Good Trix

by JACK K. HUTSON

A few years ago I decided to explore the possibility of using a small computer to take some of the drudgery out of trading. The endless hours of maintaining and experimenting with chart and numerical aids to transaction timing was infringing upon my trade decision process. I always felt that by taking just a little time, and cranking out just one more wonderful oscillator or average, that my chances for a profitable trade would be improved. In most cases all I did was reassure myself that I had examined most every "system" in my personal repertoire, but I had no idea whether this had actually improved my trading. The one thing I was very sure about was that the time and effort required to make a trade decision had jumped from minutes to hours. It was taking some of the fun out of trading.

My experience with computers started while I was still in college, using a teletype terminal linked via telephone to a time-sharing computer service. My professor was a physicist who had been drafted into teaching a mathematics course about differential equations. The book he chose relied heavily on using a computer to help solve these 'equations'. Our kindly Physics professor thought it would do us a great deal of good to use the time-shared computer arrangement to further our understanding of differential equations. This process was complicated by the fact that the books' computer examples were written in a dialect called Fortran and our time-shared computer spoke a language called BASIC. On this desperate note began my self-taught computer education.

After more than ten years of remote computer timeshared use, I decided it was about time to consider using a computer in my own personal endeavors. The so called "personal" computers had been on the market for about three years, by 1980, so I began to collect hardware information. I soon learned all about CPU's, disk drives and all the other new technology one could buy, and all about the wonderful speed these machines promised.

My past computer experience attested to the great speed advantage of the computer over hand operation. The other thing it had taught me was that it took a vast amount of time and effort to get a computer to do all this magic. I had spent thousands of hours developing computer programs (software) that track and forecast time series in manpower and engineering work. What I needed was a computer that was well supported by computer software so I would not have to start from scratch. At the time there was only two or three on the market that would satisfy my needs, and only one with sufficient graphics capability for stock and commodity chart display. Now there are many, but then only the Apple][+ had satisfactory high-resolution graphics, speed, and above all commercially available software and at a price less than last year's brokerage fees.

This leads me to the point where I met a fellow computer user while on my search for useful stock and commodity software. My friend, who has been a full-time trader for the last 15 years, has no axe to grind or product to sell, so, at this time, will remain anonymous. He described to me a trading system that he had had a friend program into his Texas Instrument Tl-59 handheld calculator. We talked a bit about the routine and where he had gotten the idea, and about its application to trading. He referred to the method as the derivative of triple exponential smoothing, and oscillator that seemed to be able to pick market turns while 'smoothing' out unnecessary false moves. I suggested that my friend write down his

procedure, and I would write a BASIC language subroutine that he could use with his computer system instead of relying on a calculator. Some time later I received a letter delineating the calculator routine and containing the following narrative:

Here is my version of "TRIX" - Triple Exponential Smoothing—operating on the log of price. You can use either common or natural logs.

This program should allow the user to select the exponent values he wants, so that through trial and error he can increase or decrease the sensitivity of the indicator. Then "he" decides on a reversal value to indicate a reversal of trend, say 2 or 3 for this set of exponent values.

This produces a series of points to be plotted near the bar chart.

ABOUT THE PROGRAM

I have embellished the BASIC computer subroutine following this article so that you need not input an alpha exponent value, but rather a number of days. When using exponential smoothing you are averaging past values of a time series in an exponentially decreasing manner. Alpha is usually used to represent the fractional value that past data is weighted, with the most recent data having the most impact or weight, and each preceding days data having exponentially less impact.

From a stock or commodity trader's point of view this is easier to think of as a number of days, as in a simple moving average. Thus the following formula may be used to closely relate an N day moving average to an exponential value of Alpha.

$$\text{Alpha} = \frac{1}{\frac{N-1}{2}+1} = \frac{2}{N+1}$$

The program computes the day-to-day change (one day momentum) of a triple exponential smoothed time series where each pass through the exponential filter uses the same alpha weighting factor.

Single linear exponential smoothing was developed in the early 1950's as a means of prediction along a straight line whose slope was based on preceding data. Triple exponential smoothing will act on trends of a higher order than linear. The form of line the triple exponential smoothing predictor follows is quadratic and may be used on nonstationary (trending) data; Taken by itself, triple exponential smoothing could tend to overreact to random market movements. This is the reasoning behind plotting the derivative (one day momentum) of the triple exponentially smoothed data.

If you use some care and 'trial and error' in choosing the number of days (N), this subroutine does a good job of picking entry and exit points. The very best results seem to come by using the TRIX subroutine to time your entry in a trending market. Since the number N is chosen so that it will filter out any insignificant cycles shorter than N, one could use the Fourier analysis subroutine published in *Technical Analysis* (Jan.83) to help pinpoint present cycles.

Figure 2 shows a frequency (cycle) power spectrum plot based on the Cotton cash daily prices shown in Figure 3. The flat base line to the left of the 60 cycle (cut off point in Figure 2) tells us that there is no persistant cycles of less than about 17 days length in the historical data shown in Figure 3. Therefore starting our 'trial and error' testing of TRIX using 17 days is reasonable (Figure 4). Raising the program smoothing factor from 17 days through about 50 days will remove more small cycles and smooth out the

curve even more, but at the loss of sensitivity. The more smoothing that is applied to the data the more of a lag in the output, but not near as much as a normal moving average.

Another example is shown in Figure 5 using Merrill Lynch common stock data. Figure 6 shows the resulting TRIX oscillator using an eight day smoothing factor.

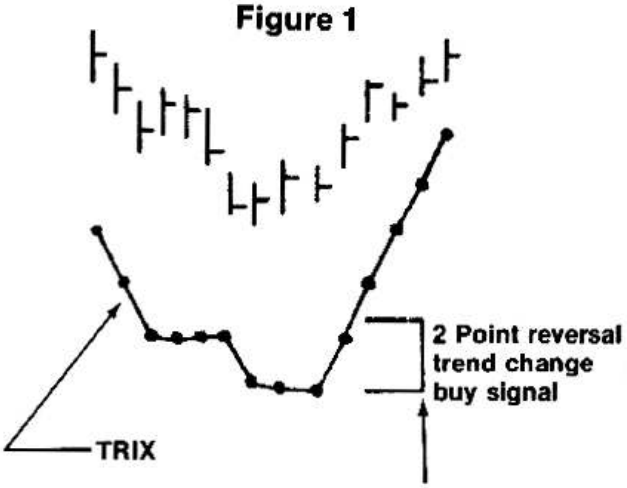
While this oscillator is not the answer to all our trading prayers, it certainly is an improvement over many. It contains two essential ingredients required in stock or commodity trading:

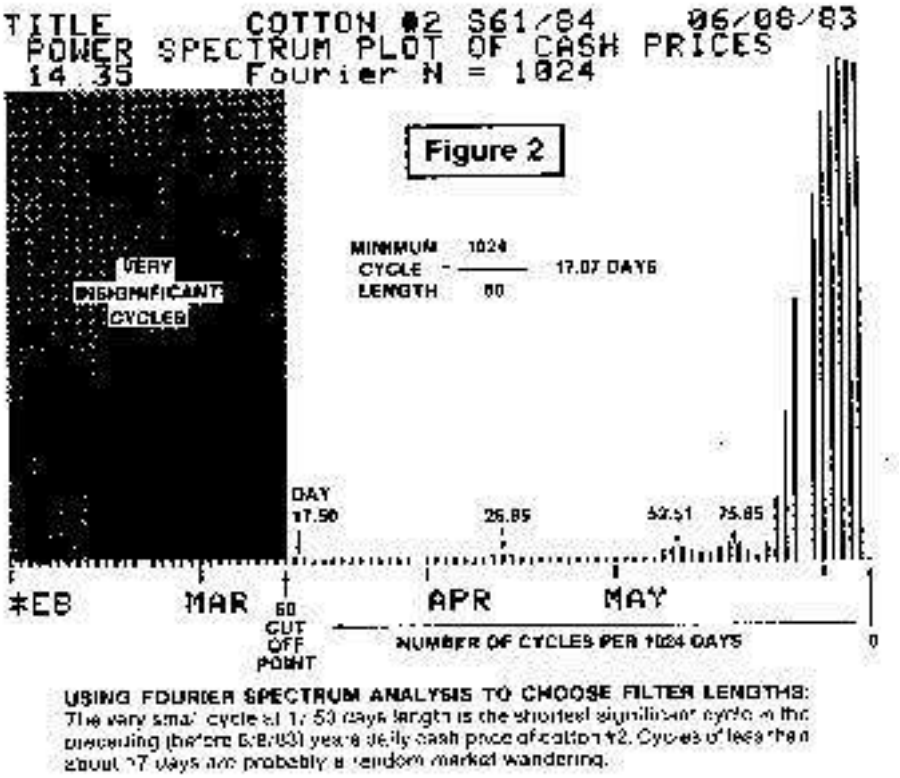
1) A filter of random market noise

AND

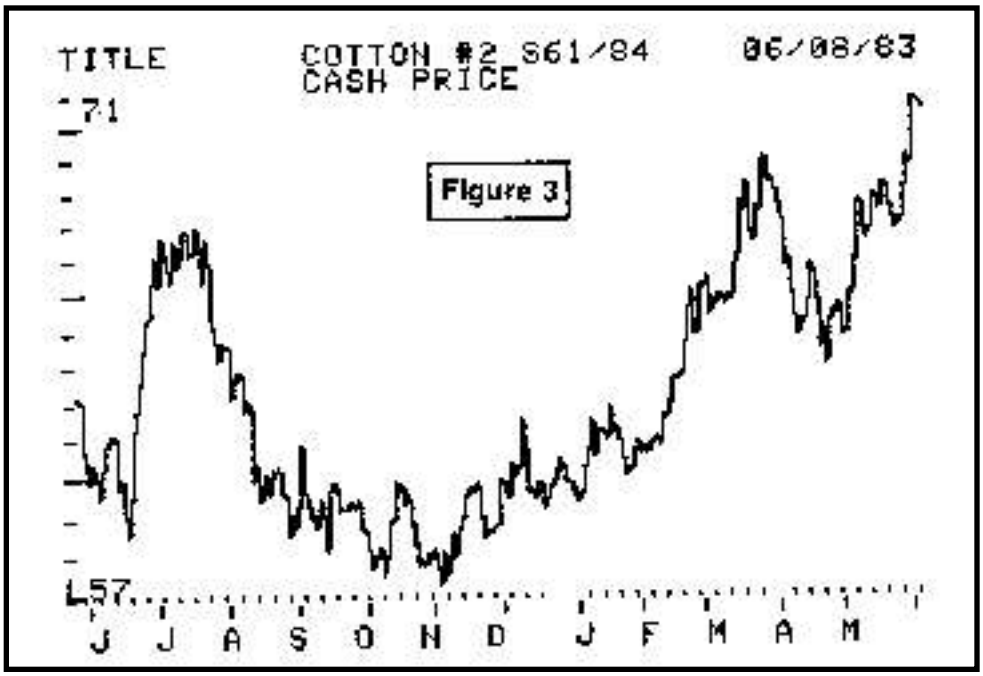
2) a positive timely signal.

Figure 1





USING FOURIER SPECTRUM ANALYSIS TO CHOOSE FILTER LENGTHS: The very small cycle at 17.50 days length is the shortest significant cycle in the preceding (before 6/8/83) year's daily cash price of cotton #2. Cycles of less than about 17 days are probably a random market wandering.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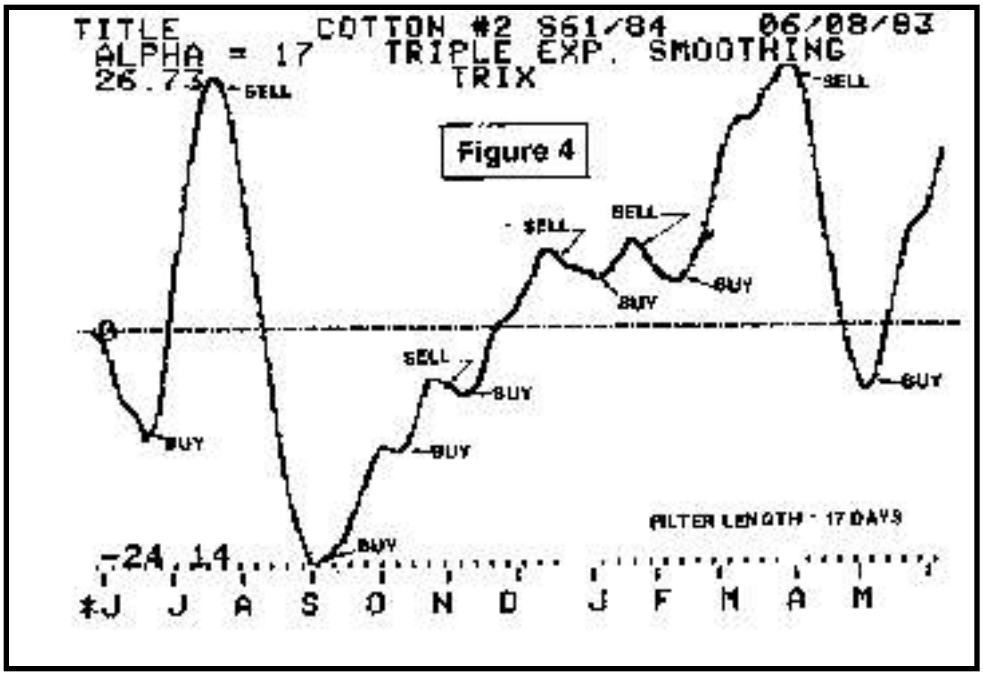
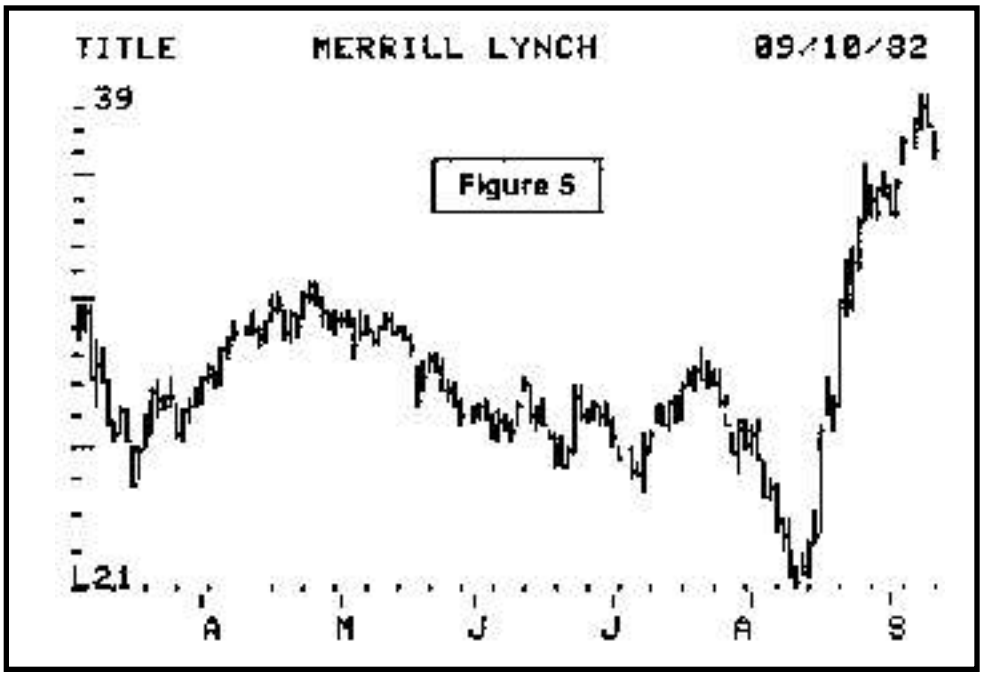
CASH PRICE
06/08/83
71
Figure 3
57
J J A S O N D J F M A M


TITLE
COTTON #2 S61/84
06/08/83
ALPHA = 17
TRIPLE EXP. SMOOTHING
26.73
TRIX
Figure 4
SELL
BUY
FILTER LENGTH - 17 DAYS
-24.14
*J J A S O N D J F M A M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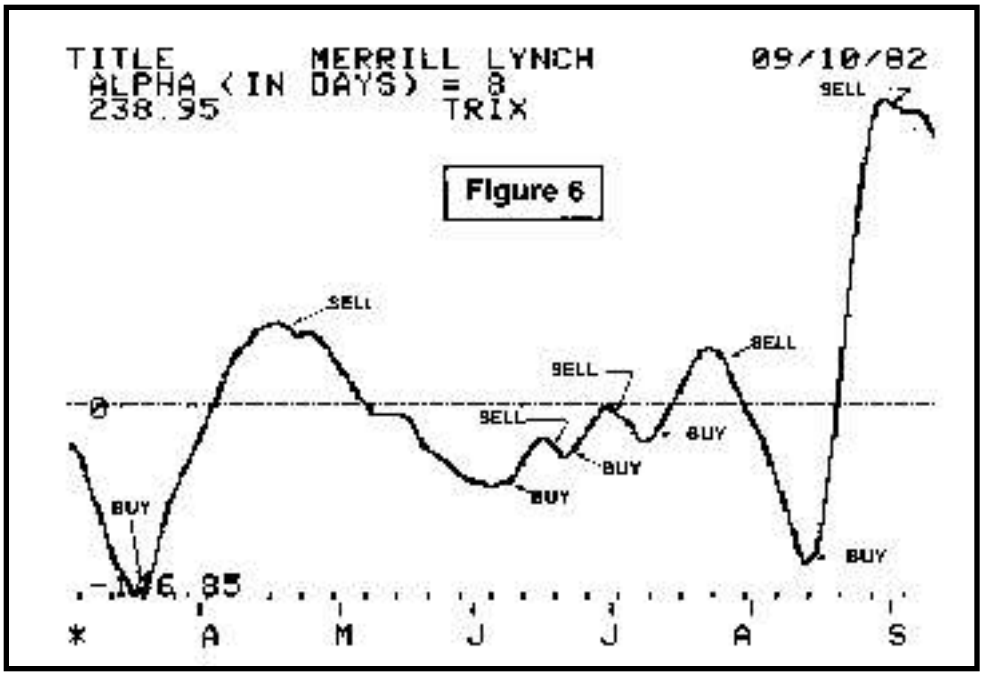
MERRILL LYNCH
09/10/82
39
Figure 5
L21
A
M
J
J
A
S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MERRILL LYNCH
09/10/82
ALPHA (IN DAYS) = 8
238.95
TRIX
Figure 6
SELL
SELL
SELL
SELL
SELL
BUY
BUY
BUY
BUY
BUY
0
-106.85
*
A
M
J
J
A
S