Monthly Plottings of Alpha Orders Showng Long Time Trend

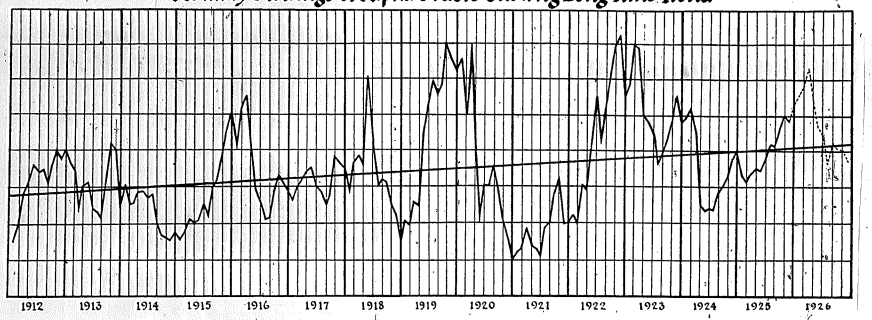

Figure 2

Before applying Macaulay's method in arriving at seasonal indices, it is necessary to take the monthly data under analysis and smooth it out, using a year's moving average to accomplish this purpose. (I shall say a few words later on in this talk about the twelve months moving average and its uses.) After the twelve months moving average, centered, is determined, the next step is to find what per cent the actual figures bear to the twelve months moving average, or the deviation of the trend. After this is done for a period of years, a reliable index of the average seasonal variations is determined. By taking all the deviations for the period considered in a study, a median is found. When the monthly per cent figures are added they will total 1,200 or 12 times the average month of the year as 100 per cent. If the figures fail to add to 1,200, slight adjustments are made.

Having determined the line of long time trend and seasonal variations, the next move is to eliminate their influences. By finding the ratio of the actual figures for each month to the corresponding ordinates of the long time trend, we eliminate the long time movements. By subtracting the seasonal indices from the percentages of trend, we secure a resulting series of positive and negative percentages free from long time trend and seasonal movements. Before we can find the relation or correlation of any series, they must be converted into some standard unit.

The standard deviation is a measure of dispersion of any data. If a set of values is centered about the arithmetic mean, the standard deviation will be small. As the values spread away from the arithmetic mean, the standard deviation will increase.

To find the standard deviation, square each percentage deviation, divide the sum of these squares by the number of months in series and extract the square root of the result. Divide each deviation, which corresponds to the arithmetic mean, by the standard deviation and we get the resulting cycles comparable to other curves. Figure 3 is the form on which this computation is rendered step by step.

Following the same line of procedure, we reduced the figures of other lines of industry to a comparable basis. In comparing our curves with other indices of trend such as the Harvard Business Curve, Manufacturing Production Index, Total Contracts Awarded, Real Estate Transactions, Lumber, Speculation and some others, we found that we either led by six months or ran in phase.

Briefly, to find out how we determined our average monthly lead or lag we applied Pearson's Coefficient of Correlation formula which is—

$$r = \frac{\Sigma xy}{n\sigma_1\sigma_2} \quad / \quad \sigma_1\sigma_2 = \frac{\Sigma xy}{n}$$

When r = the degree of correlation.
x = the First Business Variable. (Cycles)
y = the Second Business Variable. (Cycles)
Σxy = algebraic summation of the product of x and y
n = number of items.
σ_1 = Standard Deviation of the First Variable.
σ_2 = Standard Deviation of the Second Variable.
± 1 = Perfect Correlation.

CYCLE CALCULATION SHEET

KIND OF DATA: _____ SOURCE: _____

Yr. / Mo.	(A) ACTUAL	(B) TREND	(C) % of Trend A ÷ B	(D) Seasonal Indices	(E) C - D	(F) Col. E Squared	(G) CYCLE E ÷ σ
Jan.							
Feb.							
Mar.							
Apr.							
May							
June							
July							
Aug.							
Sep.							
Oct.							
Nov.							
Dec.							
TOTAL							

YEAR	ΣD^2 Annual Totals of Column F figure	STANDARD DEVIATION	REMARKS
19		$\sigma = \sqrt{\frac{\Sigma D^2}{n}}$	Standard Deviation is determined on the same period as the line of Long Time Trend.
19			
19			
19			
19			
19			
19			
19			
19			
TOTAL			

Figure 3

Whenever two different variables are compared and the movements of one compare with the oscillations of the other, the correlation is good, providing the coefficient falls above .5. Anything below .5 shows a very poor relationship. There are times when it is difficult to tell from general observation of curves whether one variable leads in movements for a given period or whether it lags. In other words, if there is a drop in general business conditions for a certain month of the year, in what month can we expect a corresponding drop in our own business? This can easily be determined by Pearson's formula which is applicable to any business factors.

After a close study of external cycles which we thought related to our business, we found that some business curves deviated more violently from the normal than our own cycle, while some were less violent. Some showed a quicker recovery than our "B" cycle. In general, however, the resemblance of all the external cycles which influence the demand for our products was very prominent. The next thought was to add all these external cycles and average them in a general demand curve, a general business curve reflecting the demand for our products. The result, when all the component cycles received equal weighting, showed a tendency to smooth out some of the erratic movements of the individual curves. But upon closer observation of this average curve, we found that if we gave extra weight to some of the cycles, some of the more erratic points could be eliminated entirely. Therefore, we recalculated the average demand cycle and laid greater stress on the most important ones. The resulting curve showed a better correlation than the first. Figure 4 shows the comparison of average demand curve with our Alpha Products.

Comparison of Alpha Orders with Average Demand Cycle in Terms of Standard Deviations

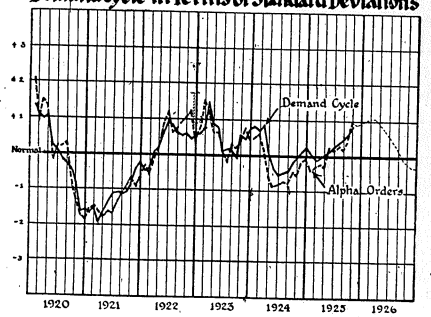

Figure 4

This average demand cycle does not run ahead of our own cycle, but the advantage derived from it is very great. We are manufacturers and must produce against orders received. To produce for the future markets and have an effective inventory control, we must make estimates definitive for the Production Department, i.e., in quantity terms. According to our average demand cycle, changes in business are always taking place. Although our own cycle shows changes at the same time as the average demand cycle, we cannot forecast unless the average demand cycle is indicating the same swing as our own cycle. We cannot analyze our own cycle, and from it alone we cannot measure the causes of the movements. Therefore, this average demand cycle keeps us down to earth, permitting us to go ahead according to its direction.