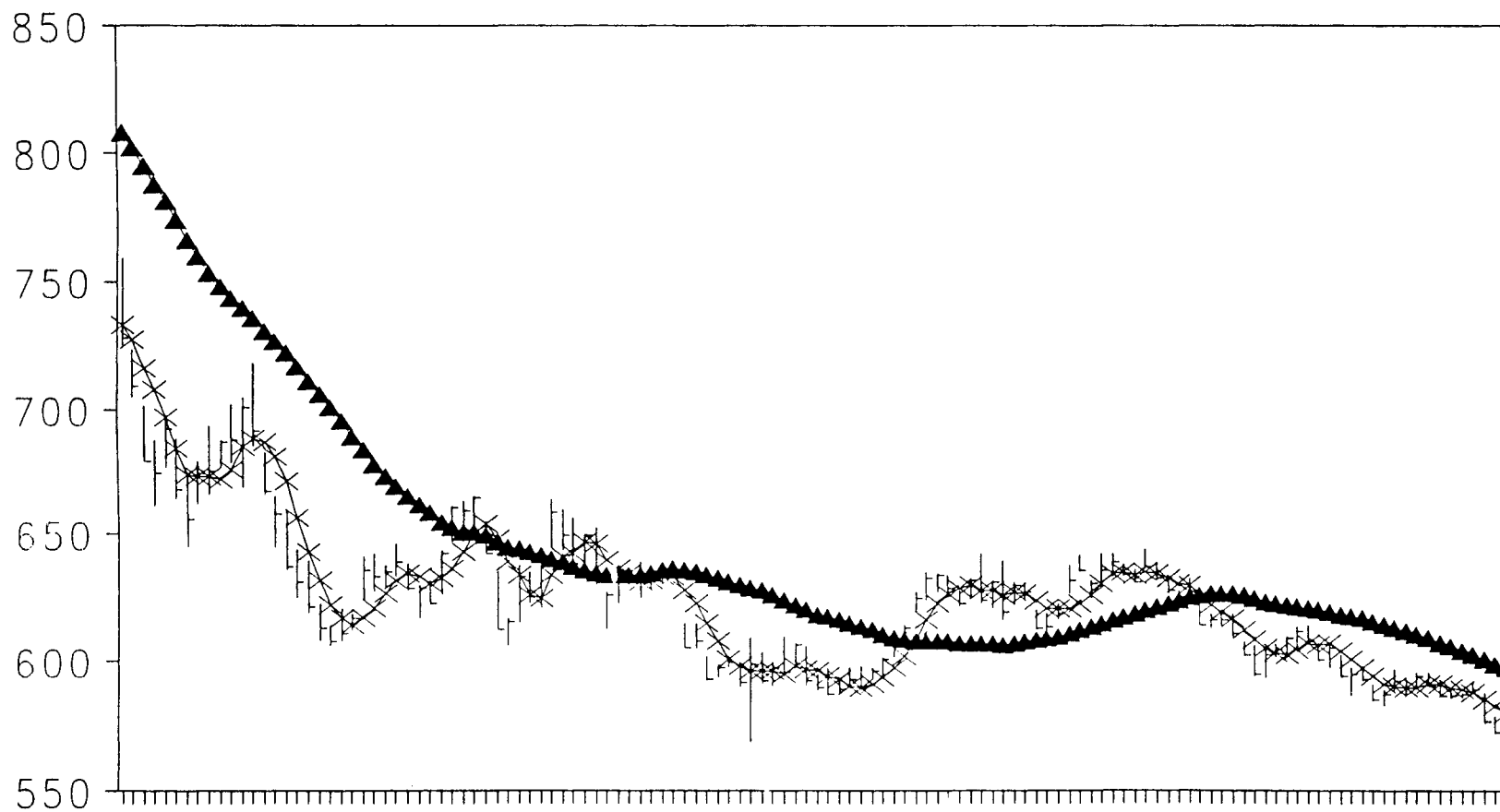
Legend: 5 Day MA, 20 Day MA

day/30-day combination. Sometimes it is suitable to use a short-term average because it is more sensitive and follows the price movement closer.

In the middle of September a sell signal was produced and was in effect until the middle of October. This is similar to that of the 10-day/30-day. When the 5-day crosses above the 20-day a buy signal is created and proves to be profitable up until November.

The following graph describes a little different picture by using a more long term focus (Diagram 8). The 30-day and 120-day moving averages yield one very profitable signal in early July. The use of the longer moving averages is good to take a look at the overall long term trend of the market.

The next graph is one that has a filter already built in (Diagram 9). This is just a moving average with about a 3% filter added to the 20-day and 3% filter subtracted. In order for a buy signal to be created prices would have to move above the upper 3% price band. One would stay in that position until prices came back and touched the upper band. If prices move to or through the upper band, one would want to liquidate a portion of their position. Once prices move to or through the 20-day moving average itself one would want to liquidate their entire position.

A sell signal was generated in the beginning of the period. Toward the end of September one would liquidate their total position when the price moved through the 20 day moving average. This brings up another very valuable point. Before taking or exiting a position, prices must close above or below the moving average. In the case with this graph, high prices for the day cross the 20-day moving average, but close at the 3% filter, which would enable one to still be in the market with a significant portion of their

Soybeans
July 84 — December 84

Legend: ─✕─ 30 Day MA ─▲─ 120 Day MA

DIAGRAM 8

Soybeans
July 84 — December 84

DIAGRAM 9

Legend: —✕— 20 MA +3%　—▲— 20 MA -3%
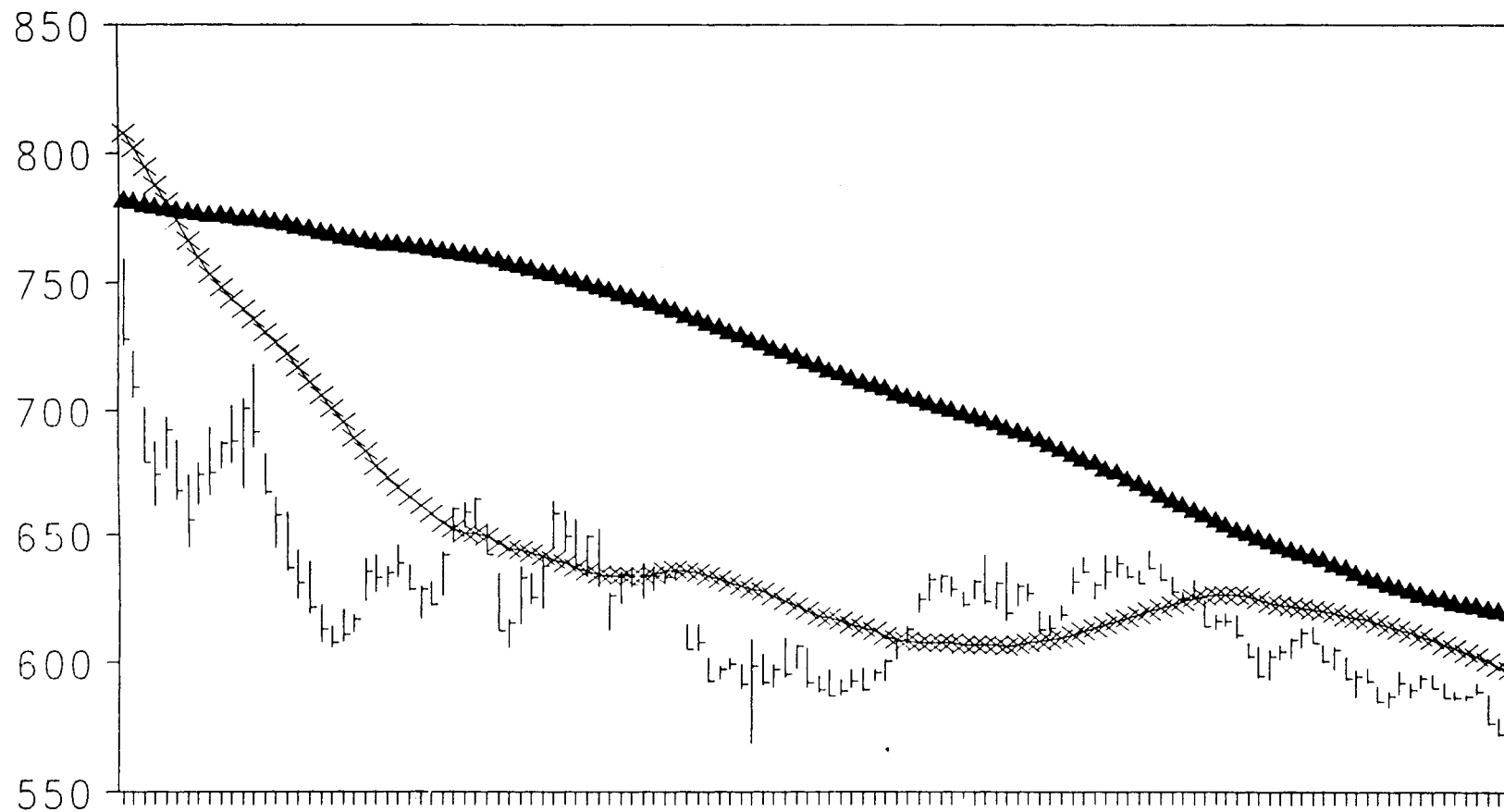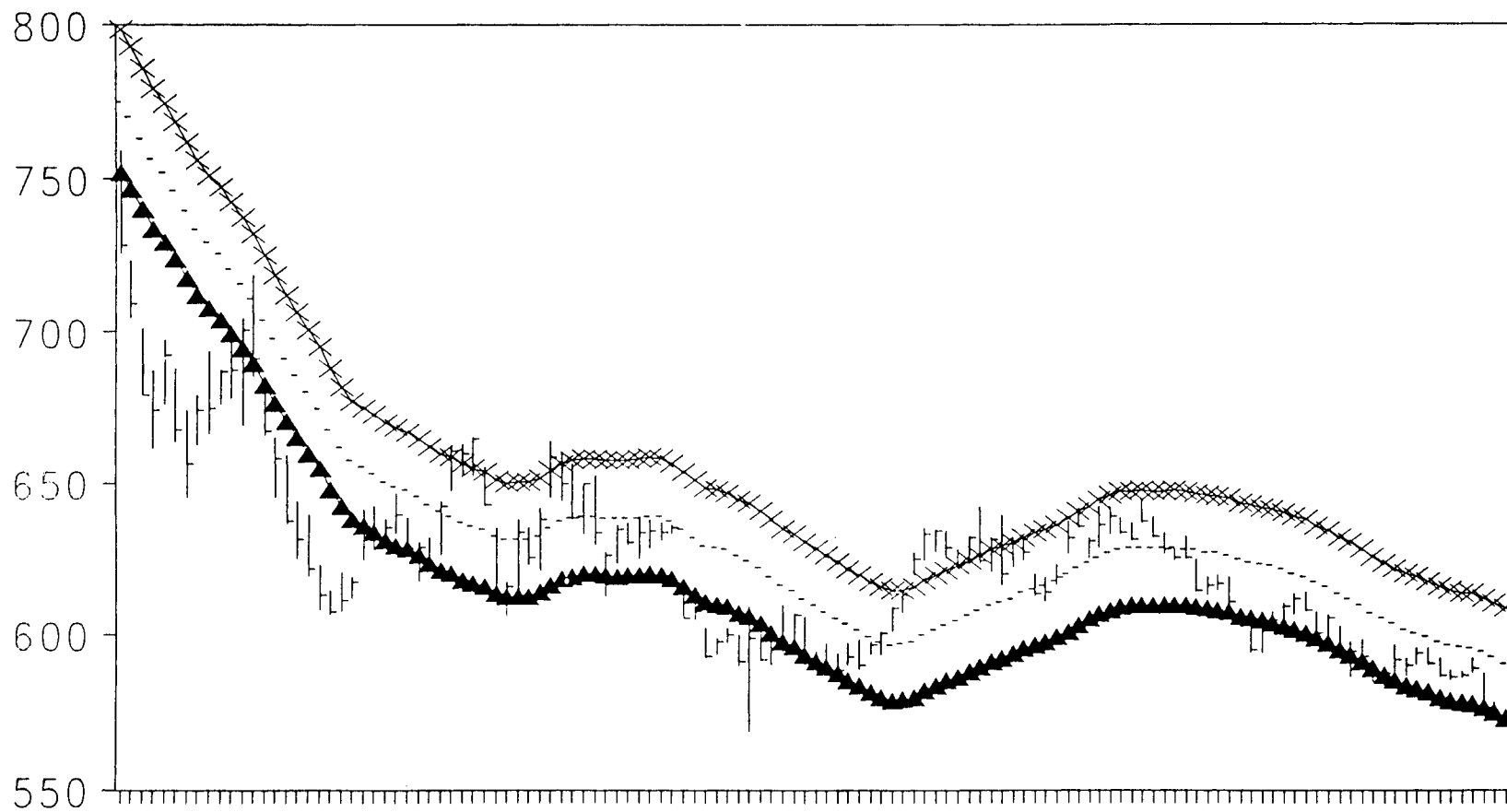
position. One would close their position in the early part of August when prices close above the 20-day moving average.

In the middle of September, another sell signal was created. This is not quite as big as the previous sell signal but would allow some profit to be made. One would hold the short position until prices close above the 20-day in early October.

Another little signal was generated in the middle of October when prices moved above the upper 3% filter. This would have initiated a long position and would have lasted until late October when prices closed below the 20-day moving average.

The next graph in question is one that uses a 20-day moving average of the high and low prices in a period (Diagram 10). In order to generate a buy or sell signal, prices must move below or above the two lines. For example, in early July a sell signal was created when prices closed below the lower moving average. This graph would keep one in the market until the middle of August when the prices closed above the upper line. Another sell signal was produced in early September when prices closed below the lower band. A month later prices close above the upper line which suggests an exit is due.

Toward the end of the graph a nice sell signal was produced in late November. This graph would keep one in the market for over a month and would yield one nice profit. The moving averages of the highs and lows seems to give better signals than the other short term average conditions.

Soybeans
July 84 — December 84
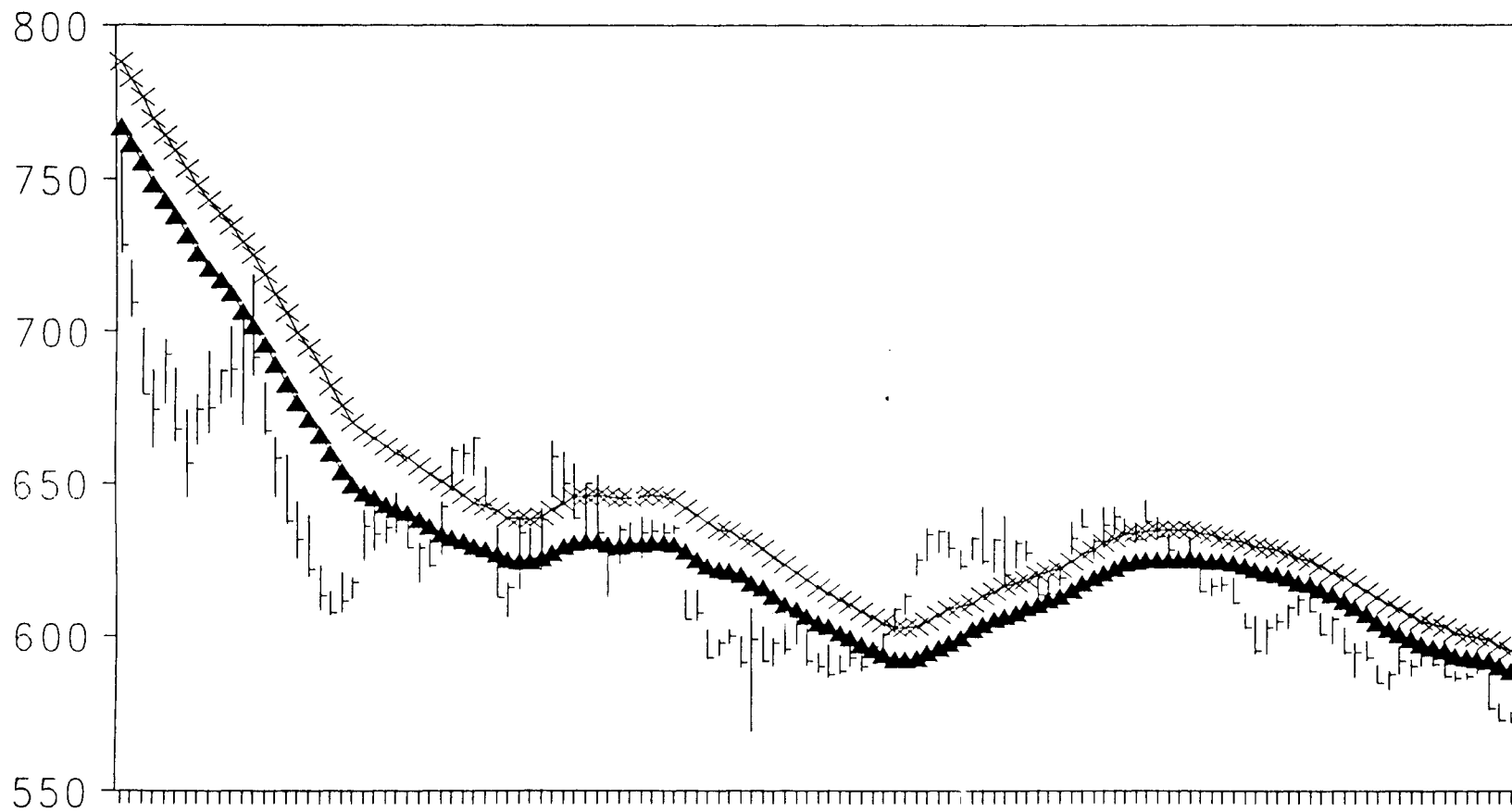
DIAGRAM 10

Legend: —✕— 20-Day MA Hi   —▲— 20-Day MA Lo

Conclusions

The purpose of this analysis was to provide an individual with a little knowledge of the arcane concept of technical analysis. Technical analysis is somewhat of an art an takes quite a bit of practice. The more one uses it, the better they become in forecasting the future outcome of price movements.

The focus of this analysis was to cover seven different aspects of technical analysis: Bar charts, volume and open interest, establish trends, trend reversals, continuation patterns, moving averages and oscillators. Unfortunately some technical problems arose with the original implementation of the data.

The first problem was importing of the data on to a computer spreadsheet program. The second problem was figuring out an effective procedure to construct a graph that has the needed information: high, low and closing prices, open interest and volume.

Instead of using the traditional approach to construct a volume and open interest graph, a different approach was adopt using contract volume and open interest. Rather than plotting open interest as a line graph above the volume, it was plotted in a high-low-close graph formation. The volume is usually plotted with vertical bars along the bottom of the graph. Instead, contract volume was plotted using the high-low-close approach.

Volume and open interest is hard enough to interpret in the normal sense using total figures. When using monthly price figures, volume and open interest is usually not used because of the large numbers. Adding the volume everyday for twenty to twenty three days in a trading period would give not only a huge number, but also would be hard to

determine the bearing it had on price movements. The system prescribed here was expected to provide a range with the high-low-close formation, that would give rather more insight to certain price movements.

Some portions of this methodology were successful. Some additional ideas can be used for further study. One example is the chart formations like the head and shoulders, double tops and bottoms, etc. Another possible area is price momentum. Since the data is already in a computer spreadsheet format, it would be easy to perform the calculations to achieve the concepts of oscillators and relative strength.

All in all this project has been productive in more ways than one. Sometimes if one changes the applications of typical procedures and uses them in other ways i8t can be a learning experience. The use of the computer alone in applying the data was a great experience. The technical analysis objectives achieved provided one with a better understanding and that was the intent of the analysis.

Phase I Diagram 2

Date	High	Low	Close	Volume			Open Interest		
				High	Low	Close	High	Low	Close
9	495	467.5	486.5	115640	35600	81270	196140	183065	186835
10	502	469	498.25	141900	46395	70975	193790	81493	81495
11	506	494.5	503.5	106010	35220	42695	167635	154455	156635
12	504.75	483.75	490.75	88260	11385	33540	159990	63065	63065
1	502.75	486.75	500.25	98730	28365	38705	153695	134115	135705
2	501.75	479.5	482.5	80650	22705	39075	136685	48700	48700
3	498	482.5	496.5	52800	20480	22410	124715	98945	119385
4	536	496.5	434.5	56535	20565	36565	120775	49100	49100
5	592.5	531.25	548.75	154450	32150	39115	197505	43775	155070
6	604	529.5	536.25	82070	37050	69820	149865	42350	42320
7	552.25	518.5	532	79970	24635	27925	80820	28420	28420
8	528	495	507.75	16170	5010	7415	28945	12640	12640
9	538	505.25	532	126500	4650	96655	246310	207480	225280
10	550	513.75	533	184190	66065	66065	249495	68195	68195
11	613.5	531.5	6905.25	165455	75880	142595	257490	176780	252075
12	614.5	575	607	149600	28200	28200	254165	53540	53540
188	641.5	601	609.5	1852250	89740	133830	309190	220770	220770
2	645	594.5	636	136550	33030	33030	213280	47135	47135
3	656	608	653.5	179050	19340	47420	241930	181150	181150
4	690	656	689.5	139280	30270	40325	184610	38025	38025
5	798	692	798	156465	48585	48585	286405	264745	271020
6	1099.5	790.5	986	150090	32330	88990	295720	62805	62805
7	1012	740	776	94920	19610	64905	154110	29945	29945
8	892	800	854.5	159950	10790	26975	88540	20110	20110

Phase II Diagram 3

Date	High	Low	Close	Volume High	Volume Low	Volume Close	Open Interest High	Low	Close
1	820	720	730.75	294420	36415	129160	259610	206705	206705
2	753	680.5	750.5	175960	54800	83440	207075	48205	48205
3	815	746	789	228320	57180	118175	240100	34045	224700
4	813	765	771	213665	38355	225845	225845	61090	61090
5	899	768.5	847	338125	45070	234425	307290	52675	279280
6	852	716	747.75	252765	51570	51570	272075	60315	60315
7	759	606	611.25	110170	54985	66080	140060	50540	50540
8	665	605	633.5	48595	11745	17420	66965	43050	29170
9	639	568.5	591.75	150925	42865	101385	183965	162345	167735
10	642	586	619	208045	66475	66475	172310	60325	60325
11	644. 5	593.5	609	129930	62900	117055	191585	60325	177270
12	614	571.5	572.25	111685	28805	30335	177730	42970	42970
1	612.5	569.5	601.25	145385	60185	104540	67915	154740	154740
2	607	559	560.75	102345	43235	43235	154740	47985	47985
3	614	560.5	605.5	131675	40085	65595	151405	40540	141930
4	609.75	585	588	73810	26285	43440	142970	42410	42410
5	593.5	556.75	567.5	117185	24070	95425	165575	37310	150595
6	598	560	562.75	141360	35885	51555	149335	46805	46805
7	581	516	523.25	62805	26495	46305	77365	38225	59685
8	528	500.5	515.25	25885	7410	14795	59685	34235	35000
9	527	501.5	512.75	147560	62665	94265	205105	176055	176055
10	517	497.5	515.75	138760	56265	127730	188625	60685	60685
11	535.5	477	499	178273	71655	71655	193945	42035	164395
12	542.75	489.25	531.25	109785	17230	38940	161755	50480	50480
186	557	525.5	533	220385	56990	99615	216745	171340	171340
2	537	516.5	527	95675	38865	59290	168910	56865	56865
3	548	527.25	541.5	134585	35785	134585	152835	127980	135405
4	563	519.75	544	128530	17810	64890	132690	34040	34040
5	554	525	525.25	121895	30815	67675	153170	23420	128065
6	534.5	510	510.25	50280	23225	29770	126945	50185	50185
7	529	499	515	70690	12660	28775	61680	33365	33365
8	519	467.5	482.75	24280	5915	12483	35905	28005	28005

Phase III Diagram 4

Date	High	Low	Close	Volume High	Volume Low	Volume Close	Open Interest High	Low	Close
9	906	799	813	260420	18115	121755	340235	304270	304270
10	830.5	751	776.5	197110	81615	81615	303960	54535	54535
11	819	729	763.75	254150	48745	151930	237615	45885	218600
12	805	751.5	804.75	180275	33985	46995	223305	56400	56400
189	832.75	740.5	772.75	238955	93505	143650	281990	203625	203625
2	777.5	722	762.5	184900	58405	58405	195550	54930	54930
3	794.5	733	738.25	199175	42555	126995	231505	43080	199780
4	761	704.5	722.5	145145	47195	47195	190070	61070	61070
5	758.5	688.75	714	185635	39230	144515	234100	200485	200485
6	760	689	735	124715	32135	32135	195555	57770	57770
7	750	623.5	624.5	69955	26770	32530	87420	41000	41000
8	628.5	567	588	33640	9515	9780	68850	25550	25550
9	598	564	568	184320	5030	145310	266650	23325	263775
10	588.5	540	558.5	193915	82495	109380	267700	64380	64380
11	596.25	556.5	582.75	125555	68840	80945	225890	50890	196415

Phase IV Diagram 5

Date	High	Low	Close	Volume High	Low	Close	Open Interest High	Low	Close
12	586.25	564	568	121330	24500	61910	197525	44505	44505
190	586.5	553.5	561	129935	55525	81215	213420	177615	177615
2	574	557.5	566.5	105420	43135	47815	179405	42050	42050
3	606.5	566	595	147600	33940	33940	218035	33755	190125
4	639	581	632.5	93315	26360	71565	184440	56605	56605
5	664.5	604	607.25	262495	65045	104215	349350	44900	272715
6	624	583	623.5	148935	54900	110300	271320	61130	61130
7	660	579.5	594.5	103680	37410	49235	126580	42280	42280
8	631.5	581	601	44145	10835	10835	99525	18145	18145
9	642	606.5	617.5	191320	104860	133435	322050	298910	299660
10	636.5	589	592	217545	97490	111985	303775	52260	52260
11	616	564.5	589.5	196915	57375	101750	289240	37625	234455
12	605	556.5	559.75	146645	38035	38035	235110	53880	53880
1	589.25	549.5	566.75	155295	64250	91565	240230	198205	200690
2	582.75	562.75	575.75	118040	43225	43225	200625	53625	53625
3	610	566.25	574.25	155100	27495	27495	229710	46210	183415
4	601	575.5	576.5	99815	29060	56925	176485	39910	39910
5	596.75	567.75	581.75	159080	39965	110835	285230	36915	281005
6	584	522.5	528	132975	43820	55085	269030	53110	53110
7	602	515	583	82575	25945	73930	111950	39170	39170
8	647.5	519.25	579.25	79850	16440	16440	94980	16110	15110
9	618	577	587	202380	90990	127710	305030	278845	296820
10	591.75	539	558	157260	712870	71800	290635	59030	59030
11	573	545.5	557	138410	28525	47340	242165	51475	232590
12	568	543	554.75	128290	31240	38295	226120	63425	63425
1	585.75	548.5	572	158210	79040	108225	248140	209715	209715
2	585	564.5	580.25	185085	40375	44370	214000	46840	46840
3	604.5	572	588.25	166990	31040	43880	233565	193325	193325
4	588.5	566	574.25	83315	27285	29275	189340	49500	49500
5	625	573	614	250645	23615	151390	318525	42715	272100
6	637	590.5	600.75	181000	51890	80560	288725	65965	65965
7	602	551.75	557.75	103570	28005	32240	145930	38840	38840
8	562.75	536.5	550.5	27800	7810	7810	90265	28325	28325

9	562	536	540.75	146540	9675	82780	311410	28865	311410
10	552	524.5	549.25	160240	76810	107320	325030	98465	98465
11	569	543	563.75	166805	31535	74220	3-02550	234165	243650
12	579	556.25	568.75	124630	18775	41445	237320	67245	67245
193	588	565	574	178635	61785	64610	279325	242205	256825
2	579	562.5	577.25	120090	40875	40875	251020	39520	39520
3	595	575.5	588.25	118510	33630	41975	258485	31540	223905
4	598	586	588.75	81275	23345	35895	222890	55925	55925
5	613.75	588	608.5	196570	77635	98480-	366880	307795	349450
6	654.5	580.5	652-5	291390	57780	57780	304475	56695	56695
7	754.5	642	685.5	79800	32445	38520	187845	49405	53845
8	708	650	659.5	54340	15880	20115	125760	26710	26710
9	665.5	616	629.75	316905	8045	148345	549065	22965	462770
10	627	604	619.75	211070	101975	116280	464070	90080	90080
11	691.5	613	671.5	303585	74330	200735	370225	61860	348515