A COMPUTERISED APPROACH TO COMPARISON BETWEEN AVERAGE PERCENTAGE AND RATIO-TO-MOVING AVERAGE METHOD FOR COMPUTING SEASONAL INDEX

BY

BOLARINWA, ISMAIL ADEWALE

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DEDICATION

To my late mum, Mrs Bolarinwa M.A

ABSTRACT

Although there exist other methods for estimating the Seasonal component, emphasis of this work is on Ratio-to-Moving Average method and the Average Percentage method.

Attempt is made to compare the two methods with a view to establishing the supremacy of one method over the other.

To effect the comparison, three linear equations (each of which is used to generate monthly trend values for a 10-yr period yielding 120 data points) and three sets of Seasonal Index are used. Each of the three equations is combined with each of the Seasonal Index to yield nine different theoritical time series (T*S).

Each of the two methods under consideration is then applied on each of the nine theoritical series. Results (i.e estimated index values) obtained from each method is then compared (for each series) with the corresponding true index from which series in quetion was generated.

The Mean Squared Error (M.S.E) is computed for each of the series under each of the two methods. The comparison is based on the M.S.E.. It is mathematically wise to state that the method that consistently produces minimal error is better.

ACKNOWLEDGEMENT

I should first of all give thanks to Almighty Allah (without whom nothing is possible) for his usual care and guidance.

I should also be very grateful to my project supervisor,Dr Y.M. Aiyesimi who despite tight schedules did not only take his time to read thoroughly through the work but also made constructive criticsm and suggestions and in good time too.

I acknowledge the efforts of lecturers in the Department Of Mathematics & Computer Science , F.U.T.Minna most espescially Prof K.R. Adeboye, who incidentally is the Head of Department, Prince Badmus, who is the Cordinator of the P.G.D.(Comp. Sci.) programme, Dr Reju, Mr Kola Raheem, and Mr John all of whom contributed in no small measure to the acquisition of the knowhow applied in the course of writing this project. I equally acknowledge the moral support of my fiancee, Temilola Odede.

I finally give thanks to everyone whose name has not been mentioned but has contributed remarkably either morally, financially, or intellectualy towards making this work a success.

CERTIFICATION

We, the undersigned certify that this work was carried out by Mr I.A Bolarinwa in the Department of Mathematics & Computer Science, Federal University of Technology, Minna

.....	.....
Supervisor	Date
Dr. Y.M Aiyesimi	
.....	.....
Head of Department	Date
Prof. K.R Adeboye	
.....	.....
External Examiner	Date

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ABBREVIATIONS

M.S.E: Mean Squared Error

A.P: Average Percentage

R.T.M.A: Ratio-to-Moving Average

M.T: Moving Total

C.M.A: Centred Moving Average

EST: Estimated

CHAPTER 1

GENERAL INTRODUCTION

1.1 Time Series Analysis

A time series is a set of quantitative data that are obtained at regular periods over time. Examples of time series are the daily closing prices of a particular stock on the Nigerian Stock Exchange and the total annual production of crude oil in Nigeria over years.

Mathematically, a time series is defined by the values $Y_1, Y_2, \ldots\ldots$ of a variable Y (annual production of crude oil, closing price of a share etc) at times $t_1, t_2, \ldots\ldots$ Thus Y is a function of t, symbolized by $Y = f(t)$.

The basic assumption underlying time series analysis is that those factors which have influenced patterns of economic activity in the past and present will continue to do so in more or less the same manner in the future. Thus the major goals of time-series analysis are to identify and isolate these influencing factors for forecasting purposes as well as for managerial planning and control.

To achieve these goals, various mathematical models have been devised for representing time series. Such models range from the (fundamental) classical multiplicative/additive model to more sophisticated Auto-Regressive-Integrated Moving Average (ARIMA) models.

However, the focus of this work is the multiplicative model. This approach views the time series as being influenced by some characteristic movements namely the trend, cyclical, seasonal and irregular components.

This is mathematically stated as

$$Y = T * C * S * I$$

where

Y is the time series variable

T is the trend component

C is the cyclical component

I is the irregular component

Trend : This is the overall or persistent longterm upward or downward pattern of movements. It could be due to changes in technology, population, wealth, values etc. Its duration is usually several years.

Seasonal : Fairly regular periodic fluctuations which occur within each 12-month period year after year. It could be due to weather conditions, social customs, religious customs etc. Its duration is usually within 12 months.

Cyclical : Repeating up and down swings or movements through four phases : from peak (prosperity) to contraction (recession) to trough (depression) to expansion (recovery or growth). Its duration is usually 2 - 10 years with differing intensity for a complete cycle.

Irregular : The erratic or "residual" fluctuations in a time series which exist after taking into account the systematic effects - trend, seasonal and cyclical. It's due to unforeseen events such as strikes, floods, fire outbreak etc.

Time series analysis consists of a mathematical description of these components . This means an evaluation of the contributory (in

quantitative term) of each of the components to the time series variable.

Various mathematical techniques are available for estimating each of the components. The seasonal component is estimated by a device known as Seasonal Index.

1.2 Aims and objectives

The main aim of this work is to evaluate and compare the performances of the Average percentage method and the Ratio-to Moving Average method for a linear trend situation using a computerized approach. Programming language to be used is Qbasic.

1.3 Scope of Study

The study focuses on two methods of computing Seasonal Index namely the Ratio-to-Moving Average and Average method.

1.4 Seasonal Index

To determine the seasonal component (S) in the multiplicative model earlier stated, we must estimate how the data in time series vary from month to month throughout a typical year. Such fluctuations are accounted for by Seasonal Index.

Seasonal Index can therefore be defined as a set of numbers showing relative values of a variable during the months of the year. An index number of 115% for a month for instance implies that the time series variable value for such month is typically 15% higher than monthly average while an index of 80% implies that it is 20% less.

Seasonal component is isolated and studied for two reasons. First, by knowing the value of the seasonal component for any

particular month, the analyst can easily adjust and improve upon trend projections for forecasting purposes. Second, by knowing the value of the Seasonal component, the analyst can decompose the series by eliminating its influences -along with those pertaining to trend and irregular components and hence concentrate on the cyclical component.

1.5 Mean Squared Error (M.S.E)

The Mean Squared Error is a measure of the discrepancies between the actual and estimated values. Thus if S_1 , S_2 , S_3 ,.....S_{12} represent true index numbers for jan,feb,.....december respectively and $\hat{S}_1$, $\hat{S}_2$, $\hat{S}_3$,.....$\hat{S}_{12}$ represent estimates of the same index numbers by any method whatsoever, then the M.S.E is defined as below

$$m.s.e = \frac{\sum_{i=1}^{12}(\hat{s}_i - s_i)^2}{12}$$

More generally,

$$m.s.e = \frac{\sum_{i=1}^{n}(\hat{y}_i - y_i)^2}{n}$$

for any variable Y.

It follows that M.S.E is zero if the true index is perfectly estimated. Low values of M.S.E suggest good performance on the part of the method employed in arriving at the estimate.

Hence, when comparing two or more methods of estimating a concept, the one with minimum M.S.E can be selected as most appropriate.

CHAPTER 2

METHODS OF COMPUTING SEASONAL INDEX

Before discussing the various methods of computing Seasonal Index, it should be mentioned that the effect of seasons on a variable is present only when one has six-monthly, quarterly, weekly or daily data.

If the data is lumped together by years or longer time periods, the effects of the seasons disappear automatically since the maximum duration of the seasonal effect is a year. If for instance values of a monthly series for any twelve consecutive months are added, the effects of the seasons disappear.

Owing to this argument, it therefore follows that estimation of seasonal component arises only when data is given for "parts" of years (i.e month, week, etc).

Methods for computing Seasonal Index are

1) Average percentage method
2) Ratio-to-Moving Average method
3) Ratio-to-Trend method
4) Link Relative method

2.1 Average Percentage Method (A.P)

Steps involved are

i) Compute the total for each year and hence the monthly average.

ii) Express the data for each month as percentages of the average for the year.

iii) The percentages for the corresponding months are then averaged using either the mean or the median .

iv) Each mean in step (iii) is expressed as a percentage of their mean. The resulting percentages represent the index. These indices however do not truly represent the seasonal component since they include the trend influences.

2.1 Ratio-to-Moving Average Method(R.T.M.A)

Steps involved in its computation are

i) Compute 12-month Moving Total.

ii) Compute 2-month Moving Total of results in (i).

iii) Divide results in (ii) by 24. The results give 12- month Centred Moving Average.

iv) Express original data for each month as a percentage of the results in (iii).

v) Average percentage for corresponding months using the mean.

vi) Express each mean in (v) as a % of their mean. Results give the required index.

The logical reasoning behind this method follows from the time series model Y = T * S * C * I. A Centred 12-month Moving Average of Y serves to eliminate seasonal and irregular movements S and I and is equivalent to values given by TC. The division of the original data by TC yields SI. i.e TCSI/TC =SI.

The subsequent averages over corresponding months serve to eliminate the irregularity I and hence result in a suitable index S.

Because this method has better theoretical basis than others, it has been recommended as the most satisfactory for computing Seasonal Index.

2.3 Ratio-to-Trend Method

The steps involved are

i) Compute monthly trend figures by the least squares method.

ii) Express each original figure as a percentage of the corresponding trend figure.

iii) Compute the mean percentage for each month.

iv) Express each mean in (iii) as a percentage of their own mean. The resulting percentages give the required index.

It's relevant to mention that (iii) yields

$$Y/T = TSCI/T = CSI.$$

Subsequent averaging of Y/T i.e CSI in (iii) produces Seasonal Index which may include cyclical and irregular variations.

2.4 Link Relative Method

This method expresses data for each month as a percentage of data for previous month. These percentages are called Link Relatives since they link each month to the preceeding one.

The steps involved are

i) Translate the original data into relatives.

ii) Obtain the mean link relative for each month

iii) Convert the series of mean link relatives into series of chain relatives. The chain relative for any month is obtained by multiplying the link relative of that month by the chain relative of the previous month and dividing result by 100. This

process is continued until we obtain chain relatives for all the 12 months and for january second time.

iv) Although last chain relative (for jan 2nd time) ought to be 100, it would usually not be so due to the presence of the elements of trend. The difference between the two chain relatives for jan represents the trend decrement or increment.

Adjustment of the chain relative for the effect of trend is of necessity. If the last chain relative is greater than 100, the correction factor is to be deducted and is to be added when reverse is the case.

The first month is kept at 100. For subsequent months however, correction factors should be added or subtracted as the case may be.

For monthly data, the correction factor for the ith month is

$$(i-1)/12 \ast D \quad (i=1,2,3...12)$$

where D is the difference between the final chain relative and 100.

v) Express the corrected relatives as percentages of the arithmetic mean. The results constitute the index

CHAPTER 3

PROGRAM DESIGN

3.1 Input Description

Inputs (within the program) are monthly trend values and Seasonal Index numbers. The trend values cover a period of ten years and are automatically generated by the program while the Seasonal Index numbers are inputted via assignment statements in the program.

Three trend equations and three sets of Seasonal Index are involved. Each equation is combined with each Seasonal Index to give nine series.

For the purpose of differentiating each series from others, the following naming nomenclature shall be adopted.

Equation 1 : T = 12 + 1.8 * I

Equation 2 : T = 2.4 + 1.5 * I

Equation 3 : T = 100 + .3 * I

Table 3.1 Original/True Seasonal Index numbers

	SEASONAL INDEX1	SEASONAL INDEX2	SEASONAL INDEX3
JANUARY	99.8	102.1	69.8
FEBRUARY	95.3	89.3	76.8
MARCH	98.0	99.6	108.0
APRIL	85.6	102.5	111.4
MAY	119.4	77.8	115.8
JUNE	100.2	88.7	117.2
JULY	104.7	95.6	111.6
AUGUST	104.4	110.5	112.1
SEPTEMBER	102.0	80.5	103.3
OCTOBER	112.0	98.2	110.3
NOVEMBER	80.6	130.5	89.5
DECEMBER	98.0	124.7	74.5

Each equation is combined with each index to yield nine theoretical series. Since the resulting series are nine in number, the nine different situations are inbuilt into nine programs (i.e prg1, prg2, prg3, ...prg9). The table gives further clarification.

Table 3.2 Combinations of Equation and Index

	Seasonal Index1	Seasonal Index2	Seasonal Index3
Equation 1	pgr1	prg4	prg7
Equation 2	prg2	prg5	prg8
Equation 3	prg3	prg6	prg9

The first entry (i.e prg1) for instance implies that series resulting from combination of Equation1 and Seasonal Index1 is inbuilt into and hence analysed in prg1. Other entries have similar meaning.

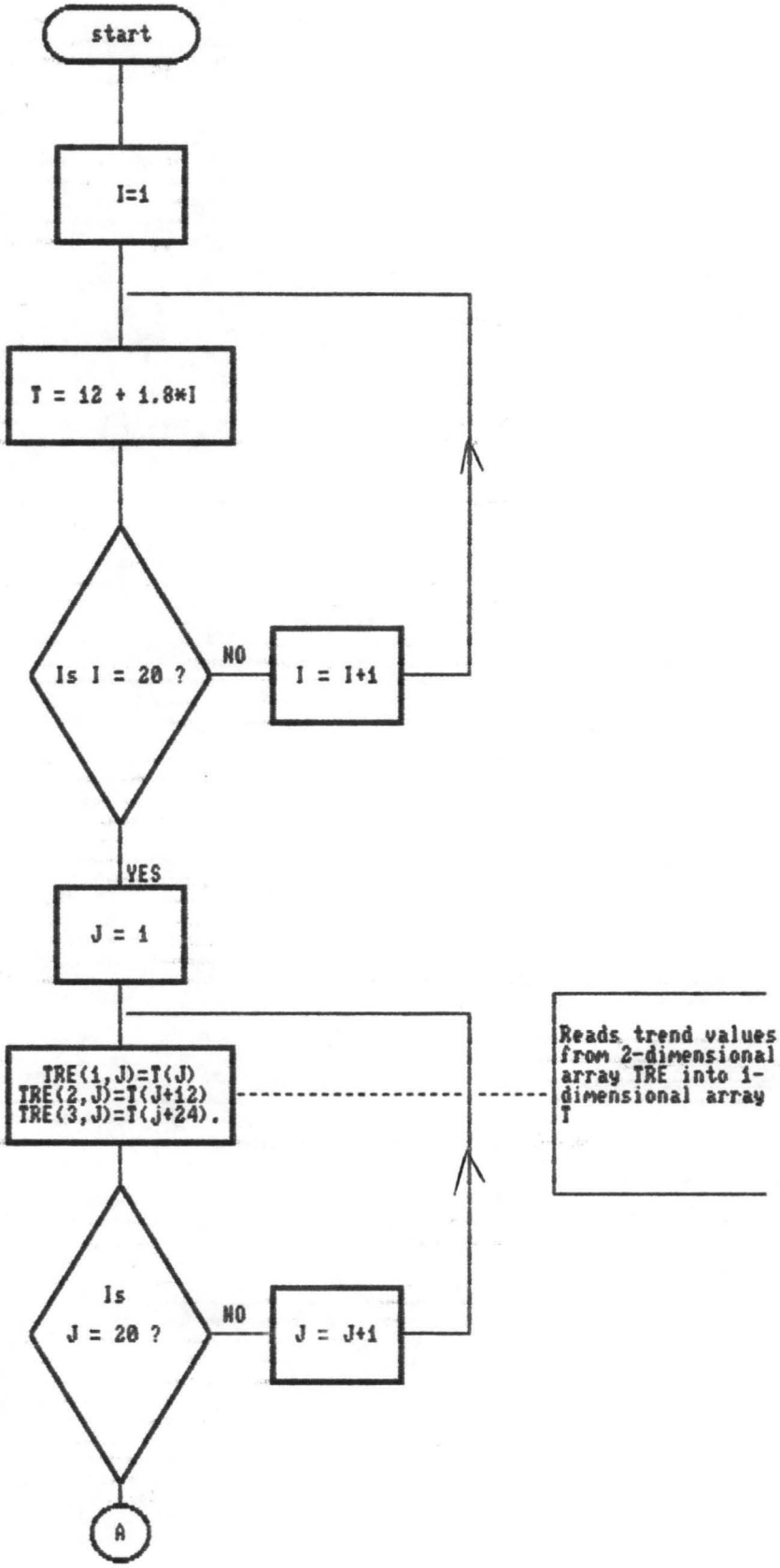
3.2 Algorithmic Representation

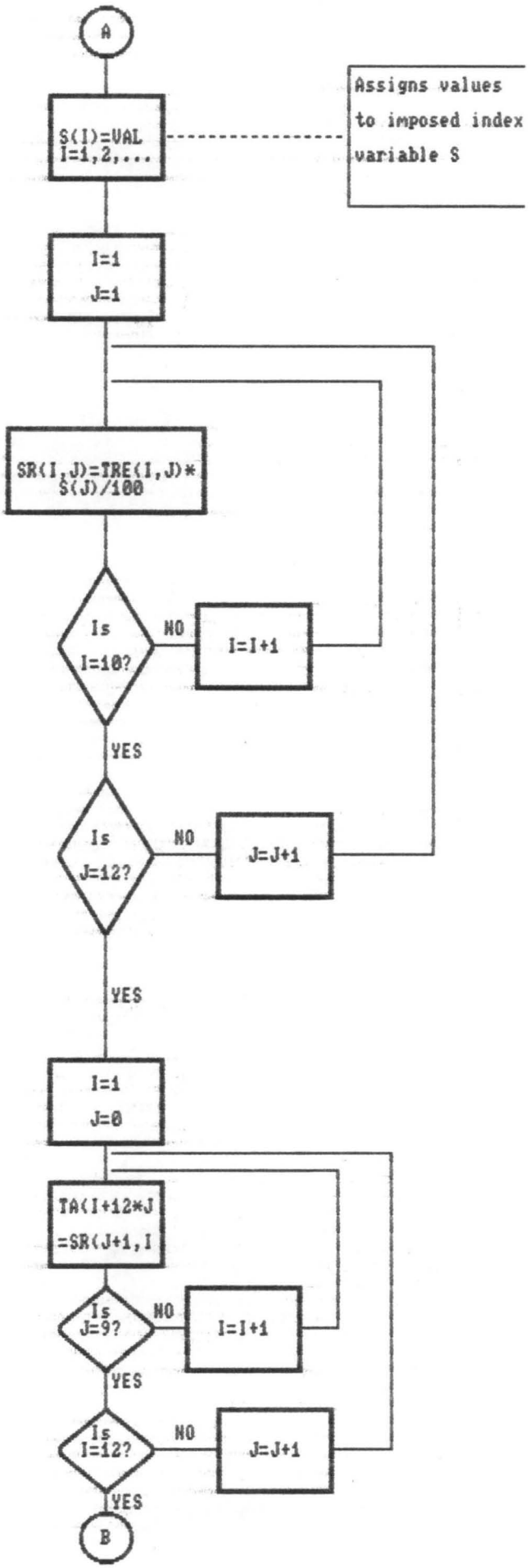
In order to find computer solution to a problem, one must decide steps to be taken by the computer. This involves working algorithm for the problem. The algorithm is then presented in any of the acceptable forms.

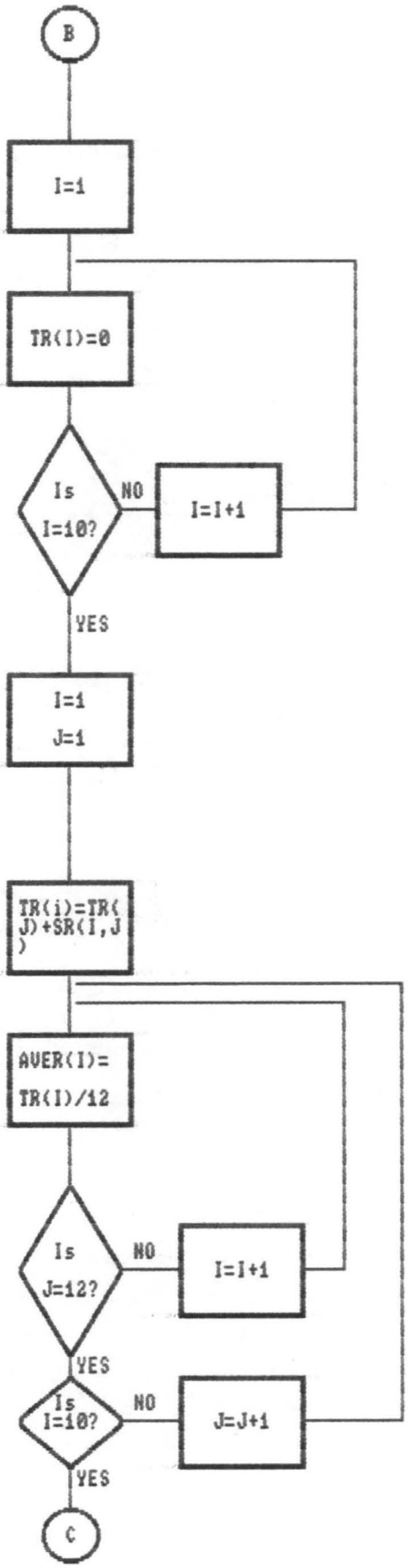
Although there exist other forms (e.g pseudocodes,N-S diagrams etc) of presenting algorithms, flowchart is employed in this work as it provides good visual representation and easy appreciation of the logic of the algorithm its representing.

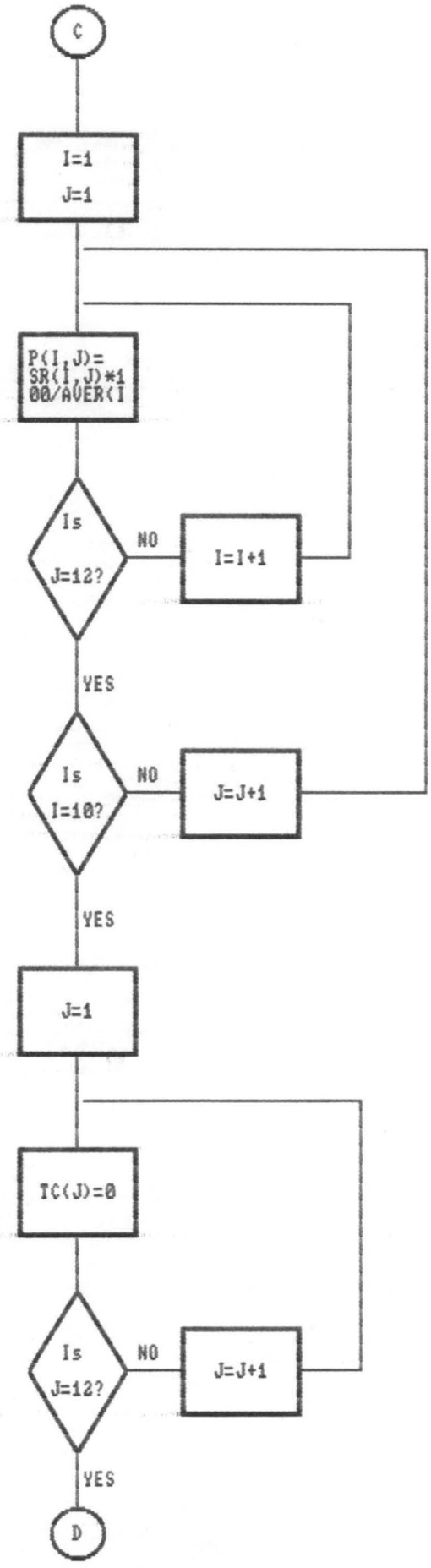
Because the nine programs have same logic basis, flowchart for only the first program (i.e prg1) is presented. Incidentally, this is the same program that is listed in the appendix.

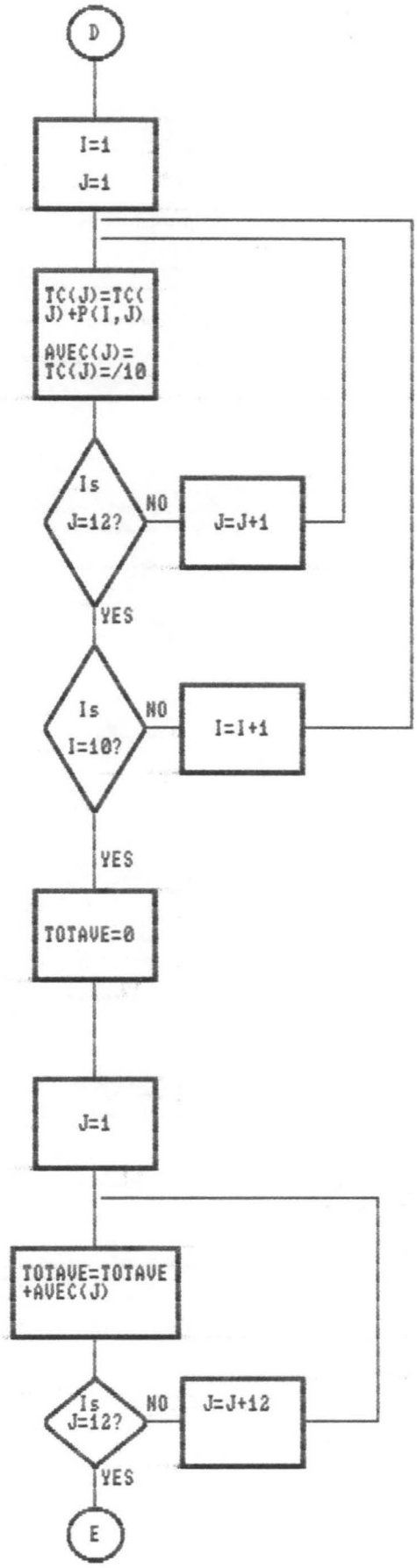
Flowchart

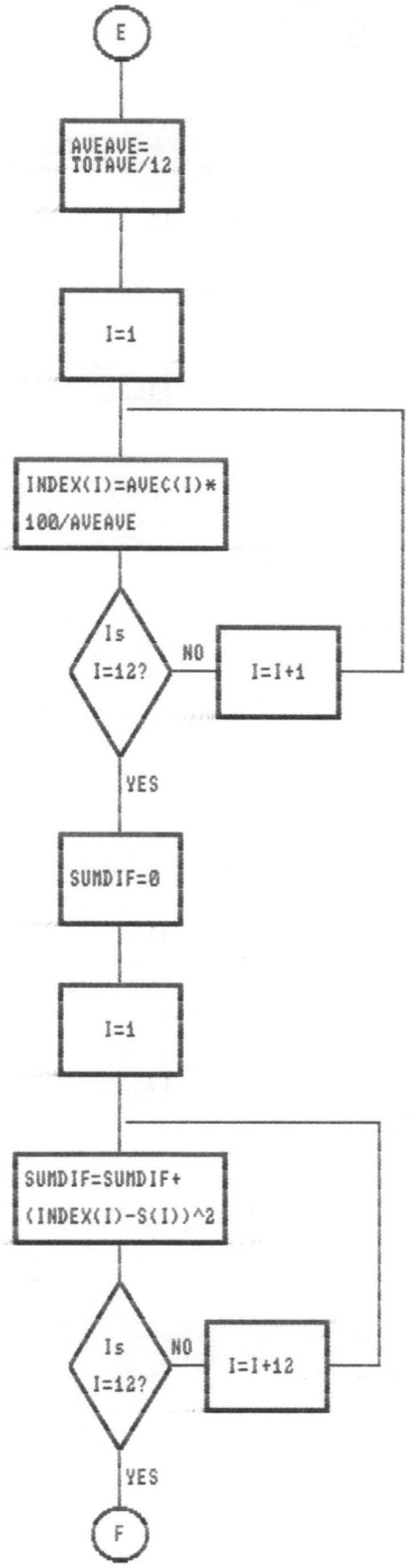

start
I=1
T = 12 + 1.8*I
Is I = 20 ?
NO
I = I+1
YES
J = 1
TRE(1,J)=T(J)
TRE(2,J)=T(J+12)
TRE(3,J)=T(j+24).
Reads trend values from 2-dimensional array TRE into 1-dimensional array T
Is
J = 20 ?
NO
J = J+1
A

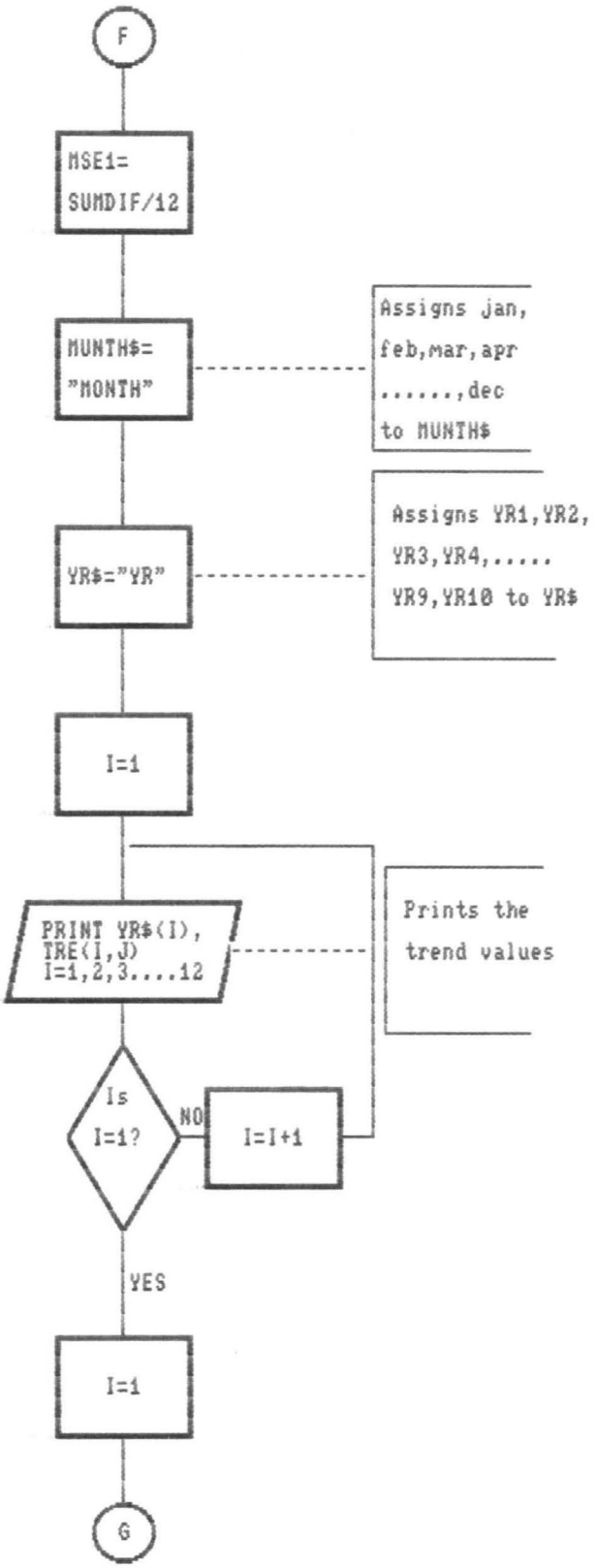

A
S(I)=VAL
I=1,2,...
Assigns values to imposed index variable S
I=1
J=1
SR(I,J)=TRE(I,J)*S(J)/100
Is I=10?
NO
I=I+1
YES
Is J=12?
NO
J=J+1
YES
I=1
J=0
TA(I+12*J =SR(J+1,I
Is J=9?
NO
I=I+1
YES
Is I=12?
NO
J=J+1
YES
B

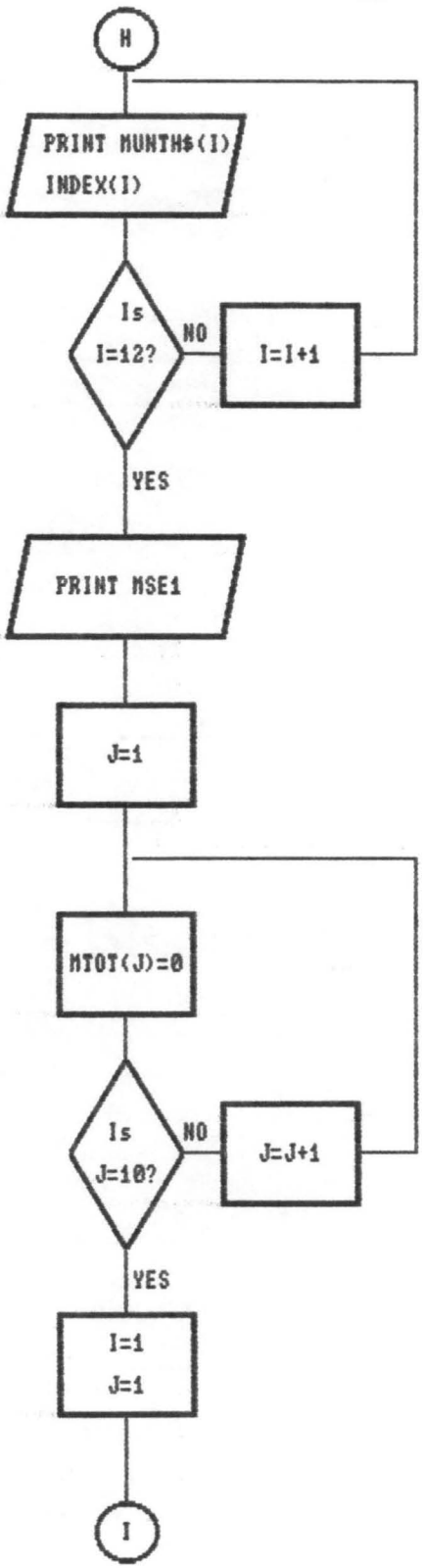

B
I=1
TR(I)=0
Is
I=10?
NO
I=I+1
YES
I=1
J=1
TR(i)=TR(
J)+SR(I,J
)
AVER(I)=
TR(I)/12
Is
J=12?
NO
I=I+1
YES
Is
I=10?
NO
J=J+1
YES
C

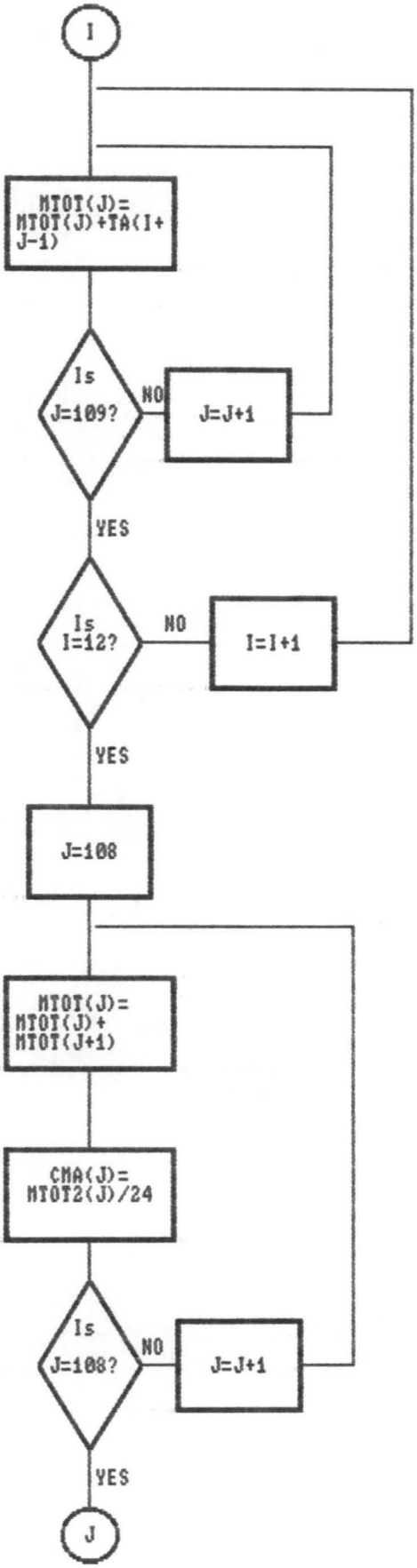

C
I=1
J=1
P(I,J)=
SR(I,J)*1
00/AVER(I
Is
J=12?
NO
I=I+1
YES
Is
I=10?
NO
J=J+1
YES
J=1
TC(J)=0
Is
J=12?
NO
J=J+1
YES
D

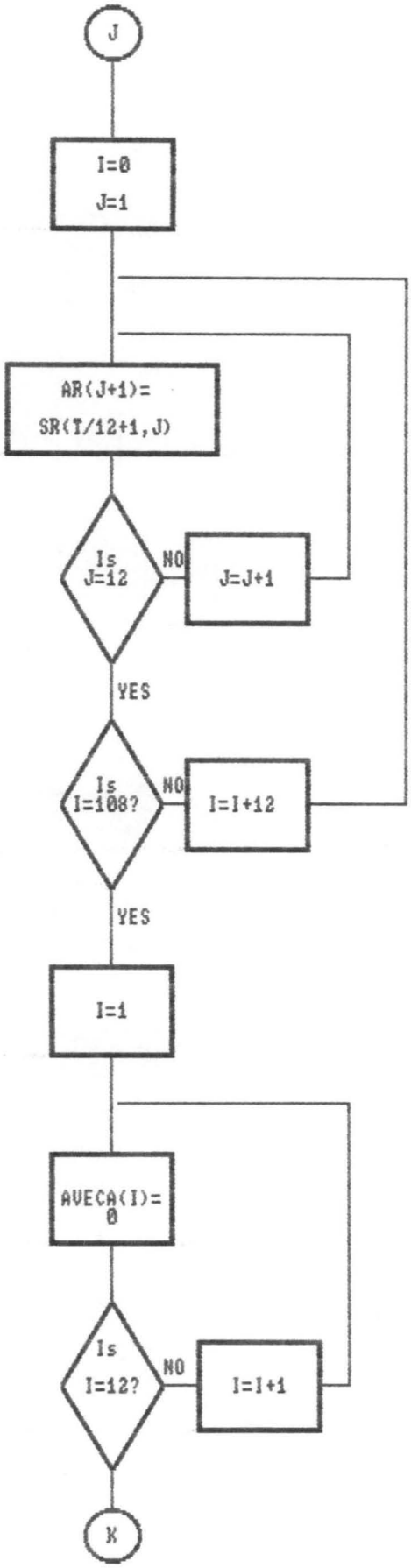

D
I=1
J=1
TC(J)=TC(
J)+P(I,J)
AVEC(J)=
TC(J)=/10
Is
J=12?
NO
J=J+1
YES
Is
I=10?
NO
I=I+1
YES
TOTAVE=0
J=1
TOTAVE=TOTAVE
+AVEC(J)
Is
J=12?
NO
J=J+12
YES
E

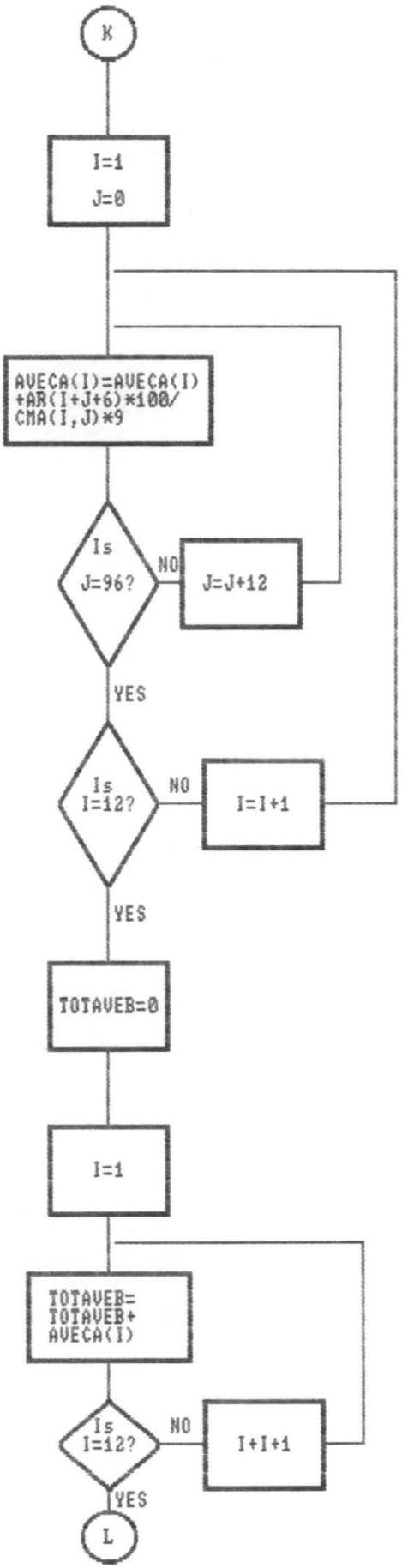

E
AVEAVE=
TOTAVE/12
I=1
INDEX(I)=AVEC(I)*
100/AVEAVE
Is
I=12?
NO
I=I+1
YES
SUMDIF=0
I=1
SUMDIF=SUMDIF+
(INDEX(I)-S(I))^2
Is
I=12?
NO
I=I+12
YES
F

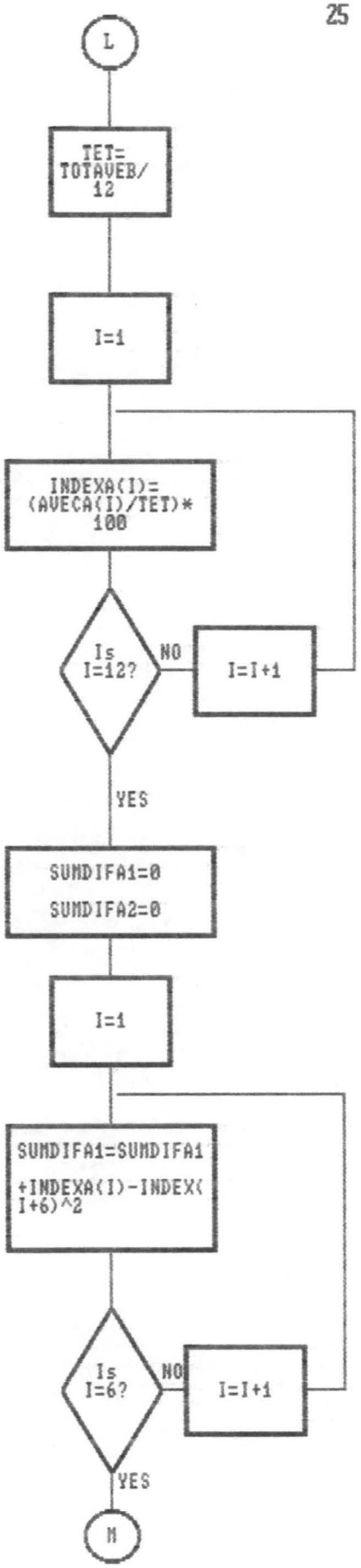

F
MSE1=
SUMDIF/12
MUNTH$=
"MONTH"
Assigns jan,
feb,mar,apr
.....,dec
to MUNTH$
YR$="YR"
Assigns YR1,YR2,
YR3,YR4,.....
YR9,YR10 to YR$
I=1
PRINT YR$(I),
TRE(I,J)
I=1,2,3....12
Prints the
trend values
Is
I=1?
NO
I=I+1
YES
I=1
G

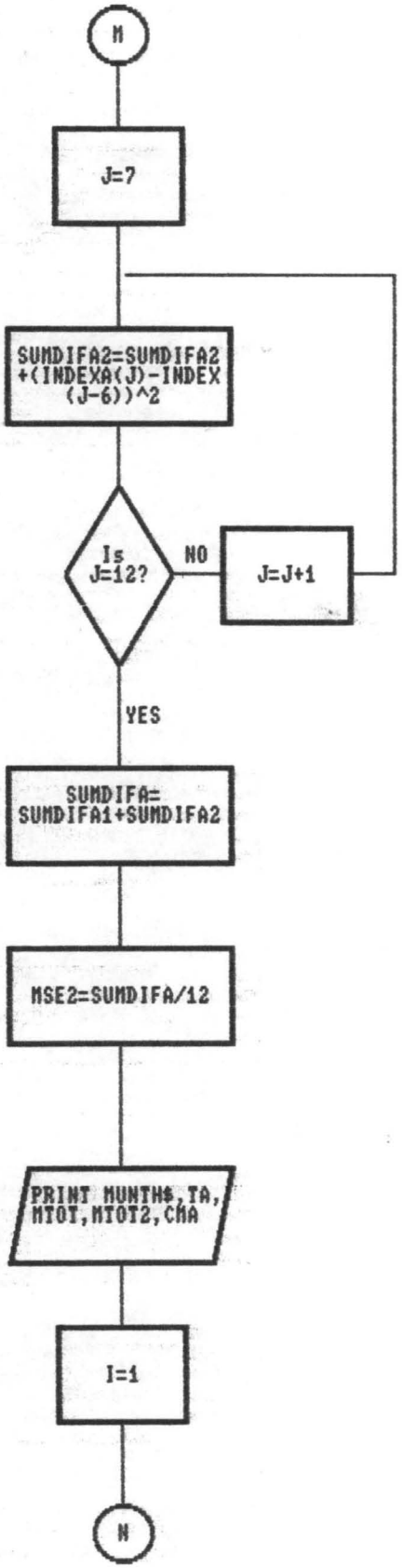

H
PRINT MUNTH$(I)
INDEX(I)
Is
I=12?
NO
I=I+1
YES
PRINT MSE1
J=1
MTOT(J)=0
Is
J=10?
NO
J=J+1
YES
I=1
J=1
I

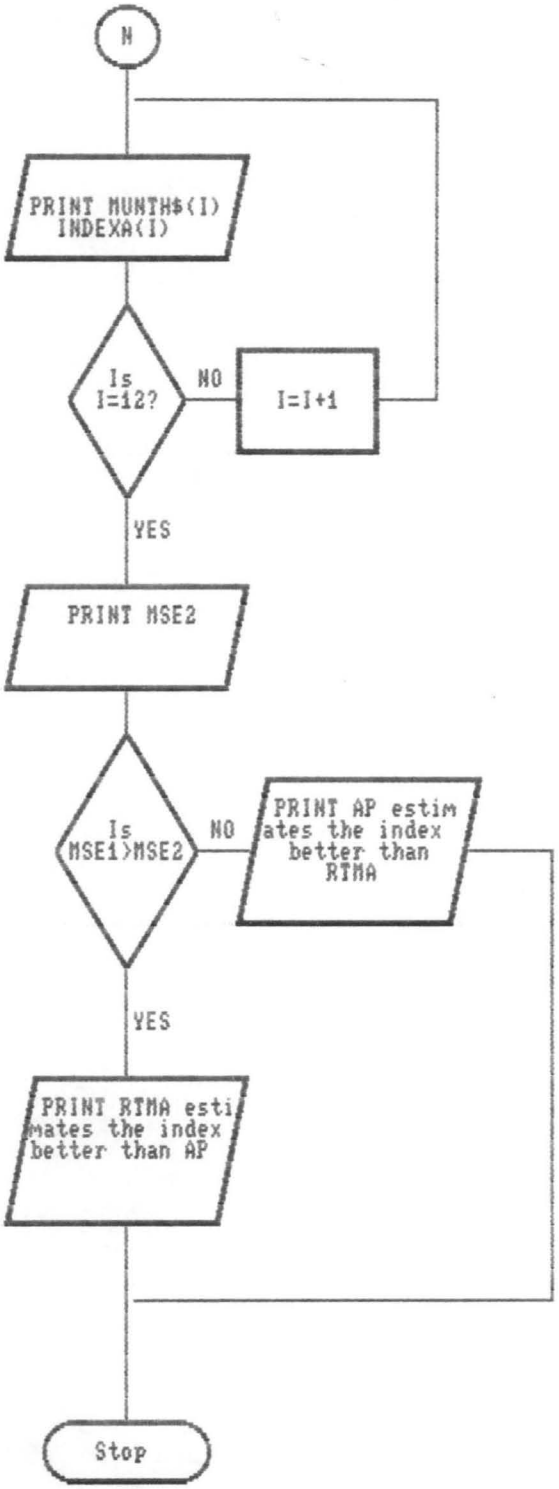

I
MTOT(J)=
MTOT(J)+TA(I+
J-1)
Is
J=109?
NO
J=J+1
YES
Is
I=12?
NO
I=I+1
YES
J=108
MTOT(J)=
MTOT(J)+
MTOT(J+1)
CMA(J)=
MTOT2(J)/24
Is
J=108?
NO
J=J+1
YES
J


J
I=0
J=1
AR(J+1)=
SR(T/12+1,J)
Is
J=12
NO
J=J+1
YES
Is
I=108?
NO
I=I+12
YES
I=1
AVECA(I)=
0
Is
I=12?
NO
I=I+1
K


K
I=1
J=0
AVECA(I)=AVECA(I)
+AR(I+J+6)*100/
CMA(I,J)*9
Is
J=96?
NO
J=J+12
YES
Is
I=12?
NO
I=I+1
YES
TOTAVEB=0
I=1
TOTAVEB=
TOTAVEB+
AVECA(I)
Is
I=12?
NO
I+I+1
YES
L


L
TET=
TOTAVEB/
12
I=1
INDEXA(I)=
(AVECA(I)/TET)*
100
Is
I=12?
NO
I=I+1
YES
SUMDIFA1=0
SUMDIFA2=0
I=1
SUMDIFA1=SUMDIFA1
+INDEXA(I)-INDEX(
I+6)^2
Is
I=6?
NO
I=I+1
YES
M


M
J=7
SUMDIFA2=SUMDIFA2 +(INDEXA(J)-INDEX (J-6))^2
Is J=12?
NO
J=J+1
YES
SUMDIFA= SUMDIFA1+SUMDIFA2
MSE2=SUMDIFA/12
PRINT MUNTH$,TA, MTOT,MTOT2,CHA
I=1
N


N
PRINT MUNTH$(I)
INDEXA(I)
Is
I=12?
NO
I=I+1
YES
PRINT MSE2
Is
MSE1>MSE2
NO
PRINT AP estim
ates the index
better than
RTMA
YES
PRINT RTMA esti
mates the index
better than AP
Stop

3.3 Program Description

Coding of the flowchart in a language of one's choice is next step. Q-Basic is the choice in this case.

This section aims at describing in steps what the various segments of the program accomplish. Since the nine programs work basically on the same principle, only a description of prg1 will be given.

Step 1 :Line 20 marks the beginning of Seasonal Index computation by the Average Percentage method . Lines (40-70) generate the monthly trend values for 10-year period thereby yielding 120 values.

Step 2 :Lines (100-120) transfer the trend values generated in step 1 into 2-dimensional array TRE.

Step 3 :Line 140 assigns true/imposed index values to array S.

Step 4 :Lines (160-200) multiply each trend value by the corresponding index figure thereby yielding theoretical series and store results in 2-dimensional array SR.

Step 5 :Lines (220-260) transfer elements in SR into 1-dimensional TA.

Step 6 :Lines (280-360) effect the computation of the total and mean of each row of the theoretical series SR.

Step 7 :Lines (380-420) effect the division of each element of SR by its corresponding row mean and express results in percentage. Results are stored in 2-dimensional P.

Step 8 :Lines (440-520) compute the column total and mean of P in step 7.

Step 9 :Lines (540-610) add all the means obtained in step 8 and compute their average. Each of the means is then expressed as a percentage of their mean (average) yielding the Seasonal Index.

Step 10 :Lines (630-670) compute the squared differences between true/imposed index figure and computed index figure for corresponding months, add them and divide result by 12 thereby yielding the Mean Squared Error MSE1.

Step 11 :Lines (690-700) assign the various months and years (10-yr period) to variables.

Step 12 :Lines (710-850) print the trend equation employed and the resulting trend values.

Step 13 :Lines (880-930) print the imposed/true index .

Step 14 :Lines (970-1060) print the table of theoretical series, its row totals and means.

Step 15 :Lines (1090-1220) print the table of percentages, its column totals and means.

Step 16 :Lines (1240-1300) print the values of the computed index and the value of the Mean Squared Error computed in step 10.

Step 17 :Line 1310 marks the beginning of Seasonal Index by the Ratio-to-Moving Average method. Lines (1330-1400) compute

the 12-month Moving Total of the 1-dimensional theoretical series TA.

Step 18 :Lines (1470-1650) compute the Seasonal Index.

Step 19 :Lines (1470-1450) compute the 2-month Moving .

Step 20 :Lines (1680-1770) compute the squared differences between imposed/true index figures and the computed index figures (obtained in step 19) of corresponding months, add them and divide result by 12 yielding the Mean Squared Error MSE2.

Step 21 :Lines (1790-2290) print Moving Totals, Centred Moving Averages computed in steps 17 and 18.

Step 22 :Lines (2310-2410) print the values of the index computed by the Ratio-to-Moving Average method and the value of the Mean Squared error (MSE2) computed in step 20.

Step 23 :Lines 240 compares the values of Mean Squared Error obtained under both methods and on the basis of the comparison decides which of the two methods is better.

CHAPTER 4

SYSTEM IMPLEMENTATION

4.1 Output expected/Results

Each of the programs is expected to output a set of Seasonal Index and Mean Squared Error for both the Average Percentage and the Ratio-to-Moving Average method.

Results obtained from the execution of the programs are condensed into tables given below.

Table 4.1 Extract from Output of prg1

MONTH	TRUE INDEX	EST. INDEX(AP)	EST.INDEX(RTMA)
Jan	99.80	87.05	99.79
Feb	95.30	85.34	95.20
Mar	98.00	90.04	97.84
Apr	85.60	80.63	85.36
May	119.40	115.25	119.15
Jun	100.20	99.05	100.18
Jul	104.70	105.93	104.70
Aug	104.40	108.05	104.46
Sep	102.00	107.94	102.14
Oct	112.00	121.13	112.35
Nov	80.60	89.04	80.80
Dec	98.00	110.54	98.04

Table 4.2 Extract from Output of prg2

MONTH	TRUE INDEX	EST. INDEX(AP)	EST.INDEX(RTMA)
Jan	99.80	83.28	99.78
Feb	95.30	82.40	95.18
Mar	98.00	87.68	97.81
Apr	85.60	79.17	85.32
May	119.40	114.02	119.10
Jun	100.20	98.71	100.17
Jul	104.70	106.29	104.70
Aug	104.40	109.13	104.48
Sep	102.00	109.70	102.17
Oct	112.00	123.83	112.42
Nov	80.60	91.54	80.84
Dec	98.00	114.25	98.04

Table 4.6 Exract from Output of pgr6

MONTH	TRUE INDEX	EST. INDEX(AP)	EST.INDEX(RTMA)
Jan	102.10	104.29	102.04
Feb	89.30	90.88	89.25
Mar	99.30	100.99	99.53
Apr	102.50	103.55	102.39
May	77.80	78.31	77.76
Jun	88.70	88.95	88.74
Jul	95.60	95.51	95.69
Aug	110.50	109.99	110.59
Sep	80.60	79.83	80.55
Oct	98.20	97.01	98.26
Nov	130.50	128.43	130.54
Dec	124.70	122.26	124.66

Table 4.7 Extract from Output of prg7

MONTH	TRUE INDEX	EST. INDEX(AP)	EST.INDEX(RTMA)
Jan	69.80	60.81	69.62
Feb	76.50	68.42	76.13
Mar	108.00	99.10	107.34
Apr	111.40	104.80	110.60
May	115.80	111.63	114.97
Jun	117.20	115.70	116.76
Jul	111.60	112.76	111.80
Aug	112.10	115.86	113.01
Sep	103.30	109.86	104.29
Oct	110.30	109.16	111.08
Nov	89.50	119.12	89.85
Dec	74.50	83.95	74.52

Table 4.10 M.S.E. Values

PROGRAM	M.S.E.(AP)	M.S.E.(RTMA)
prg1	60.84	29.91
prg2	102.17	50.32
prg3	1.56	0.77
prg4	70.08	36.07
prg5	121.10	60.07
prg6	1.92	0.96
prg7	49.14	20.91
prg8	82.27	35.34
prg9	1.27	0.53

4.2 True Index Versus Estimated Index

Tables presented in section 4.1 shall be the basis of the comparison.

A critical study of the contents of the tables revealed the following :

(1) for prg1, prg2, prg7 and prg8 results from both the A.P and R.T.M.A exhibited a similar pattern in the sense that both of them underestimated the index for the first six months i.e jan, feb, mar.....jun and overestimated it for the last six months i.e jul, aug, ...dec.

(2) for prg3 and prg9, both methods also exhibited similar behaviour but this time around, both methods overestimated the Index for the first six months and underestimated it" for the rest.

(3) for prg4 and prg5, the two methods exhibited contrasting behaviour. While the A.P underestimated the Index for the first six months and overestimated for the rest, R.T.M.A overestimated the Index for the first six months and underestimated for the rest.

In a similar development, A.P overestimated the Index for the first six months and underestimated it for the rest while R.T.M.A underestimated the Index for the first six months and overestimated it for the rest.

(4) for all cases, each estimated Index figure under R.T.M.A is much closer to the true Index figure than do the estimated Index figures under A.P method.

(5) each of the cases achieved a balance in the number of occurrences of underestimation and overestimation.

4.3 M.S.E for A.P method Versus M.S.E for R.T.M.A method

A quick glance at Table 4.10 reveals that M.S.E is consistently greater for A.P than for the R.T.M.A method. It could be more revealing if their relationship can be viewed from the perspective of percentage so that each M.S.E for R.T.M.A is expressed as a percentage of corresponding M.S.E for the A.P method. Such percentages are presented below.

Table 4.11 Ratio of M.S.E

PROGRAM	M.S.E.(RTMA)/M.S.E.(AP)
prg1	49.16
prg2	49.25
prg3	49.36
prg4	51.47
prg5	49.60
prg6	50.00
prg7	42.55
prg8	42.96
prg9	41.73

Table 4.11 reveals percentages which range between 41.7 % to 51.47%. In fact M.S.E produced by R.T.M.A method in most cases is at most halve of that produced by A.P - an indication of superiority of R.T.M.A over A.P method.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

The tables in chapter 4 have revealed it all. For instance, Table 4.10 revealed that the M.S.E. is greater for the A.P than for the R.T.M.A. method in all considered cases. This is a pointer to superiority of R.T.M.A over the A.P method since one with lower M.S.E. produces more accurate result.

Item 4 under section 4.2 which claims that estimates of R.T.M.A are consistently much closer to true values than do the estimates of the A.P method is another indication of superiority of R.T.M.A over A.P method.

From all these findings, it can be deduced that when the underlying trend phenomenon which characterizes a time series is linear, the Ratio-to-Moving Average method estimates the Seasonal Index better than the Average Percentage method.

5.2 Recommendations

Interested researchers could extend this study to other methods not covered in this work. Such efforts may also incorporate cases of non-linear trend.

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```
10 'PROGRAM BY BOLARINWA,  I.A    PGD/MCS/210/96
   CLS
20 'THIS PART COMPUTES THE SEASIONAL INDEX
    'BY AVERAGE PERCENTAGE METHOD
   DIM T(120), TRE(10, 12), S(12), SR(10, 12), TR(10)
   DIM AVER(10), P(10, 12), TC(12), AVEC(12), INDEX(12)
   DIM MUNTH$(12), YR$(10), MTOT(109), MTOT2(108), CMA(108)
   DIM INDEXA(12), AVECA(12), AR(120), TA(120)
40 'THIS SEGMENT GENERATES THE TREND VALUES
   'FROM THE EQUATION T=12+1.8I
50  FOR I = 1 TO 120
60    T(I) = 12 + 1.8 * I
70  NEXT I
80  EQT$ = "T = 12 + 1.8*I"
90 'THIS SEGMENT READS TREND VALUES INTO TRE
100 FOR J = 1 TO 12
110   TRE(1, J) = T(J): TRE(2, J) = T(J + 12)
      TRE(3, J) = T(J + 24): TRE(4, J) = T(J + 36)
      TRE(5, J) = T(J + 48): TRE(6, J) = T(J + 60)
      TRE(7, J) = T(J + 72): TRE(8, J) = T(J + 84)
      TRE(9, J) = T(J + 96): TRE(10, J) = T(J + 108)
120 NEXT J
130 'THIS SEGMENT ASSIGNS VALUES TO THE INDEX TO BE IMPOSED
140 S(1) = 99.8: S(2) = 95.3: S(3) = 98: S(4) = 85.6
    S(5) = 119.4: S(6) = 100.2: S(7) = 104.7: S(8) = 104.4
    S(9) = 102: S(10) = 112: S(11) = 80.6: S(12) = 98
150 'THIS SEGMENT MULTIPLIES EACH TREND VALUE BY THE CORRESPONDING
    'INDEX FIGURE AND STORES RESULTS IN ARRAY SR
160 FOR I = 1 TO 10
170 FOR J = 1 TO 12
180   SR(I, J) = (TRE(I, J) * S(J)) / 100
190 NEXT J
200 NEXT I
210 'THIS SEGMENT TRANSFERS ELEMENTS IN 2-DIM SR INTO 1-DIM TA
220 FOR I = 1 TO 12
230 FOR J = 0 TO 9
240   TA(I + 12 * J) = SR(J + 1, I)
250 NEXT J
260 NEXT I
270 'THIS SEGMENT COMPUTES THE TOTAL $ MEAN OF EACH ROW OF SR
280 FOR I = 1 TO 10
290   TR(I) = 0
300 NEXT I
310 FOR I = 1 TO 10
320 FOR J = 1 TO 12
330   TR(I) = TR(I) + SR(I, J)
340 AVER(I) = TR(I) / 12
350 NEXT J
360 NEXT I
370 'THIS SEGMENT DIVIDES EACH OF THE ITEMS IN SR BY THE
    'CORRESPONDING ROW MEAN & EXPRESSES RESULTS IN PERCENTAGES
380 FOR I = 1 TO 10
390 FOR J = 1 TO 12
400   P(I, J) = (SR(I, J) / AVER(I)) * 100
410 NEXT J
420 NEXT I
```

```
430 'THIS SEGMENT COMPUTES THE COLUMN TOTAL AND MEAN FOR P
440 FOR J = 1 TO 12
450   TC(J) = 0
460 NEXT J
470 FOR I = 1 TO 10
480 FOR J = 1 TO 12
490   TC(J) = TC(J) + P(I, J)
500   AVEC(J) = TC(J) / 10
510 NEXT J
520 NEXT I
530 'THIS SEGMENT COMPUTES THE SEASIONAL INDEX
540 TOTAVE = 0
550 FOR J = 1 TO 12
560   TOTAVE = TOTAVE + AVEC(J)
570 NEXT J
580 AVEAVE = TOTAVE / 12
590 FOR I = 1 TO 12
600   INDEX(I) = (AVEC(I) / AVEAVE) * 100
610 NEXT I
620 'THIS SEGMENT COMPUTES THE MEAN SQUARED ERROR
630 SUMDIF = 0
640 FOR I = 1 TO 12
650   SUMDIF = SUMDIF + (INDEX(I) - S(I)) ^ 2
660 NEXT I
670 MSE1 = SUMDIF / 12
680 'THIS SECTION ASSIGNS STRINGS TO MONTH AND YEAR
690 MUNTH$(1) = "jan": MUNTH$(2) = "feb": MUNTH$(3) = "mar"
   MUNTH$(4) = "apr": MUNTH$(5) = "may": MUNTH$(6) = "jun"
   MUNTH$(7) = "jul": MUNTH$(8) = "aug": MUNTH$(9) = "sep"
   MUNTH$(10) = "oct": MUNTH$(11) = "nov": MUNTH$(12) = "dec"
700 YR$(1) = "YR1": YR$(2) = "YR2": YR$(3) = "YR3":
   YR$(4) = "YR4": YR$(5) = "YR5": YR$(6) = "YR6":
   YR$(7) = "YR7": YR$(8) = "YR8": YR$(9) = "YR9":
   YR$(10) = "YR10"
710 PRINT TAB(20); , "OUTPUT TO PROGRAM1"
   PRINT TAB(20); , "------------------": PRINT
   PRINT TAB(10); "THE TREND EQUATION EMPLOYED IS :"; EQT$
730 PRINT
740 'THIS SEGMENT PRINTS THE TREND VALUES
750 PRINT TAB(25); , "TABLE OF TREND VALUES"
   PRINT TAB(25); , "----------------------"
760 PRINT
770 PRINT TAB(10); "JANUARY"; TAB(20); "FEBRUARY"; TAB(30);
   PRINT "MARCH"; TAB(41); "APRIL"; TAB(51); "MAY"; TAB(61); "JUNE"
780 FOR I = 1 TO 10
790   PRINT TAB(5); YR$(I); TAB(10); TRE(I, 1); TAB(20); TRE(I, 2);
     PRINT TAB(30); TRE(I, 3); TAB(40); TRE(I, 4); TAB(50);
     PRINT TRE(I, 5); TAB(60); TRE(I, 6)
800 NEXT I
810 PRINT : PRINT
820 PRINT TAB(10); "JULY"; TAB(20); "AUGUST"; TAB(30); "SEPTEMBER";
   PRINT TAB(40); "OCTOBER"; TAB(50); "NOVEMBER"; TAB(60); "DECEMBER"
830 FOR I = 1 TO 10
840 PRINT TAB(6); YR$(I); TAB(10); TRE(I, 7); TAB(20); TRE(I, 8);
   PRINT TAB(30); TRE(I, 9); TAB(40); TRE(I, 10); TAB(50);
   PRINT TRE(I, 11); TAB(60); TRE(I, 12)
850 NEXT I
860 PRINT : PRINT : PRINT
```

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870 'THIS SEGMENT PRINTS THE IMPOSED\TRUE INDEX
880 PRINT TAB(28); "TABLE OF IMPOSED INDEX"
   PRINT TAB(28); "----------------------"
890 PRINT
900 PRINT TAB(25); "MONTH"; TAB(41); "INDEX"
910 FOR I = 1 TO 12
920 PRINT TAB(26); MUNTH$(I); TAB(42); S(I)
930 NEXT I
940 PRINT : PRINT
950 'THIS SEGMENT PRINTS THE THEORITICAL SERIES,ROW TOTALS & MEANS
960 PRINT : PRINT : PRINT
970 PRINT TAB(25); " TABLE OF THEORITICAL SERIES I.E TRE*S"
   PRINT TAB(25); "-------------------------------------"
980 PRINT
990 PRINT TAB(10); "JANUARY"; TAB(19); "FEBRUARY"; TAB(30);
   PRINT "MARCH"; TAB(40); "APRIL"; TAB(51); "MAY";
   PRINT TAB(60); "JUNE"; TAB(71); "JULY"
1000 FOR I = 1 TO 10
1010 PRINT TAB(5); YR$(I); TAB(9); SR(I, 1); TAB(19); SR(I, 2);
   PRINT TAB(29); SR(I, 3); TAB(39); SR(I, 4); TAB(49); SR(I, 5);
   PRINT TAB(59); SR(I, 6); TAB(69); SR(I, 7)
1020 NEXT I: PRINT
1030 PRINT TAB(9); "AUGUST"; TAB(19); "SEPTEMBER"; TAB(29); "OCTOBER";
   PRINT TAB(39); "NOVEMBER"; TAB(49); "DECEMBER"; TAB(61); "TOTAL";
   PRINT TAB(71); "MEAN"
1040 FOR I = 1 TO 10
1050 PRINT TAB(5); YR$(I); TAB(9); SR(I, 8); TAB(19); SR(I, 9);
   PRINT TAB(29); SR(I, 10); TAB(39); SR(I, 11);
   PRINT TAB(49); SR(I, 12); TAB(59); TR(I); TAB(69); AVER(I)
1060 NEXT I
1070 'THIS SEGMENT PRINTS TABLES OF PERCENTAGES,COL TOTALS & MEANS
1080 PRINT : PRINT : PRINT
1090 PRINT TAB(30); "TABLE OF PERCENTAGES"
   PRINT TAB(30); "--------------------"
1100 PRINT
1110 PRINT TAB(16); "JANUARY"; TAB(26); "FEBRUARY"; TAB(38); "MARCH";
   PRINT TAB(47); "APRIL"; TAB(58); "MAY"; TAB(68); "JUNE"
1120 FOR I = 1 TO 10
1130   PRINT TAB(11); YR$(I); TAB(15); P(I, 1); TAB(25); P(I, 2);
    PRINT TAB(35); P(I, 3); TAB(45); P(I, 4); TAB(55); P(I, 5);
    PRINT TAB(65); P(I, 6)
1140 NEXT I
1150 PRINT TAB(11); "TOT"; TAB(15); TC(1); TAB(25); TC(2); TAB(35);
   PRINT TC(3); TAB(45); TC(4); TAB(55); TC(5); TAB(65); TC(6)
1160 PRINT TAB(11); "MEAN"; TAB(15); AVEC(1); TAB(25); AVEC(2);
   PRINT TAB(35); AVEC(3); TAB(45); AVEC(4); TAB(55); AVEC(5);
   PRINT TAB(65); AVEC(6): PRINT : PRINT
1170 PRINT TAB(18); "JULY"; TAB(27); "AUGUST"; TAB(35); "SEPTEMBER";
   PRINT TAB(46); "OCTOBER"; TAB(56); "NOVEMBER"; TAB(66); "DECEMBER"
1180 FOR I = 1 TO 10
1190 PRINT TAB(11); YR$(I); TAB(15); P(I, 7); TAB(25); P(I, 8);
   PRINT TAB(35); P(I, 9); TAB(45); P(I, 10);
   PRINT TAB(55); P(I, 11); TAB(65); P(I, 12)
1200 NEXT I
1210 PRINT TAB(11); "TOT"; TAB(15); TC(7); TAB(25); TC(8); TAB(35);
   PRINT TC(9); TAB(45); TC(10); TAB(55); TC(11); TAB(65); TC(12)
1220 PRINT TAB(11); "U"; TAB(15); AVEC(7); TAB(25); AVEC(8); TAB(35);
   PRINT AVEC(9); TAB(45); AVEC(10); TAB(55); AVEC(11); TAB(65);
```

```
   PRINT AVEC(12)
1230 PRINT : PRINT : PRINT
1240 PRINT TAB(12); "TABLE OF COMPUTED INDEX BY THE AVERAGE PERCENTAGE
METHOD"
   PRINT TAB(12); "-----------------------------------------------------"
1250 PRINT TAB(25); "MONTH"; TAB(47); "INDEX"
   PRINT TAB(25); "-----"; TAB(47); "------"
1260 FOR I = 1 TO 12
1270 PRINT TAB(25); MUNTH$(I); TAB(45); INDEX(I)
1280 NEXT I
1290 PRINT : PRINT : PRINT
1300 PRINT TAB(15); "MEAN SQUARED ERROR FOR THE AVERAGE PERCENTAGE
METHOD ="; MSE1
1310 'THIS PART COMPUTES THE INDEX BY THE RATIO TO MOVING AVERAGE METHOD
1320 'THIS SEGMENT COMPUTES THE 12-MONTH MOVING TOTAL
1330 FOR J = 1 TO 109
1340   MTOT(J) = 0
1350 NEXT J
1360 FOR I = 1 TO 12
1370 FOR J = 1 TO 109
1380   MTOT(J) = MTOT(J) + TA(I + J - 1)
1390 NEXT J
1400 NEXT I
1410 'THIS SEGMENT COMPUTES THE 2-MONTH MOVING TOTAL OF 12-MONTH MOVING
TOTAL &ALSO COMPUTES 12-MONTH CENTRED MOVING AVERAGE
1420 FOR J = 1 TO 108
1430 MTOT2(J) = MTOT(J) + MTOT(J + 1)
1440 CMA(J) = MTOT2(J) / 24
1450 NEXT J
1460 'THIS SEGMENT COMPUTES THE SPECIFIC SEASIONALS
1470 FOR I = 0 TO 108 STEP 12
1480 FOR J = 1 TO 12
1490   AR(J + I) = SR((I / 12) + 1, J)
1500 NEXT J
1510 NEXT I
1550 FOR I = 1 TO 12
     A = AR(I + 6) / CMA(I) + AR(I + 18) / CMA(I + 12) + AR(I + 30) / CMA(I + 24)
     B = AR(I + 42) / CMA(I + 36) + AR(I + 54) / CMA(I + 48) + AR(I + 66) / CMA(I + 60)
     C = AR(I + 78) / CMA(I + 72) + AR(I + 90) / CMA(I + 84) + AR(I + 102) / CMA(I + 96)
1560    AVECA(I) = (A + B + C) * 100 / 9
1570 NEXT I
1580 'THIS SEGMENT COMPUTES THE TYPICAL SEASIONALS
1590 TOTAVEB = 0
1600 FOR I = 1 TO 12
1610   TOTAVEB = TOTAVEB + AVECA(I)
1620 NEXT I
1630 TET = TOTAVEB / 12
1640 FOR I = 1 TO 12
1650   INDEXA(I) = (AVECA(I) / TET) * 100
1660 NEXT I
1670 'THIS SEGMENT COMPUTES THE MEAN SQUARED ERROR FOR THE RATIO TO
MOVING AVERAGE METHOD
1680 SUMDIFA1 = 0
1690 SUMDIFA2 = 0
1700 FOR I = 1 TO 6
1710   SUMDIFA1 = SUMDIFA1 + (INDEXA(I) - INDEX(I + 6)) ^ 2
1720 NEXT I
```

```
1730 FOR J = 7 TO 12
1740   SUMDIFA2 = SUMDIFA2 + (INDEXA(J) - INDEX(J - 6)) ^ 2
1750 NEXT J
1760 SUMDIFA = SUMDUFA1 + SUMDIFA2
1770 MSE2 = SUMDIFA / 12: PRINT : PRINT : PRINT
1780 'THIS SEGMENT PRINTS THE CMA TABLE
1790 PRINT TAB(12); "TABLE OF MOVING TOTALS & 12-MONTH CENTRED MOVING
AVERAGE"
   PRINT TAB(12); "-----------------------------------------------------"
1800 PRINT
1810 PRINT TAB(7); "YEAR & MONTH"; TAB(23); "DATA"; TAB(32); "12-MONTH  MT";
   PRINT TAB(49); "2-MTH MT OF C3"; TAB(66); "12-MTH CMA"
1820 PRINT
1830 PRINT TAB(7); "YEAR1"
1840 FOR I = 1 TO 6
1850 PRINT TAB(7); MUNTH$(I); TAB(22); TA(I)
1860 NEXT I
1870 FOR I = 7 TO 12
1880 PRINT TAB(7); MUNTH$(I); TAB(22); TA(I); TAB(33); MTOT(I - 6);
   PRINT TAB(50); MTOT2(I - 6); TAB(66); CMA(I - 6)
1890 NEXT I
1900 PRINT TAB(7); "YEAR2"
1910 FOR I = 1 TO 12
1920   PRINT TAB(7); MUNTH$(I); TAB(22); TA(I + 12); TAB(33); MTOT(I + 6);
    PRINT TAB(50); MTOT2(I + 6); TAB(66); CMA(I + 6)
1930 NEXT I
1940 PRINT TAB(7); "YEAR3"
1950 FOR I = 1 TO 12
1960   PRINT TAB(7); MUNTH$(I); TAB(22); TA(I + 24); TAB(33); MTOT(I + 18);
    PRINT TAB(50); MTOT2(I + 18); TAB(66); CMA(I + 18)
1970 NEXT I
1980 PRINT TAB(7); "YEAR4"
1990 FOR I = 1 TO 12
2000   PRINT TAB(7); MUNTH$(I); TAB(22); TA(I + 36); TAB(33); MTOT(I + 30);
    PRINT TAB(50); MTOT2(I + 30); TAB(66); CMA(I + 30)
2010 NEXT I
2020 PRINT TAB(7); "YEAR5"
2030 FOR I = 1 TO 12

2040   PRINT TAB(7); MUNTH$(I); TAB(22); TA(I + 48); TAB(33); MTOT(I + 42);
    PRINT TAB(50); MTOT2(I + 42); TAB(66); CMA(I + 42)
2050 NEXT I
2060 PRINT TAB(7); "YEAR6"
2070 FOR I = 1 TO 12
2080   PRINT TAB(7); MUNTH$(I); TAB(22); TA(I + 60); TAB(33); MTOT(I + 54);
    PRINT TAB(50); MTOT2(I + 54); TAB(66); CMA(I + 54)
2090 NEXT I
2100 PRINT TAB(7); "YEAR7"
2110 FOR I = 1 TO 12
2120   PRINT TAB(7); MUNTH$(I); TAB(22); TA(I + 72); TAB(33); MTOT(I + 66);
    PRINT TAB(50); MTOT2(I + 66); TAB(66); CMA(I + 66)
2130 NEXT I
2140 PRINT TAB(7); "YEAR8"
2150 FOR I = 1 TO 12
2160   PRINT TAB(7); MUNTH$(I); TAB(22); TA(I + 84); TAB(33); MTOT(I + 78);
    PRINT TAB(50); MTOT2(I + 78); TAB(66); CMA(I + 78)
2170 NEXT I
2180 PRINT TAB(7); "YEAR9"
```

```
2190 FOR I = 1 TO 12
2200   PRINT TAB(7); MUNTH$(I); TAB(22); TA(I + 96); TAB(33); MTOT(I + 90);
     PRINT TAB(50); MTOT2(I + 90); TAB(66); CMA(I + 90)
2210 NEXT I
2220 PRINT TAB(7); "YEAR10"
2230 FOR I = 1 TO 6
2240   PRINT TAB(7); MUNTH$(I); TAB(22); TA(I + 108); TAB(33); MTOT(I + 102);
     PRINT TAB(50); MTOT2(I + 102); TAB(66); CMA(I + 102)
2250 NEXT I
2260 PRINT TAB(7); MUNTH$(7); TAB(22); TA(115); TAB(33); MTOT(109)
2270 FOR I = 8 TO 12
2280   PRINT TAB(7); MUNTH$(I); TAB(22); TA(I + 108)
2290 NEXT I
2300 PRINT : PRINT : PRINT
2310 PRINT TAB(10); "TABLE OF COMPUTED INDEX BY THE RATIO TO MOVING
AVERAGE METHOD"
    PRINT TAB(10); "------------------------------------------------------------"
2320 PRINT : PRINT ""
2330 PRINT TAB(20); "MONTH"; TAB(42); "INDEX"
2340 FOR I = 1 TO 6
2350   PRINT TAB(20); MUNTH$(I); TAB(40); INDEXA(I + 6)
2360 NEXT I
2370 FOR I = 7 TO 12
2380   PRINT TAB(20); MUNTH$(I); TAB(40); INDEXA(I - 6)
2390 NEXT I
2400 PRINT : PRINT : PRINT
2410 PRINT "MEAN SQUARED ERROR FOR RATIO TO MOVING AVERAGE METHOD =";
MSE2
2420 IF MSE1 > MSE2 THEN PRINT "SINCE MSE1>MSE2,RATIO TO MOVING AVERAGE
ESTIMATES THE INDEX BETTER THAN THE AVERAGE PERCENTAGE METHOD" ELSE
PRINT "SINCE MSE2>MSE1,AVERAGE PERCENTAGE METHOD ESTIMATES THE INDEX
BETTER THAN THE RATIO TO MOVING AVERAGE MET"
```

OUTPUT TO PROGRAM1

THE TREND EQUATION EMPLOYED IS :T = 12 + 1.8*I

TABLE OF TREND VALUES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	13.8	15.6	17.4	19.2	21	22.8
YR2	35.4	37.2	39	40.8	42.6	44.4
YR3	57	58.8	60.6	62.4	64.2	66
YR4	78.6	80.4	82.2	84	85.8	87.6
YR5	100.2	102	103.8	105.6	107.4	109.2
YR6	121.8	123.6	125.4	127.2	129	130.8
YR7	143.4	145.2	147	148.8	150.6	152.4
YR8	165	166.8	168.6	170.4	172.2	174
YR9	186.6	188.4	190.2	192	193.8	195.6
YR10	208.2	210	211.8	213.6	215.4	217.2

	JUL.	AUG.	SEPT	OCT	NOV	DEC
YR1	24.6	26.4	28.2	30	31.8	33.6
YR2	46.2	48	49.8	51.6	53.4	55.2
YR3	67.8	69.6	71.4	73.2	75	76.8
YR4	89.4	91.2	93	94.8	96.6	98.39999
YR5	111	112.8	114.6	116.4	118.2	120
YR6	132.6	134.4	136.2	138	139.8	141.6
YR7	154.2	156	157.8	159.6	161.4	163.2
YR8	175.8	177.6	179.4	181.2	183	184.8
YR9	197.4	199.2	201	202.8	204.6	206.4
YR10	219	220.8	222.6	224.4	226.2	228

TABLE OF IMPOSED INDEX

MONTH	INDEX
jan	99.8
feb	95.3
mar	98
apr	85.6
may	119.4
jun	100.2
jul	104.7
aug	104.4
sep	102
oct	112
nov	80.6
dec	98

TABLE OF THEORITICAL SERIES I.E TRE*S

	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY
YR1	13.7724	14.8668	17.052	16.4352	25.074	22.8456	25.7562
YR2	35.3292	35.4516	38.22	34.9248	50.8644	44.4888	48.3714
YR3	56.886	56.0364	59.388	53.4144	76.6548	66.132	70.9866
YR4	78.4428	76.6212	80.556	71.904	102.4452	87.77519	93.6018
YR5	99.9996	97.206	101.724	90.3936	128.2356	109.4184	116.217
YR6	121.5564	117.7908	122.892	108.8832	154.026	131.0616	138.8322
YR7	143.1132	138.3756	144.06	127.3728	179.8164	152.7048	161.4474
YR8	164.67	158.9604	165.228	145.8624	205.6068	174.348	184.0626
YR9	186.2268	179.5452	186.396	164.352	231.3972	195.9912	206.6778
YR10	207.7836	200.13	207.564	182.8416	257.1876	217.6344	229.293

	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL	MEAN
YR1	27.5616	28.764	33.6	25.6308	32.928	284.2866	23.69055
YR2	50.112	50.796	57.792	43.0404	54.096	543.4866	45.29055
YR3	72.6624	72.828	81.98399	60.45	75.26399	802.6866	66.89055
YR4	95.2128	94.86	106.176	77.8596	96.43199	1061.887	88.49055
YR5	117.7632	116.892	130.368	95.2692	117.6	1321.087	110.0905
YR6	140.3136	138.924	154.56	112.6788	138.768	1580.286	131.6905
YR7	162.864	160.956	178.752	130.0884	159.936	1839.487	153.2905
YR8	185.4144	182.988	202.944	147.498	181.104	2098.687	174.8906
YR9	207.9648	205.02	227.136	164.9076	202.272	2357.886	196.4905
YR10	230.5152	227.052	251.328	182.3172	223.44	2617.086	218.0905

TABLE OF PERCENTAGES

	JAN.	FEB	MAR	APR	MAY	JUNE
YR1	58.13457	62.75414	71.97807	69.3745	105.8397	96.43338
YR2	78.00568	78.27595	84.38847	77.11278	112.3069	98.22976
YR3	85.0434	83.77327	88.78384	79.85343	114.5974	98.86598
YR4	88.6454	86.58688	91.03345	81.25613	115.7697	99.1916
YR5	90.83396	88.29641	92.40031	82.10841	116.4819	99.38946
YR6	92.30458	89.44515	93.31877	82.68111	116.9606	99.52242
YR7	93.36076	90.27014	93.9784	83.09241	117.3043	99.61788
YR8	94.15602	90.89136	94.47507	83.4021	117.5631	99.68977
YR9	94.77647	91.376	94.86258	83.64371	117.7651	99.74586
YR10	95.27401	91.76465	95.17332	83.83747	117.927	99.79085
TOT	870.5349	853.434	900.3923	806.3621	1152.516	990.4769
MEAN	87.05348	85.3434	90.03923	80.63621	115.2515	99.04768

	JULY	AUG	SEPT	OCT	NOV	DEC
YR1	108.7193	116.3401	121.4155	141.8287	108.19	138.9921
YR2	106.8024	110.6456	112.1559	127.6028	95.03175	119.4421
YR3	106.1235	108.6288	108.8764	122.5644	90.37151	112.5181
YR4	105.776	107.5966	107.1979	119.9857	87.98634	108.9743
YR5	105.5649	106.9694	106.1781	118.4189	86.53712	106.8212
YR6	105.423	106.548	105.4928	117.3661	85.56332	105.3743
YR7	105.3212	106.2453	105.0006	116.6099	84.86394	104.3352
YR8	105.2444	106.0174	104.63	116.0406	84.33731	103.5527
YR9	105.1846	105.8396	104.3409	115.5964	83.92648	102.9424
YR10	105.1366	105.697	104.1091	115.2402	83.59703	102.4529
TOT	1059.296	1080.528	1079.397	1211.254	890.4048	1105.405
U	105.9296	108.0528	107.9397	121.1254	89.04048	110.5405

TABLE OF COMPUTED INDEX BY THE AVERAGE PERCENTAGE METHOD

MONTH	INDEX
jan	87.05348
feb	85.3434
mar	90.03923
apr	80.63621
may	115.2515
jun	99.04768
jul	105.9296
aug	108.0528
sep	107.9397
oct	121.1254
nov	89.04048
dec	110.5405

MEAN SQUARED ERROR FOR THE AVERAGE PERCENTAGE METHOD = 60.83935

TABLE OF MOVING TOTALS & 12-MONTH CENTRED MOVING AVERAGE

YEAR & MONTH	DATA	12-MONTH MT	2-MTH MT OF C3	12-MTH CMA
YEAR1				
jan	13.7724			
feb	14.8668			
mar	17.052			
apr	16.4352			
may	25.074			
jun	22.8456			
jul	25.7562	284.2866	590.13	24.58875
aug	27.5616	305.8434	632.2716	26.34465
sep	28.764	326.4282	674.0244	28.08435
oct	33.6	347.5962	713.682	29.73675
nov	25.6308	366.0858	757.962	31.58175
dec	32.928	391.8762	805.3956	33.55815
YEAR2				
jan	35.3292	413.5194	849.654	35.40225
feb	35.4516	436.1346	894.8196	37.28415
mar	38.22	458.685	939.402	39.14175
apr	34.9248	480.717	985.626	41.06775
may	50.8644	504.909	1027.228	42.80115
jun	44.4888	522.3185	1065.805	44.40855
jul	48.3714	543.4866	1108.53	46.18875
aug	50.112	565.0434	1150.672	47.94465
sep	50.796	585.6282	1192.424	49.68435
oct	57.792	606.7962	1232.082	51.33675
nov	43.0404	625.2858	1276.362	53.18175
dec	54.096	651.0762	1323.796	55.15815
YEAR3				
jan	56.886	672.7194	1368.054	57.00225
feb	56.0364	695.3346	1413.22	58.88415
mar	59.388	717.885	1457.802	60.74175
apr	53.4144	739.917	1504.026	62.66775
may	76.6548	764.109	1545.628	64.40115
jun	66.132	781.5186	1584.205	66.00855
jul	70.9866	802.6866	1626.93	67.78875

aug	72.6624	824.2434	1669.072	69.54465
sep	72.828	844.8282	1710.824	71.28436
oct	81.98399	865.9962	1750.482	72.93674
nov	60.45	884.4858	1794.762	74.78175
dec	75.26399	910.2762	1842.196	76.75815
YEAR4				
jan	78.4428	931.9194	1886.454	78.60225
feb	76.6212	954.5345	1931.62	80.48415
mar	80.556	977.085	1976.202	82.34174
apr	71.904	999.1169	2022.426	84.26775
may	102.4452	1023.309	2064.028	86.00116
jun	87.77519	1040.719	2102.605	87.60855
jul	93.6018	1061.887	2145.33	89.38876
aug	95.2128	1083.443	2187.472	91.14465
sep	94.86	1104.028	2229.225	92.88436
oct	106.176	1125.196	2268.882	94.53675
nov	77.8596	1143.686	2313.162	96.38175
dec	96.43199	1169.476	2360.596	98.35815
YEAR5				
jan	99.9996	1191.119	2404.854	100.2022
feb	97.206	1213.735	2450.02	102.0841
mar	101.724	1236.285	2494.602	103.9417
apr	90.3936	1258.317	2540.826	105.8678
may	128.2356	1282.509	2582.428	107.6012
jun	109.4184	1299.919	2621.005	109.2085
jul	116.217	1321.087	2663.73	110.9887
aug	117.7632	1342.643	2705.872	112.7447
sep	116.892	1363.228	2747.624	114.4843
oct	130.368	1384.396	2787.282	116.1367
nov	95.2692	1402.886	2831.562	117.9817
dec	117.6	1428.676	2878.995	119.9581
YEAR6				
jan	121.5564	1450.319	2923.254	121.8022
feb	117.7908	1472.935	2968.419	123.6841
mar	122.892	1495.485	3013.002	125.5417
apr	108.8832	1517.517	3059.226	127.4677
may	154.026	1541.709	3100.828	129.2012
jun	131.0616	1559.119	3139.405	130.8085
jul	138.8322	1580.286	3182.129	132.5887
aug	140.3136	1601.843	3224.271	134.3446
sep	138.924	1622.428	3266.024	136.0844
oct	154.56	1643.596	3305.682	137.7367
nov	112.6788	1662.086	3349.962	139.5817
dec	138.768	1687.876	3397.396	141.5582
YEAR7				
jan	143.1132	1709.52	3441.654	143.4023
feb	138.3756	1732.135	3486.82	145.2842
mar	144.06	1754.685	3531.402	147.1418
apr	127.3728	1776.717	3577.626	149.0677
may	179.8164	1800.909	3619.228	150.8011
jun	152.7048	1818.319	3657.805	152.4086
jul	161.4474	1839.487	3700.53	154.1888
aug	162.864	1861.043	3742.672	155.9447
sep	160.956	1881.628	3784.425	157.6844
oct	178.752	1902.796	3824.082	159.3367
nov	130.0884	1921.286	3868.362	161.1818
dec	159.936	1947.076	3915.796	163.1582
YEAR8				

jan	164.67	1968.72	3960.054	165.0023
feb	158.9604	1991.335	4005.22	166.8842
mar	165.228	2013.885	4049.802	168.7418
apr	145.8624	2035.917	4096.026	170.6678
may	205.6068	2060.109	4137.628	172.4012
jun	174.348	2077.519	4176.206	174.0086
jul	184.0626	2098.687	4218.93	175.7888
aug	185.4144	2120.243	4261.072	177.5447
sep	182.988	2140.828	4302.824	179.2843
oct	202.944	2161.996	4342.482	180.9368
nov	147.498	2180.486	4386.762	182.7817
dec	181.104	2206.276	4434.195	184.7581
YEAR9				
jan	186.2268	2227.919	4478.454	186.6022
feb	179.5452	2250.534	4523.619	188.4841
mar	186.396	2273.085	4568.202	190.3418
apr	164.352	2295.117	4614.426	192.2677
may	231.3972	2319.309	4656.028	194.0012
jun	195.9912	2336.719	4694.605	195.6086
jul	206.6778	2357.886	4737.33	197.3887
aug	207.9648	2379.444	4779.472	199.1447
sep	205.02	2400.028	4821.225	200.8844
oct	227.136	2421.196	4860.882	202.5367
nov	164.9076	2439.686	4905.162	204.3817
dec	202.272	2465.476	4952.595	206.3581
YEAR10				
jan	207.7836	2487.119	4996.854	208.2022
feb	200.13	2509.734	5042.019	210.0841
mar	207.564	2532.285	5086.602	211.9417
apr	182.8416	2554.317	5132.826	213.8677
may	257.1876	2578.509	5174.427	215.6011
jun	217.6344	2595.918	5213.005	217.2085
jul	229.293	2617.086		
aug	230.5152			
sep	227.052			
oct	251.328			
nov	182.3172			
dec	223.44			

TABLE OF COMPUTED INDEX BY THE RATIO TO MOVING AVERAGE METHOD

MONTH	INDEX
jan	99.78596
feb	95.20251
mar	97.84293
apr	85.35607
may	119.1466
jun	100.18
jul	104.7039
aug	104.4634
sep	102.137
oct	112.3474
nov	80.79866
dec	98.03555

MEAN SQUARED ERROR FOR RATIO TO MOVING AVERAGE METHOD = 29.91225
SINCE MSE1>MSE2,RATIO TO MOVING AVERAGE ESTIMATES THE INDEX BETTER THAN THE AVERAGE PERCENTAGE METHOD

OUTPUT OF PROGRAM2

THE TREND EQUATION EMPLOYED IS :T = 2.4+ 1.5*I

TABLE OF TREND VALUES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
R1	3.9	5.4	6.9	8.4	9.9	11.4
R2	21.9	23.4	24.9	26.4	27.9	29.4
R3	39.9	41.4	42.9	44.4	45.9	47.4
R4	57.9	59.4	60.9	62.4	63.9	65.4
R5	75.9	77.4	78.9	80.4	81.9	83.4
R6	93.9	95.4	96.9	98.4	99.9	101.4
R7	111.9	113.4	114.9	116.4	117.9	119.4
R8	129.9	131.4	132.9	134.4	135.9	137.4
R9	147.9	149.4	150.9	152.4	153.9	155.4
R10	165.9	167.4	168.9	170.4	171.9	173.4

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	12.9	14.4	15.9	17.4	18.9	20.4
YR2	30.9	32.4	33.9	35.4	36.9	38.4
YR3	48.9	50.4	51.9	53.4	54.9	56.4
YR4	66.9	68.4	69.9	71.4	72.9	74.4
YR5	84.9	86.4	87.9	89.4	90.9	92.4
YR6	102.9	104.4	105.9	107.4	108.9	110.4
YR7	120.9	122.4	123.9	125.4	126.9	128.4
YR8	138.9	140.4	141.9	143.4	144.9	146.4
YR9	156.9	158.4	159.9	161.4	162.9	164.4
YR10	174.9	176.4	177.9	179.4	180.9	182.4

TABLE OF IMPOSED INDEX

MONTH	INDEX
jan	99.8
feb	95.3
mar	98
apr	85.6
may	119.4
jun	100.2
jul	104.7
aug	104.4
sep	102
oct	112
nov	80.6
dec	98

TABLE OF THEORITICAL SERIES I.E TRE*S

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
YR1	3.8922	5.1462	6.762	7.1904	11.8206	11.4228	13.5063
YR2	21.8562	22.3002	24.402	22.5984	33.3126	29.4588	32.3523
YR3	39.8202	39.4542	42.042	38.0064	54.8046	47.4948	51.1983
YR4	57.7842	56.6082	59.682	53.4144	76.2966	65.5308	70.0443
YR5	75.74821	73.76221	77.322	68.8224	97.7886	83.5668	88.8903
YR6	93.7122	90.91621	94.962	84.2304	119.2806	101.6028	107.7363
YR7	111.6762	108.0702	112.602	99.6384	140.7726	119.6388	126.5823
YR8	129.6402	125.2242	130.242	115.0464	162.2646	137.6748	145.4283
YR9	147.6042	142.3782	147.882	130.4544	183.7566	155.7108	164.2743
YR10	165.5682	159.5322	165.522	145.8624	205.2486	173.7468	183.1203

	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	MEAN
YR1	15.0336	16.218	19.488	15.2334	19.992	145.7055	12.14212
YR2	33.8256	34.578	39.648	29.7414	37.632	361.7055	30.14212
YR3	52.6176	52.938	59.808	44.2494	55.272	577.7056	48.14213
YR4	71.4096	71.298	79.968	58.7574	72.912	793.7055	66.14213
YR5	90.2016	89.658	100.128	73.2654	90.552	1009.706	84.14213
YR6	108.9936	108.018	120.288	87.7734	108.192	1225.706	102.1421
YR7	127.7856	126.378	140.448	102.2814	125.832	1441.705	120.1421
YR8	146.5776	144.738	160.608	116.7894	143.472	1657.706	138.1421
YR9	165.3696	163.098	180.768	131.2974	161.112	1873.705	156.1421
YR10	184.1616	181.458	200.928	145.8054	178.752	2089.705	174.1421

TABLE OF PERCENTAGES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	32.05535	42.38303	55.69042	59.21863	97.35199	94.07579
YR2	72.51049	73.98351	80.95647	74.97282	110.5184	97.73299
YR3	82.71383	81.95359	87.32891	78.94624	113.8392	98.65537
YR4	87.36369	85.5857	90.23296	80.757	115.3525	99.07574
YR5	90.02412	87.66383	91.89452	81.79304	116.2184	99.31624
YR6	91.74687	89.00951	92.97045	82.46392	116.779	99.47198
YR7	92.95342	89.95197	93.72401	82.93378	117.1717	99.58106
YR8	93.84551	90.6488	94.28114	83.28117	117.4621	99.66169
YR9	94.53197	91.18501	94.70987	83.5485	117.6855	99.72376
YR10	95.07648	91.61035	95.04995	83.76056	117.8627	99.77299
TOT	832.8217	823.9753	876.8386	791.6757	1140.241	987.0676
MEAN	83.28217	82.39753	87.68386	79.16757	114.0241	98.70676

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	111.2351	123.8136	133.5681	160.4991	125.4591	164.6499
YR2	107.3325	112.2204	114.7166	131.5369	98.67056	124.8485
YR3	106.3482	109.2964	109.9619	124.2321	91.91409	114.81
YR4	105.8997	107.9639	107.7952	120.9033	88.83506	110.2353
YR5	105.643	107.2015	106.5554	118.9986	87.07338	107.6179
YR6	105.4768	106.7078	105.7526	117.7653	85.93261	105.923
YR7	105.3605	106.362	105.1904	116.9016	85.13367	104.736
YR8	105.2744	106.1064	104.7747	116.2629	84.54292	103.8582
YR9	105.2082	105.9097	104.4548	115.7715	84.08839	103.1829
YR10	105.1557	105.7536	104.2011	115.3816	83.72782	102.6472
TOT	1062.934	1091.335	1096.971	1238.253	915.3776	1142.509
U	106.2934	109.1335	109.6971	123.8253	91.53776	114.2509

TABLE OF COMPUTED INDEX BY THE AVERAGE PERCENTAGE METHOD

MONTH	INDEX
jan	83.28217
feb	82.39753
mar	87.68386
apr	79.16757
may	114.0241
jun	98.70676
jul	106.2934
aug	109.1335
sep	109.6971
oct	123.8253
nov	91.53776
dec	114.2509

MEAN SQUARED ERROR FOR THE AVERAGE PERCENTAGE METHOD = 102.1663

TABLE OF MOVING TOTALS & 12-MONTH CENTRED MOVING AVERAGE

YEAR & MONTH	DATA	12-MONTH MT	2-MTH MT OF C3	12-MTH CMA
YEAR1				
jan	3.8922			
feb	5.1462			
mar	6.762			
apr	7.1904			
may	11.8206			
jun	11.4228			
jul	13.5063	145.7055	309.375	12.89063
aug	15.0336	163.6695	344.493	14.35387
sep	16.218	180.8235	379.287	15.80362
oct	19.488	198.4635	412.335	17.18063
nov	15.2334	213.8715	449.235	18.71813
dec	19.992	235.3635	488.763	20.36513
YEAR2				
jan	21.8562	253.3995	525.645	21.90188
feb	22.3002	272.2455	563.283	23.47013
mar	24.402	291.0375	600.435	25.01813
apr	22.5984	309.3975	638.955	26.62312
may	33.3126	329.5575	673.623	28.06763
jun	29.4588	344.0655	705.771	29.40713
jul	32.3523	361.7055	741.3749	30.89062
aug	33.8256	379.6695	776.4929	32.35387
sep	34.578	396.8235	811.287	33.80362
oct	39.648	414.4635	844.335	35.18062
nov	29.7414	429.8715	881.235	36.71812
dec	37.632	451.3635	920.763	38.36512
YEAR3				
jan	39.8202	469.3995	957.645	39.90187
feb	39.4542	488.2455	995.2831	41.47013
mar	42.042	507.0376	1032.435	43.01813
apr	38.0064	525.3976	1070.955	44.62313
may	54.8046	545.5576	1105.623	46.06763
jun	47.4948	560.0655	1137.771	47.40712
jul	51.1983	577.7056	1173.375	48.89063

aug	52.6176	595.6695	1208.493	50.35387
sep	52.938	612.8235	1243.287	51.80362
oct	59.808	630.4635	1276.335	53.18063
nov	44.2494	645.8716	1313.235	54.71813
dec	55.272	667.3635	1352.763	56.36513
YEAR4				
jan	57.7842	685.3996	1389.645	57.90188
feb	56.6082	704.2455	1427.283	59.47013
mar	59.682	723.0376	1464.435	61.01813
apr	53.4144	741.3976	1502.955	62.62313
may	76.2966	761.5575	1537.623	64.06763
jun	65.5308	776.0655	1569.771	65.40713
jul	70.0443	793.7055	1605.375	66.89063
aug	71.4096	811.6696	1640.493	68.35387
sep	71.298	828.8235	1675.287	69.80363
oct	79.968	846.4635	1708.335	71.18063
nov	58.7574	861.8715	1745.235	72.71813
dec	72.912	883.3635	1784.763	74.36512
YEAR5				
jan	75.74821	901.3994	1821.645	75.90188
feb	73.76221	920.2455	1859.283	77.47012
mar	77.322	939.0375	1896.435	79.01813
apr	68.8224	957.3975	1934.955	80.62313
may	97.7886	977.5575	1969.623	82.06763
jun	83.5668	992.0656	2001.771	83.40713
jul	88.8903	1009.706	2037.375	84.89063
aug	90.2016	1027.669	2072.493	86.35387
sep	89.658	1044.823	2107.287	87.80363
oct	100.128	1062.464	2140.335	89.18063
nov	73.2654	1077.871	2177.235	90.71812
dec	90.552	1099.364	2216.763	92.36512
YEAR6				
jan	93.7122	1117.399	2253.645	93.90188
feb	90.91621	1136.245	2291.283	95.47012
mar	94.962	1155.037	2328.435	97.01813
apr	84.2304	1173.397	2366.955	98.62312
may	119.2806	1193.557	2401.623	100.0676
jun	101.6028	1208.066	2433.771	101.4071
jul	107.7363	1225.706	2469.375	102.8906
aug	108.9936	1243.669	2504.493	104.3539
sep	108.018	1260.824	2539.287	105.8036
oct	120.288	1278.464	2572.335	107.1806
nov	87.7734	1293.872	2609.235	108.7181
dec	108.192	1315.364	2648.763	110.3651
YEAR7				
jan	111.6762	1333.4	2685.645	111.9019
feb	108.0702	1352.245	2723.283	113.4701
mar	112.602	1371.037	2760.435	115.0181
apr	99.6384	1389.398	2798.955	116.6231
may	140.7726	1409.557	2833.623	118.0676
jun	119.6388	1424.066	2865.771	119.4071
jul	126.5823	1441.705	2901.375	120.8906
aug	127.7856	1459.669	2936.493	122.3539
sep	126.378	1476.824	2971.287	123.8036
oct	140.448	1494.464	3004.335	125.1806
nov	102.2814	1509.871	3041.235	126.7181
dec	125.832	1531.364	3080.763	128.3651

YEAR8				
jan	129.6402	1549.399	3117.645	129.9019
feb	125.2242	1568.245	3155.283	131.4701
mar	130.242	1587.037	3192.435	133.0181
apr	115.0464	1605.397	3230.955	134.6231
may	162.2646	1625.557	3265.623	136.0676
jun	137.6748	1640.066	3297.771	137.4071
jul	145.4283	1657.706	3333.375	138.8906
aug	146.5776	1675.67	3368.493	140.3539
sep	144.738	1692.823	3403.287	141.8036
oct	160.608	1710.463	3436.335	143.1806
nov	116.7894	1725.871	3473.235	144.7181
dec	143.472	1747.363	3512.763	146.3651
YEAR9				
jan	147.6042	1765.399	3549.645	147.9019
feb	142.3782	1784.245	3587.283	149.4701
mar	147.882	1803.037	3624.435	151.0181
apr	130.4544	1821.398	3662.955	152.6231
may	183.7566	1841.557	3697.623	154.0676
jun	155.7108	1856.065	3729.771	155.4071
jul	164.2743	1873.705	3765.375	156.8906
aug	165.3696	1891.67	3800.493	158.3539
sep	163.098	1908.823	3835.287	159.8036
oct	180.768	1926.464	3868.335	161.1806
nov	131.2974	1941.872	3905.235	162.7181
dec	161.112	1963.364	3944.763	164.3651
YEAR10				
jan	165.5682	1981.399	3981.645	165.9019
feb	159.5322	2000.245	4019.283	167.4701
mar	165.522	2019.037	4056.435	169.0181
apr	145.8624	2037.397	4094.955	170.6231
may	205.2486	2057.558	4129.623	172.0676
jun	173.7468	2072.065	4161.771	173.4071
jul	183.1203	2089.705		
aug	184.1616			
sep	181.458			
oct	200.928			
nov	145.8054			
dec	178.752			

TABLE OF COMPUTED INDEX BY THE RATIO TO MOVING AVERAGE METHOD

MONTH	INDEX
jan	99.7787
feb	95.1815
mar	97.81309
apr	85.315
may	119.104
jun	100.172
jul	104.7013
aug	104.4759
sep	102.1655
oct	112.4194
nov	80.83572
dec	98.03776

SQUARED ERROR FOR RATIO TO MOVING AVERAGE METHOD = 50.32581

OUTPUT OF PROGRAM2

THE TREND EQUATION EMPLOYED IS :T = 100 - 0.3*I

TABLE OF TREND VALUES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	99.7	99.4	99.1	98.8	98.5	98.2
YR2	96.1	95.8	95.5	95.2	94.9	94.6
YR3	92.5	92.2	91.9	91.6	91.3	91
YR4	88.9	88.6	88.3	88	87.7	87.4
YR5	85.3	85	84.7	84.4	84.1	83.8
YR6	81.7	81.4	81.1	80.8	80.5	80.2
yr7	78.1	77.8	77.5	77.2	76.9	76.6
yr8	74.5	74.2	73.9	73.6	73.3	73
yr9	70.9	70.6	70.3	70	69.7	69.4
yr10	67.3	67	66.7	66.4	66.1	65.8

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	97.9	97.6	97.3	97	96.7	96.4
YR2	94.3	94	93.7	93.4	93.1	92.8
YR3	90.7	90.4	90.1	89.8	89.5	89.2
YR4	87.1	86.8	86.5	86.2	85.9	85.6
YR5	83.5	83.2	82.9	82.6	82.3	82
YR6	79.9	79.6	79.3	79	78.7	78.4
yr7	76.3	76	75.7	75.4	75.1	74.8
yr8	72.7	72.4	72.1	71.8	71.5	71.2
yr9	69.1	68.8	68.5	68.2	67.9	67.6
yr10	65.5	65.2	64.9	64.6	64.3	64

TABLE OF IMPOSED INDEX

MONTH	INDEX
jan	99.8
feb	95.3
mar	98
apr	85.6
may	119.4
jun	100.2
jul	104.7
aug	104.4
sep	102
oct	112
nov	80.6
dec	98

TABLE OF THEORITICAL SERIES I.E TRE*S

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
YR1	99.5006	94.7282	97.118	84.5728	117.609	98.39639	102.5013
YR2	95.9078	91.29741	93.59	81.4912	113.3106	94.78919	98.7321
YR3	92.315	87.8666	90.062	78.4096	109.0122	91.182	94.96289
YR4	88.72221	84.4358	86.534	75.328	104.7138	87.5748	91.1937
YR5	85.1294	81.005	83.006	72.2464	100.4154	83.9676	87.4245
YR6	81.5366	77.5742	79.478	69.1648	96.117	80.3604	83.6553
yr7	77.9438	74.14339	75.95	66.0832	91.8186	76.7532	79.88609
yr8	74.35101	70.7126	72.422	63.0016	87.5202	73.146	76.1169
yr9	70.7582	67.2818	68.894	59.92	83.22179	69.5388	72.34769
yr10	67.1654	63.851	65.366	56.8384	78.9234	65.93159	68.5785

	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	MEAN
YR1	101.8944	99.246	108.64	77.94019	94.472	1176.619	98.05158
YR2	98.136	95.574	104.608	75.0386	90.944	1133.419	94.45157
YR3	94.3776	91.902	100.576	72.137	87.416	1090.219	90.85157
YR4	90.6192	88.23	96.544	69.2354	83.888	1047.019	87.25158
YR5	86.8608	84.558	92.512	66.3338	80.36	1003.819	83.65157
YR6	83.1024	80.88599	88.48	63.4322	76.832	960.6189	80.05157
yr7	79.344	77.214	84.448	60.5306	73.30399	917.4189	76.45158
yr8	75.5856	73.542	80.41599	57.629	69.77599	874.2189	72.85157
yr9	71.82719	69.87	76.384	54.7274	66.248	831.0189	69.25157
yr10	68.06879	66.198	72.352	51.82579	62.72	787.8188	65.65157

TABLE OF PERCENTAGES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	101.4778	96.61058	99.04786	86.25337	119.9461	100.3517
YR2	101.5418	96.66055	99.08781	86.27829	119.9669	100.3575
YR3	101.6108	96.71445	99.13093	86.30517	119.9893	100.3637
YR4	101.6855	96.7728	99.17758	86.33425	120.0136	100.3704
YR5	101.7666	96.8362	99.22826	86.36586	120.0401	100.3778
YR6	101.8551	96.90528	99.28349	86.4003	120.0688	100.3858
yr7	101.9519	96.98086	99.34393	86.43798	120.1003	100.3945
yr8	102.0582	97.06393	99.41035	86.47939	120.1349	100.4041
yr9	102.1756	97.15562	99.48366	86.52511	120.1731	100.4148
yr10	102.3058	97.25739	99.56501	86.57584	120.2156	100.4265
TOT	1018.429	968.9577	992.7589	863.9556	1200.649	1003.847
MEAN	101.8429	96.89577	99.27589	86.39555	120.0649	100.3847

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	104.5381	103.9192	101.2182	110.7988	79.48897	96.34929
YR2	104.532	103.9009	101.1884	110.7531	79.44664	96.28638
YR3	104.5253	103.8811	101.1562	110.7037	79.40094	96.21848
YR4	104.5181	103.8597	101.1214	110.6501	79.35146	96.14497
YR5	104.5103	103.8364	101.0836	110.5921	79.29773	96.06514
YR6	104.5017	103.8111	101.0424	110.5287	79.23917	95.97813
yr7	104.4924	103.7833	100.9973	110.4595	79.17508	95.8829
yr8	104.4822	103.7529	100.9477	110.3833	79.10468	95.7783
yr9	104.4708	103.7192	100.893	110.2993	79.02695	95.66281
yr10	104.4583	103.6819	100.8323	110.206	78.94067	95.53465
TOT	1045.029	1038.146	1010.48	1105.375	792.4723	959.9011
U	104.5029	103.8146	101.048	110.5375	79.24723	95.99011

TABLE OF COMPUTED INDEX BY THE AVERAGE PERCENTAGE METHOD

MONTH	INDEX
jan	101.8429
feb	96.89577
mar	99.27589
apr	86.39555
may	120.0649
jun	100.3847
jul	104.5029
aug	103.8146
sep	101.048
oct	110.5375
nov	79.24723
dec	95.99011

MEAN SQUARED ERROR FOR THE AVERAGE PERCENTAGE METHOD = 1.562781

TABLE OF MOVING TOTALS & 12-MONTH CENTRED MOVING AVERAGE

YEAR & MONTH	DATA	12-MONTH MT	2-MTH MT OF C3	12-MTH CMA
YEAR1				
jan	99.5006			
feb	94.7282			
mar	97.118			
apr	84.5728			
may	117.609			
jun	98.39639			
jul	102.5013	1176.619	2349.645	97.90189
aug	101.8944	1173.026	2342.622	97.60923
sep	99.246	1169.595	2335.662	97.31927
oct	108.64	1166.067	2329.053	97.04386
nov	77.94019	1162.986	2321.673	96.73637
dec	94.472	1158.687	2313.767	96.40696
YEAR2				
jan	95.9078	1155.08	2306.391	96.09962
feb	91.29741	1151.311	2298.863	95.78597
mar	93.59	1147.552	2291.433	95.47638
apr	81.4912	1143.88	2283.729	95.15537
may	113.3106	1139.849	2276.795	94.86648
jun	94.78919	1136.947	2270.366	94.59857
jul	98.7321	1133.419	2263.245	94.30186
aug	98.136	1129.826	2256.221	94.00922
sep	95.574	1126.395	2249.262	93.71926
oct	104.608	1122.867	2242.653	93.44387
nov	75.0386	1119.786	2235.273	93.13638
dec	90.944	1115.487	2227.367	92.80698
YEAR3				
jan	92.315	1111.88	2219.991	92.49963
feb	87.8666	1108.111	2212.463	92.18597
mar	90.062	1104.353	2205.033	91.87638
apr	78.4096	1100.681	2197.329	91.55538
may	109.0122	1096.649	2190.396	91.26648
jun	91.182	1093.747	2183.966	90.99857
jul	94.96289	1090.219	2176.845	90.70187

aug	94.3776	1086.626	2169.822	90.40923
sep	91.902	1083.195	2162.863	90.11929
oct	100.576	1079.667	2156.253	89.84387
nov	72.137	1076.586	2148.873	89.53638
dec	87.416	1072.287	2140.967	89.20697
YEAR4				
jan	88.72221	1068.68	2133.591	88.89962
feb	84.4358	1064.911	2126.063	88.58598
mar	86.534	1061.153	2118.633	88.27639
apr	75.328	1057.481	2110.929	87.95538
may	104.7138	1053.448	2103.995	87.66647
jun	87.5748	1050.547	2097.566	87.39858
jul	91.1937	1047.019	2090.445	87.10188
aug	90.6192	1043.426	2083.421	86.80923
sep	88.23	1039.995	2076.463	86.51928
oct	96.544	1036.467	2069.853	86.24387
nov	69.2354	1033.386	2062.473	85.93638
dec	83.888	1029.087	2054.567	85.60697
YEAR5				
jan	85.1294	1025.48	2047.191	85.29962
feb	81.005	1021.711	2039.663	84.98597
mar	83.006	1017.952	2032.233	84.67637
apr	72.2464	1014.28	2024.529	84.35537
may	100.4154	1010.248	2017.595	84.06647
jun	83.9676	1007.347	2011.166	83.79858
jul	87.4245	1003.819	2004.045	83.50187
aug	86.8608	1000.226	1997.021	83.20922
sep	84.558	996.7953	1990.063	82.91927
oct	92.512	993.2673	1983.453	82.64388
nov	66.3338	990.1858	1976.073	82.33639
dec	80.36	985.8874	1968.167	82.00698
YEAR6				
jan	81.5366	982.2802	1960.791	81.69962
feb	77.5742	978.5109	1953.263	81.38597
mar	79.478	974.7524	1945.833	81.07638
apr	69.1648	971.0805	1938.129	80.75538
may	96.117	967.0485	1931.195	80.46647
jun	80.3604	964.1469	1924.766	80.19857
jul	83.6553	960.6189	1917.645	79.90188
aug	83.1024	957.0261	1910.621	79.60922
sep	80.88599	953.5952	1903.662	79.31927
oct	88.48	950.0672	1897.053	79.04386
nov	63.4322	946.9856	1889.673	78.73637
dec	76.832	942.6873	1881.767	78.40697
YEAR7				
jan	77.9438	939.08	1874.391	78.09962
feb	74.14339	935.3109	1866.863	77.78597
mar	75.95	931.5524	1859.433	77.47637
apr	66.0832	927.8804	1851.729	77.15537
may	91.8186	923.8484	1844.795	76.86647
jun	76.7532	920.9468	1838.366	76.59857
jul	79.88609	917.4189	1831.245	76.30187
aug	79.344	913.826	1824.221	76.00922
sep	77.214	910.3953	1817.262	75.71927
oct	84.448	906.8672	1810.653	75.44387
nov	60.5306	903.7857	1803.273	75.13638
dec	73.30399	899.4872	1795.367	74.80697

YEAR8				
jan	74.35101	895.8801	1787.991	74.49963
feb	70.7126	892.1108	1780.463	74.18597
mar	72.422	888.3524	1773.033	73.87637
apr	63.0016	884.6804	1765.329	73.55537
may	87.5202	880.6484	1758.395	73.26647
jun	73.146	877.7469	1751.966	72.99857
jul	76.1169	874.2189	1744.845	72.70187
aug	75.5856	870.6261	1737.821	72.40922
sep	73.542	867.1953	1730.863	72.11927
oct	80.41599	863.6672	1724.253	71.84387
nov	57.629	860.5856	1716.873	71.53637
dec	69.77599	856.2872	1708.967	71.20697
YEAR9				
jan	70.7582	852.6801	1701.591	70.89962
feb	67.2818	848.9109	1694.063	70.58598
mar	68.894	845.1525	1686.633	70.27637
apr	59.92	841.4805	1678.929	69.95538
may	83.22179	837.4485	1671.995	69.66647
jun	69.5388	834.5469	1665.566	69.39857
jul	72.34769	831.0189	1658.445	69.10187
aug	71.82719	827.426	1651.421	68.80922
sep	69.87	823.9952	1644.463	68.51927
oct	76.384	820.4673	1637.853	68.24387
nov	54.7274	817.3856	1630.473	67.93637
dec	66.248	813.0873	1622.567	67.60697
YEAR10				
jan	67.1654	809.4801	1615.191	67.29962
feb	63.851	805.7108	1607.663	66.98597
mar	65.366	801.9525	1600.233	66.67637
apr	56.8384	798.2805	1592.529	66.35537
may	78.9234	794.2485	1585.595	66.06647
jun	65.93159	791.3469	1579.166	65.79858
jul	68.5785	787.8188		
aug	68.06879			
sep	66.198			
oct	72.352			
nov	51.82579			
dec	62.72			

TABLE OF COMPUTED INDEX BY THE RATIO TO MOVING AVERAGE METHOD

MONTH	INDEX
jan	99.80019
feb	95.31639
mar	98.02867
apr	85.64771
may	119.4501
jun	100.2015
jul	104.6973
aug	104.388
sep	101.9757
oct	111.9395
nov	80.56371
dec	97.99129

OUTPUT TO PROGRAM4.

THE TREND EQUATION EMPLOYED IS :T = 12 + 1.8*I

TABLE OF TREND VALUES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	13.8	15.6	17.4	19.2	21	22.8
YR2	35.4	37.2	39	40.8	42.6	44.4
YR3	57	58.8	60.6	62.4	64.2	66
YR4	78.6	80.4	82.2	84	85.8	87.6
YR5	100.2	102	103.8	105.6	107.4	109.2
YR6	121.8	123.6	125.4	127.2	129	130.8
YR7	143.4	145.2	147	148.8	150.6	152.4
YR8	165	166.8	168.6	170.4	172.2	174
YR9	186.6	188.4	190.2	192	193.8	195.6
YR10	208.2	210	211.8	213.6	215.4	217.2

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	24.6	26.4	28.2	30	31.8	33.6
YR2	46.2	48	49.8	51.6	53.4	55.2
YR3	67.8	69.6	71.4	73.2	75	76.8
YR4	89.4	91.2	93	94.8	96.6	98.39999
YR5	111	112.8	114.6	116.4	118.2	120
YR6	132.6	134.4	136.2	138	139.8	141.6
YR7	154.2	156	157.8	159.6	161.4	163.2
YR8	175.8	177.6	179.4	181.2	183	184.8
YR9	197.4	199.2	201	202.8	204.6	206.4
YR10	219	220.8	222.6	224.4	226.2	228

TABLE OF IMPOSED INDEX

MONTH	INDEX
jan	102.1
feb	89.3
mar	99.6
apr	102.5
may	77.8
jun	88.7
jul	95.6
aug	110.5
sep	80.5
oct	98.2
nov	130.5
dec	124.7

TABLE OF THEORITICAL SERIES I.E TRE*S

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
YR1	14.0898	13.9308	17.3304	19.68	16.338	20.2236	23.5176
YR2	36.1434	33.2196	38.844	41.82	33.1428	39.3828	44.1672
YR3	58.197	52.5084	60.3576	63.96	49.9476	58.542	64.8168
YR4	80.2506	71.7972	81.87119	86.1	66.7524	77.70119	85.4664
YR5	102.3042	91.08601	103.3848	108.24	83.5572	96.8604	106.116
YR6	124.3578	110.3748	124.8984	130.38	100.362	116.0196	126.7656
YR7	146.4114	129.6636	146.412	152.52	117.1668	135.1788	147.4152
YR8	168.465	148.9524	167.9256	174.66	133.9716	154.338	168.0648
YR9	190.5186	168.2412	189.4392	196.8	150.7764	173.4972	188.7144
YR10	212.5722	187.53	210.9528	218.94	167.5812	192.6564	209.364

	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	MEAN
YR1	29.172	22.701	29.46	41.499	41.8992	289.8414	24.15345
YR2	53.04	40.089	50.6712	69.687	68.8344	549.0414	45.75345
YR3	76.908	57.477	71.88239	97.875	95.76959	808.2413	67.35345
YR4	100.776	74.865	93.09359	126.063	122.7048	1067.441	88.95344
YR5	124.644	92.253	114.3048	154.251	149.64	1326.641	110.5534
YR6	148.512	109.641	135.516	182.439	176.5752	1585.841	132.1534
YR7	172.38	127.029	156.7272	210.627	203.5104	1845.041	153.7534
YR8	196.248	144.417	177.9384	238.815	230.4456	2104.241	175.3535
YR9	220.116	161.805	199.1496	267.003	257.3808	2363.441	196.9534
YR10	243.984	179.193	220.3608	295.191	284.316	2622.641	218.5535

TABLE OF PERCENTAGES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	58.33452	57.67624	71.75124	81.47904	67.64252	83.72964
YR2	78.99601	72.60567	84.89851	91.40295	72.43782	86.07613
YR3	86.40537	77.95949	89.61323	94.96173	74.15746	86.9176
YR4	90.21641	80.71324	92.03825	96.79221	75.04195	87.35041
YR5	92.53822	82.39092	93.51567	97.90739	75.58082	87.61409
YR6	94.10107	83.52019	94.51013	98.65804	75.94354	87.79158
YR7	95.22478	84.33216	95.22518	99.19778	76.20434	87.91919
YR8	96.07167	84.9441	95.76406	99.60453	76.40089	88.01537
YR9	96.7328	85.42181	96.18476	99.92209	76.55434	88.09046
YR10	97.26325	85.8051	96.52229	100.1769	76.67744	88.1507
TOT	885.8841	795.369	910.0233	960.1027	746.6411	871.6552
MEAN	88.58841	79.5369	91.00233	96.01027	74.66411	87.16551

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	97.36745	120.7778	93.98656	121.9701	171.814	173.4709
YR2	96.53305	115.9257	87.61963	110.7484	152.3098	150.4464
YR3	96.23382	114.1857	85.3364	106.7242	145.3155	142.1896
YR4	96.07993	113.2907	84.162	104.6543	141.718	137.9427
YR5	95.98615	112.7455	83.44652	103.3932	139.5262	135.3553
YR6	95.92303	112.3785	82.96492	102.5444	138.0509	133.6138
YR7	95.87765	112.1146	82.61864	101.9341	136.9901	132.3615
YR8	95.84345	111.9157	82.35765	101.4741	136.1906	131.4178
YR9	95.81675	111.7604	82.15393	101.1151	135.5665	130.681
YR10	95.79533	111.6358	81.99046	100.827	135.0658	130.0899
TOT	961.4566	1136.73	846.6368	1055.385	1432.547	1397.569
U	96.14566	113.673	84.66368	105.5385	143.2547	139.7569

TABLE OF COMPUTED INDEX BY THE AVERAGE PERCENTAGE METHOD

MONTH	INDEX
jan	88.58842
feb	79.5369
mar	91.00233
apr	96.01028
may	74.66412
jun	87.16552
jul	96.14567
aug	113.673
sep	84.66369
oct	105.5385
nov	143.2547
dec	139.7569

MEAN SQUARED ERROR FOR THE AVERAGE PERCENTAGE METHOD = 73.08793

TABLE OF MOVING TOTALS & 12-MONTH CENTRED MOVING AVERAGE

YEAR & MONTH	DATA	12-MONTH MT	2-MTH MT OF C3	12-MTH CMA
YEAR1				
jan	14.0898			
feb	13.9308			
mar	17.3304			
apr	19.68			
may	16.338			
jun	20.2236			
jul	23.5176	289.8414	601.7365	25.07235
aug	29.172	311.895	643.0789	26.79495
sep	22.701	331.1838	683.8812	28.49505
oct	29.46	352.6974	727.5348	30.31395
nov	41.499	374.8374	766.4796	31.93665
dec	41.8992	391.6422	802.4436	33.43515
YEAR2				
jan	36.1434	410.8014	842.2524	35.09385
feb	33.2196	431.451	886.77	36.94875
mar	38.844	455.319	928.0259	38.66775
apr	41.82	472.707	966.6252	40.27605
may	33.1428	493.9182	1016.024	42.33435
jun	39.3828	522.1062	1071.148	44.63115
jul	44.1672	549.0414	1120.136	46.67235
aug	53.04	571.095	1161.479	48.39495
sep	40.089	590.3839	1202.281	50.09505
oct	50.6712	611.8974	1245.935	51.91395
nov	69.687	634.0374	1284.88	53.53665
dec	68.8344	650.8422	1320.844	55.03515
YEAR3				
jan	58.197	670.0015	1360.652	56.69385
feb	52.5084	690.651	1405.17	58.54875
mar	60.3576	714.519	1446.426	60.26775
apr	63.96	731.907	1485.025	61.87605
may	49.9476	753.1182	1534.424	63.93435
jun	58.542	781.3062	1589.547	66.23115
jul	64.8168	808.2413	1638.536	68.27235

aug	76.908	830.295	1679.879	69.99494
sep	57.477	849.5837	1720.681	71.69505
oct	71.88239	871.0974	1764.335	73.51395
nov	97.875	893.2374	1803.28	75.13665
dec	95.76959	910.0421	1839.243	76.63514
YEAR4				
jan	80.2506	929.2013	1879.052	78.29385
feb	71.7972	949.851	1923.57	80.14874
mar	81.87119	973.7189	1964.826	81.86774
apr	86.1	991.1069	2003.425	83.47604
may	66.7524	1012.318	2052.824	85.53434
jun	77.70119	1040.506	2107.947	87.83114
jul	85.4664	1067.441	2156.936	89.87234
aug	100.776	1089.495	2198.279	91.59494
sep	74.865	1108.784	2239.081	93.29504
oct	93.09359	1130.297	2282.735	95.11395
nov	126.063	1152.437	2321.68	96.73666
dec	122.7048	1169.242	2357.644	98.23515
YEAR5				
jan	102.3042	1188.401	2397.452	99.89384
feb	91.08601	1209.051	2441.97	101.7487
mar	103.3848	1232.919	2483.226	103.4678
apr	108.24	1250.307	2521.825	105.076
may	83.5572	1271.518	2571.225	107.1344
jun	96.8604	1299.706	2626.348	109.4312
jul	106.116	1326.641	2675.336	111.4724
aug	124.644	1348.695	2716.679	113.1949
sep	92.253	1367.984	2757.481	114.895
oct	114.3048	1389.497	2801.135	116.714
nov	154.251	1411.637	2840.08	118.3366
dec	149.64	1428.442	2876.044	119.8352
YEAR6				
jan	124.3578	1447.602	2915.853	121.4939
feb	110.3748	1468.251	2960.37	123.3488
mar	124.8984	1492.119	3001.626	125.0677
apr	130.38	1509.507	3040.225	126.676
may	100.362	1530.718	3089.624	128.7343
jun	116.0196	1558.906	3144.748	131.0311
jul	126.7656	1585.841	3193.736	133.0723
aug	148.512	1607.895	3235.079	134.7949
sep	109.641	1627.184	3275.881	136.495
oct	135.516	1648.697	3319.535	138.3139
nov	182.439	1670.837	3358.479	139.9366
dec	176.5752	1687.642	3394.443	141.4351
YEAR7				
jan	146.4114	1706.801	3434.252	143.0939
feb	129.6636	1727.451	3478.77	144.9487
mar	146.412	1751.319	3520.026	146.6677
apr	152.52	1768.707	3558.625	148.276
may	117.1668	1789.918	3608.024	150.3344
jun	135.1788	1818.106	3663.147	152.6311
jul	147.4152	1845.041	3712.136	154.6723
aug	172.38	1867.095	3753.479	156.3949
sep	127.029	1886.384	3794.281	158.095
oct	156.7272	1907.897	3837.935	159.9139
nov	210.627	1930.037	3876.879	161.5366
dec	203.5104	1946.842	3912.843	163.0351

YEAR8				
jan	168.465	1966.001	3952.652	164.6938
feb	148.9524	1986.651	3997.17	166.5487
mar	167.9256	2010.519	4038.426	168.2677
apr	174.66	2027.907	4077.025	169.8761
may	133.9716	2049.118	4126.424	171.9343
jun	154.338	2077.306	4181.548	174.2312
jul	168.0648	2104.241	4230.536	176.2723
aug	196.248	2126.295	4271.879	177.9949
sep	144.417	2145.584	4312.681	179.6951
oct	177.9384	2167.097	4356.335	181.514
nov	238.815	2189.237	4395.279	183.1366
dec	230.4456	2206.042	4431.244	184.6351
YEAR9				
jan	190.5186	2225.202	4471.053	186.2939
feb	168.2412	2245.851	4515.57	188.1488
mar	189.4392	2269.719	4556.826	189.8678
apr	196.8	2287.107	4595.425	191.476
may	150.7764	2308.318	4644.824	193.5343
jun	173.4972	2336.506	4699.947	195.8311
jul	188.7144	2363.441	4748.937	197.8724
aug	220.116	2385.495	4790.279	199.595
sep	161.805	2404.784	4831.081	201.295
oct	199.1496	2426.297	4874.734	203.1139
nov	267.003	2448.437	4913.68	204.7366
dec	257.3808	2465.242	4949.644	206.2352
YEAR10				
jan	212.5722	2484.401	4989.452	207.8938
feb	187.53	2505.051	5033.97	209.7487
mar	210.9528	2528.919	5075.226	211.4677
apr	218.94	2546.307	5113.825	213.076
may	167.5812	2567.518	5163.224	215.1343
jun	192.6564	2595.706	5218.348	217.4312
jul	209.364	2622.641		
aug	243.984			
sep	179.193			
oct	220.3608			
nov	295.191			
dec	284.316			

TABLE OF COMPUTED INDEX BY THE RATIO TO MOVING AVERAGE METHOD

MONTH	INDEX
jan	102.4752
feb	89.56639
mar	99.97553
apr	103.0812
may	78.02768
jun	88.52325
jul	95.01871
aug	109.9638
sep	80.2236
oct	97.85248
nov	130.3242
dec	124.9679

OUTPUT TO PROGRAM5

THE TREND EQUATION EMPLOYED IS :T = 2.4 + 1.5*I

TABLE OF TREND VALUES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	3.9	5.4	6.9	8.4	9.9	11.4
YR2	21.9	23.4	24.9	26.4	27.9	29.4
YR3	39.9	41.4	42.9	44.4	45.9	47.4
YR4	57.9	59.4	60.9	62.4	63.9	65.4
YR5	75.9	77.4	78.9	80.4	81.9	83.4
YR6	93.9	95.4	96.9	98.4	99.9	101.4
YR7	111.9	113.4	114.9	116.4	117.9	119.4
YR8	129.9	131.4	132.9	134.4	135.9	137.4
YR9	147.9	149.4	150.9	152.4	153.9	155.4
YR10	165.9	167.4	168.9	170.4	171.9	173.4

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	12.9	14.4	15.9	17.4	18.9	20.4
YR2	30.9	32.4	33.9	35.4	36.9	38.4
YR3	48.9	50.4	51.9	53.4	54.9	56.4
YR4	66.9	68.4	69.9	71.4	72.9	74.4
YR5	84.9	86.4	87.9	89.4	90.9	92.4
YR6	102.9	104.4	105.9	107.4	108.9	110.4
YR7	120.9	122.4	123.9	125.4	126.9	128.4
YR8	138.9	140.4	141.9	143.4	144.9	146.4
YR9	156.9	158.4	159.9	161.4	162.9	164.4
YR10	174.9	176.4	177.9	179.4	180.9	182.4

TABLE OF IMPOSED INDEX

MONTH	INDEX
jan	102.1
feb	89.3
mar	99.6
apr	102.5
may	77.8
jun	88.7
jul	95.6
aug	110.5
sep	80.5
oct	98.2
nov	130.5
dec	124.7

TABLE OF THEORITICAL SERIES I.E TRE*S

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
YR1	3.9819	4.8222	6.8724	8.61	7.7022	10.1118	12.3324
YR2	22.3599	20.8962	24.8004	27.06	21.7062	26.0778	29.5404
YR3	40.7379	36.9702	42.7284	45.51	35.7102	42.0438	46.7484
YR4	59.1159	53.0442	60.6564	63.96	49.7142	58.0098	63.9564
YR5	77.4939	69.1182	78.5844	82.41	63.7182	73.9758	81.1644
YR6	95.8719	85.19221	96.5124	100.86	77.72221	89.9418	98.3724
YR7	114.2499	101.2662	114.4404	119.31	91.7262	105.9078	115.5804
YR8	132.6279	117.3402	132.3684	137.76	105.7302	121.8738	132.7884
YR9	151.0059	133.4142	150.2964	156.21	119.7342	137.8398	149.9964
YR10	169.3839	149.4882	168.2244	174.66	133.7382	153.8058	167.2044

	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	MEAN
YR1	15.912	12.7995	17.0868	24.6645	25.4388	150.3345	12.52787
YR2	35.802	27.2895	34.7628	48.1545	47.8848	366.3345	30.52788
YR3	55.692	41.7795	52.4388	71.6445	70.3308	582.3346	48.52788
YR4	75.582	56.2695	70.1148	95.1345	92.7768	798.3345	66.52788
YR5	95.472	70.7595	87.7908	118.6245	115.2228	1014.334	84.52787
YR6	115.362	85.2495	105.4668	142.1145	137.6688	1230.335	102.5279
YR7	135.252	99.7395	123.1428	165.6045	160.1148	1446.334	120.5279
YR8	155.142	114.2295	140.8188	189.0945	182.5608	1662.334	138.5279
YR9	175.032	128.7195	158.4948	212.5845	205.0068	1878.334	156.5279
YR10	194.922	143.2095	176.1708	236.0745	227.4528	2094.334	174.5279

TABLE OF PERCENTAGES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	31.78432	38.49176	54.85687	68.72674	61.4805	80.7144
YR2	73.2442	68.44957	81.23853	88.64029	71.10287	85.4229
YR3	83.94741	76.18343	88.04918	93.78114	73.58698	86.63844
YR4	88.85884	79.7323	91.17441	96.14015	74.72688	87.19623
YR5	91.67853	81.76972	92.96863	97.49448	75.38129	87.51646
YR6	93.50813	83.09174	94.13283	98.37324	75.80592	87.72423
YR7	94.79128	84.01891	94.94933	98.98956	76.10373	87.86996
YR8	95.74094	84.70512	95.55361	99.44569	76.32413	87.97781
YR9	96.4722	85.23351	96.01893	99.79691	76.49385	88.06085
YR10	97.05263	85.65291	96.38827	100.0757	76.62856	88.12677
TOT	847.0785	767.329	885.3305	941.4639	737.6346	867.248
MEAN	84.70785	76.73289	88.53305	94.14639	73.76347	86.72481

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	98.43967	127.0128	102.1682	136.3902	196.877	203.0576
YR2	96.76532	117.2764	89.39207	113.8723	157.7394	156.856
YR3	96.33308	114.7629	86.09381	108.0591	147.6357	144.9286
YR4	96.13474	113.6095	84.58033	105.3916	142.9995	139.4555
YR5	96.02087	112.9474	83.71144	103.8602	140.3377	136.3134
YR6	95.94697	112.5177	83.14763	102.8664	138.6106	134.2745
YR7	95.89516	112.2164	82.75223	102.1696	137.3994	132.8446
YR8	95.8568	111.9933	82.45957	101.6538	136.5029	131.7863
YR9	95.82728	111.8216	82.23423	101.2566	135.8125	130.9714
YR10	95.80383	111.6853	82.05537	100.9413	135.2646	130.3246
TOT	963.0237	1145.843	858.5949	1076.461	1469.179	1440.813
U	96.30237	114.5843	85.85949	107.6461	146.9179	144.0813

TABLE OF COMPUTED INDEX BY THE AVERAGE PERCENTAGE METHOD

MONTH	INDEX
jan	84.70785
feb	76.73289
mar	88.53305
apr	94.14639
may	73.76347
jun	86.72481
jul	96.30237
aug	114.5843
sep	85.85949
oct	107.6461
nov	146.9179
dec	144.0813

MEAN SQUARED ERROR FOR THE AVERAGE PERCENTAGE METHOD = 121.0988

TABLE OF MOVING TOTALS & 12-MONTH CENTRED MOVING AVERAGE

YEAR & MONTH	DATA	12-MONTH MT	2-MTH MT OF C3	12-MTH CMA
YEAR1				
jan	3.9819			
feb	4.8222			
mar	6.8724			
apr	8.61			
may	7.7022			
jun	10.1118			
jul	12.3324	150.3345	319.047	13.29362
aug	15.912	168.7125	353.499	14.72912
sep	12.7995	184.7865	387.501	16.14587
oct	17.0868	202.7145	423.879	17.66162
nov	24.6645	221.1645	456.333	19.01387
dec	25.4388	235.1685	486.303	20.26262
YEAR2				
jan	22.3599	251.1345	519.477	21.64487
feb	20.8962	268.3425	556.575	23.19062
mar	24.8004	288.2325	590.955	24.62312
apr	27.06	302.7225	623.121	25.96337
may	21.7062	320.3985	664.287	27.67863
jun	26.0778	343.8885	710.223	29.59263
jul	29.5404	366.3345	751.0471	31.29363
aug	35.802	384.7125	785.499	32.72913
sep	27.2895	400.7865	819.501	34.14588
oct	34.7628	418.7145	855.879	35.66162
nov	48.1545	437.1645	888.333	37.01387
dec	47.8848	451.1685	918.303	38.26262
YEAR3				
jan	40.7379	467.1345	951.4771	39.64488
feb	36.9702	484.3425	988.5751	41.19063
mar	42.7284	504.2325	1022.955	42.62313
apr	45.51	518.7225	1055.121	43.96338
may	35.7102	536.3986	1096.287	45.67863
jun	42.0438	559.8885	1142.223	47.59263
jul	46.7484	582.3346	1183.047	49.29363

aug	55.692	600.7125	1217.499	50.72913
sep	41.7795	616.7865	1251.501	52.14587
oct	52.4388	634.7145	1287.879	53.66162
nov	71.6445	653.1646	1320.333	55.01387
dec	70.3308	667.1685	1350.303	56.26262
YEAR4				
jan	59.1159	683.1346	1383.477	57.64488
feb	53.0442	700.3426	1420.575	59.19063
mar	60.6564	720.2325	1454.955	60.62313
apr	63.96	734.7225	1487.121	61.96338
may	49.7142	752.3985	1528.287	63.67862
jun	58.0098	775.8885	1574.223	65.59263
jul	63.9564	798.3345	1615.047	67.29363
aug	75.582	816.7125	1649.499	68.72913
sep	56.2695	832.7865	1683.501	70.14587
oct	70.1148	850.7145	1719.879	71.66163
nov	95.1345	869.1646	1752.333	73.01388
dec	92.7768	883.1685	1782.303	74.26263
YEAR5				
jan	77.4939	899.1345	1815.477	75.64487
feb	69.1182	916.3425	1852.575	77.19062
mar	78.5844	936.2325	1886.955	78.62312
apr	82.41	950.7225	1919.121	79.96338
may	63.7182	968.3986	1960.287	81.67863
jun	73.9758	991.8885	2006.223	83.59263
jul	81.1644	1014.334	2047.047	85.29362
aug	95.472	1032.713	2081.499	86.72913
sep	70.7595	1048.786	2115.501	88.14587
oct	87.7908	1066.714	2151.879	89.66162
nov	118.6245	1085.164	2184.333	91.01388
dec	115.2228	1099.168	2214.303	92.26261
YEAR6				
jan	95.8719	1115.134	2247.477	93.64487
feb	85.19221	1132.343	2284.575	95.19062
mar	96.5124	1152.232	2318.955	96.62312
apr	100.86	1166.722	2351.121	97.96337
may	77.72221	1184.398	2392.287	99.67862
jun	89.9418	1207.888	2438.223	101.5926
jul	98.3724	1230.335	2479.047	103.2936
aug	115.362	1248.713	2513.499	104.7291
sep	85.2495	1264.786	2547.501	106.1459
oct	105.4668	1282.715	2583.879	107.6616
nov	142.1145	1301.165	2616.333	109.0139
dec	137.6688	1315.169	2646.303	110.2626
YEAR7				
jan	114.2499	1331.135	2679.477	111.6449
feb	101.2662	1348.343	2716.575	113.1906
mar	114.4404	1368.233	2750.955	114.6231
apr	119.31	1382.723	2783.121	115.9634
may	91.7262	1400.398	2824.287	117.6786
jun	105.9078	1423.888	2870.223	119.5926
jul	115.5804	1446.334	2911.047	121.2936
aug	135.252	1464.713	2945.499	122.7291
sep	99.7395	1480.786	2979.501	124.1459
oct	123.1428	1498.715	3015.879	125.6616
nov	165.6045	1517.165	3048.333	127.0139
dec	160.1148	1531.169	3078.303	128.2626

YEAR8				
jan	132.6279	1547.135	3111.477	129.6449
feb	117.3402	1564.343	3148.575	131.1906
mar	132.3684	1584.233	3182.955	132.6231
apr	137.76	1598.723	3215.121	133.9634
may	105.7302	1616.398	3256.287	135.6786
jun	121.8738	1639.888	3302.223	137.5926
jul	132.7884	1662.334	3343.047	139.2936
aug	155.142	1680.712	3377.499	140.7291
sep	114.2295	1696.786	3411.5	142.1459
oct	140.8188	1714.714	3447.879	143.6616
nov	189.0945	1733.164	3480.333	145.0139
dec	182.5608	1747.168	3510.303	146.2626
YEAR9				
jan	151.0059	1763.134	3543.477	147.6449
feb	133.4142	1780.342	3580.575	149.1906
mar	150.2964	1800.232	3614.955	150.6231
apr	156.21	1814.722	3647.121	151.9634
may	119.7342	1832.398	3688.287	153.6786
jun	137.8398	1855.888	3734.223	155.5926
jul	149.9964	1878.334	3775.047	157.2936
aug	175.032	1896.712	3809.499	158.7291
sep	128.7195	1912.786	3843.501	160.1459
oct	158.4948	1930.714	3879.879	161.6616
nov	212.5845	1949.164	3912.333	163.0139
dec	205.0068	1963.168	3942.303	164.2626
YEAR10				
jan	169.3839	1979.134	3975.477	165.6449
feb	149.4882	1996.342	4012.575	167.1906
mar	168.2244	2016.232	4046.955	168.6231
apr	174.66	2030.722	4079.121	169.9634
may	133.7382	2048.398	4120.287	171.6786
jun	153.8058	2071.888	4166.223	173.5926
jul	167.2044	2094.334		
aug	194.922			
sep	143.2095			
oct	176.1708			
nov	236.0745			
dec	227.4528			

TABLE OF COMPUTED INDEX BY THE RATIO TO MOVING AVERAGE METHOD

MONTH	INDEX
jan	102.5562
feb	89.6235
mar	100.0496
apr	103.1848
may	78.07175
jun	88.51142
jul	94.86573
aug	109.8394
sep	80.16825
oct	97.78937
nov	130.305
dec	125.035

OUTPUT OF PROGRAM6

THE TREND EQUATION EMPLOYED IS :T = 100 - 0.3*I

TABLE OF TREND VALUES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	99.7	99.4	99.1	98.8	98.5	98.2
YR2	96.1	95.8	95.5	95.2	94.9	94.6
YR3	92.5	92.2	91.9	91.6	91.3	91
YR4	88.9	88.6	88.3	88	87.7	87.4
YR5	85.3	85	84.7	84.4	84.1	83.8
YR6	81.7	81.4	81.1	80.8	80.5	80.2
YR7	78.1	77.8	77.5	77.2	76.9	76.6
YR8	74.5	74.2	73.9	73.6	73.3	73
YR9	70.9	70.6	70.3	70	69.7	69.4
YR10	67.3	67	66.7	66.4	66.1	65.8

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	97.9	97.6	97.3	97	96.7	96.4
YR2	94.3	94	93.7	93.4	93.1	92.8
YR3	90.7	90.4	90.1	89.8	89.5	89.2
YR4	87.1	86.8	86.5	86.2	85.9	85.6
YR5	83.5	83.2	82.9	82.6	82.3	82
YR6	79.9	79.6	79.3	79	78.7	78.4
YR7	76.3	76	75.7	75.4	75.1	74.8
YR8	72.7	72.4	72.1	71.8	71.5	71.2
YR9	69.1	68.8	68.5	68.2	67.9	67.6
YR10	65.5	65.2	64.9	64.6	64.3	64

TABLE OF IMPOSED INDEX

MONTH	INDEX
jan	102.1
feb	89.3
mar	99.6
apr	102.5
may	77.8
jun	88.7
jul	95.6
aug	110.5
sep	80.5
oct	98.2
nov	130.5
dec	124.7

TABLE OF THEORITICAL SERIES I.E TRE*S

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
YR1	101.7937	88.76421	98.7036	101.27	76.633	87.10339	93.5924
YR2	98.1181	85.54941	95.118	97.57999	73.83221	83.91019	90.1508
YR3	94.4425	82.3346	91.5324	93.89	71.0314	80.717	86.7092
YR4	90.7669	79.1198	87.9468	90.2	68.2306	77.5238	83.2676
YR5	87.0913	75.905	84.3612	86.51	65.4298	74.3306	79.826
YR6	83.4157	72.6902	80.7756	82.82	62.629	71.1374	76.3844
YR7	79.7401	69.4754	77.19	79.13	59.82821	67.9442	72.94279
YR8	76.0645	66.2606	73.6044	75.43999	57.0274	64.751	69.5012
YR9	72.3889	63.0458	70.01879	71.75	54.2266	61.5578	66.0596
YR10	68.71329	59.831	66.4332	68.06001	51.4258	58.36459	62.618

	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	MEAN
YR1	107.848	78.3265	95.254	126.1935	120.2108	1175.693	97.97443
YR2	103.87	75.4285	91.7188	121.4955	115.7216	1132.493	94.37443
YR3	99.892	72.5305	88.1836	116.7975	111.2324	1089.293	90.77442
YR4	95.914	69.6325	84.64839	112.0995	106.7432	1046.093	87.17442
YR5	91.936	66.7345	81.1132	107.4015	102.254	1002.893	83.57442
YR6	87.958	63.83649	77.578	102.7035	97.7648	959.6931	79.97443
YR7	83.98	60.9385	74.0428	98.0055	93.27559	916.493	76.37442
YR8	80.002	58.0405	70.50759	93.3075	88.78639	873.2931	72.77442
YR9	76.02399	55.1425	66.9724	88.6095	84.2972	830.0931	69.17442
YR10	72.046	52.2445	63.43719	83.91149	79.808	786.8931	65.57442

TABLE OF PERCENTAGES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	103.8982	90.59937	100.7442	103.3637	78.21735	88.90421
YR2	103.9668	90.64893	100.7879	103.3966	78.23328	88.912
YR3	104.0409	90.70242	100.835	103.4322	78.25046	88.92042
YR4	104.121	90.76035	100.886	103.4707	78.26907	88.92953
YR5	104.2081	90.82323	100.9414	103.5125	78.28926	88.93941
YR6	104.303	90.89181	101.0018	103.5581	78.31129	88.95018
YR7	104.4068	90.96684	101.0679	103.608	78.3354	88.96198
YR8	104.5209	91.04929	101.1405	103.6628	78.36187	88.97495
YR9	104.6469	91.14034	101.2206	103.7233	78.39111	88.98925
YR10	104.7867	91.24136	101.3096	103.7905	78.42356	89.00512
TOT	1042.899	908.824	1009.935	1035.518	783.0826	889.4871
MEAN	104.2899	90.8824	100.9935	103.5518	78.30827	88.94871

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	95.52737	110.0777	79.94586	97.22333	128.8025	122.6961
YR2	95.5246	110.0616	79.92472	97.18607	128.7377	122.6197
YR3	95.52162	110.0442	79.90192	97.14587	128.6678	122.5372
YR4	95.51839	110.0254	79.87722	97.10233	128.5922	122.4478
YR5	95.51486	110.0049	79.85039	97.05505	128.51	122.3508
YR6	95.51103	109.9827	79.82114	97.0035	128.4204	122.2451
YR7	95.50684	109.9583	79.78915	96.94712	128.3224	122.1294
YR8	95.50224	109.9315	79.75398	96.88512	128.2147	122.0022
YR9	95.49715	109.9019	79.71516	96.8167	128.0958	121.8618
YR10	95.4915	109.869	79.67207	96.74075	127.9637	121.706
TOT	955.1157	1099.857	798.2516	970.1058	1284.327	1222.596
U	95.51157	109.9857	79.82516	97.01058	128.4327	122.2596

TABLE OF COMPUTED INDEX BY THE AVERAGE PERCENTAGE METHOD

MONTH	INDEX
jan	104.2899
feb	90.8824
mar	100.9935
apr	103.5518
may	78.30827
jun	88.94871
jul	95.51157
aug	109.9857
sep	79.82516
oct	97.01058
nov	128.4327
dec	122.2596

MEAN SQUARED ERROR FOR THE AVERAGE PERCENTAGE METHOD = 1.919992

TABLE OF MOVING TOTALS & 12-MONTH CENTRED MOVING AVERAGE

YEAR & MONTH	DATA	12-MONTH MT	2-MTH MT OF C3	12-MTH CMA
YEAR1				
jan	101.7937			
feb	88.76421			
mar	98.7036			
apr	101.27			
may	76.633			
jun	87.10339			
jul	93.5924	1175.693	2347.71	97.82127
aug	107.848	1172.017	2340.82	97.53417
sep	78.3265	1168.803	2334.02	97.25082
oct	95.254	1165.217	2326.744	96.94767
nov	126.1935	1161.527	2320.253	96.67722
dec	120.2108	1158.726	2314.259	96.42747
YEAR2				
jan	98.1181	1155.533	2307.625	96.15102
feb	85.54941	1152.092	2300.205	95.84188
mar	95.118	1148.114	2293.329	95.55538
apr	97.57999	1145.216	2286.896	95.28733
may	73.83221	1141.68	2278.663	94.94427
jun	83.91019	1136.982	2269.476	94.56149
jul	90.1508	1132.493	2261.311	94.22128
aug	103.87	1128.818	2254.42	93.93417
sep	75.4285	1125.603	2247.62	93.65082
oct	91.7188	1122.017	2240.344	93.34768
nov	121.4955	1118.327	2233.854	93.07723
dec	115.7216	1115.526	2227.859	92.82748
YEAR3				
jan	94.4425	1112.333	2221.225	92.55103
feb	82.3346	1108.891	2213.805	92.24187
mar	91.5324	1104.913	2206.929	91.95538
apr	93.89	1102.016	2200.496	91.68732
may	71.0314	1098.48	2192.262	91.34427
jun	80.717	1093.782	2183.075	90.96146
jul	86.7092	1089.293	2174.911	90.62128

YEAR8				
jan	115.17	1970.068	3964.241	165.1767
feb	127.602	1994.173	4012.56	167.19
mar	182.088	2018.387	4059.086	169.1286
apr	189.8256	2040.699	4105.224	171.051
may	199.4076	2064.524	4148.381	172.8492
jun	203.928	2083.856	4183.805	174.3252
jul	196.1928	2099.948	4214.974	175.6239
aug	199.0896	2115.025	4246.574	176.9406
sep	185.3202	2131.549	4286.427	178.6011
oct	199.8636	2154.877	4333.817	180.5757
nov	163.785	2178.94	4382.892	182.6205
dec	137.676	2203.952	4433.22	184.7175
YEAR9				
jan	130.2468	2229.268	4482.641	186.7767
feb	144.126	2253.373	4530.96	188.79
mar	205.416	2277.587	4577.486	190.7286
apr	213.888	2299.9	4623.624	192.651
may	224.4204	2323.724	4666.781	194.4492
jun	229.2432	2343.056	4702.205	195.9252
jul	220.2984	2359.148	4733.374	197.2239
aug	223.3032	2374.225	4764.974	198.5406
sep	207.633	2390.749	4804.826	200.2011
oct	223.6884	2414.077	4852.216	202.1757
nov	183.117	2438.139	4901.292	204.2205
dec	153.768	2463.152	4951.62	206.3175
YEAR10				
jan	145.3236	2488.468	5001.041	208.3767
feb	160.65	2512.573	5049.36	210.39
mar	228.744	2536.787	5095.887	212.3286
apr	237.9504	2559.1	5142.024	214.251
may	249.4332	2582.924	5185.181	216.0492
jun	254.5584	2602.256	5220.604	217.5252
jul	244.404	2618.348		
aug	247.5168			
sep	229.9458			
oct	247.5132			
nov	202.449			
dec	169.86			

TABLE OF COMPUTED INDEX BY THE RATIO TO MOVING AVERAGE METHOD

MONTH	INDEX
jan	69.62199
feb	76.13438
mar	107.3403
apr	110.5974
may	114.986
jun	116.7597
jul	111.8009
aug	113.0104
sep	104.2928
oct	111.0811
nov	89.84923
dec	74.52592

TA MOVING AVERAGE METHOD = 20.91166

OUTPUT OF PROGRAM8

THE TREND EQUATION EMPLOYED IS :T = 2.4 + 1.5*I

TABLE OF TREND VALUES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	3.9	5.4	6.9	8.4	9.9	11.4
YR2	21.9	23.4	24.9	26.4	27.9	29.4
YR3	39.9	41.4	42.9	44.4	45.9	47.4
YR4	57.9	59.4	60.9	62.4	63.9	65.4
YR5	75.9	77.4	78.9	80.4	81.9	83.4
YR6	93.9	95.4	96.9	98.4	99.9	101.4
YR7	111.9	113.4	114.9	116.4	117.9	119.4
YR8	129.9	131.4	132.9	134.4	135.9	137.4
YR9	147.9	149.4	150.9	152.4	153.9	155.4
YR10	165.9	167.4	168.9	170.4	171.9	173.4

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	12.9	14.4	15.9	17.4	18.9	20.4
YR2	30.9	32.4	33.9	35.4	36.9	38.4
YR3	48.9	50.4	51.9	53.4	54.9	56.4
YR4	66.9	68.4	69.9	71.4	72.9	74.4
YR5	84.9	86.4	87.9	89.4	90.9	92.4
YR6	102.9	104.4	105.9	107.4	108.9	110.4
YR7	120.9	122.4	123.9	125.4	126.9	128.4
YR8	138.9	140.4	141.9	143.4	144.9	146.4
YR9	156.9	158.4	159.9	161.4	162.9	164.4
YR10	174.9	176.4	177.9	179.4	180.9	182.4

TABLE OF IMPOSED INDEX

MONTH	INDEX
jan	69.8
feb	76.5
mar	108
apr	111.4
may	115.8
jun	117.2
jul	111.6
aug	112.1
sep	103.3
oct	110.3
nov	89.5
dec	74.5

TABLE OF THEORITICAL SERIES I.E TRE*S

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
YR1	2.7222	4.131	7.452	9.357599	11.4642	13.3608	14.3964
YR2	15.2862	17.901	26.892	29.4096	32.3082	34.4568	34.4844
YR3	27.8502	31.671	46.332	49.4616	53.1522	55.5528	54.5724
YR4	40.4142	45.441	65.772	69.5136	73.9962	76.6488	74.6604
YR5	52.9782	59.211	85.212	89.56561	94.8402	97.7448	94.7484
YR6	65.54221	72.981	104.652	109.6176	115.6842	118.8408	114.8364
YR7	78.1062	86.751	124.092	129.6696	136.5282	139.9368	134.9244
YR8	90.6702	100.521	143.532	149.7216	157.3722	161.0328	155.0124
YR9	103.2342	114.291	162.972	169.7736	178.2162	182.1288	175.1004
YR10	115.7982	128.061	182.412	189.8256	199.0602	203.2248	195.1884

	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	MEAN
YR1	16.1424	16.4247	19.1922	16.9155	15.198	146.757	12.22975
YR2	36.3204	35.0187	39.0462	33.0255	28.608	362.757	30.22975
YR3	56.4984	53.6127	58.9002	49.1355	42.018	578.757	48.22975
YR4	76.6764	72.2067	78.7542	65.2455	55.428	794.757	66.22975
YR5	96.8544	90.8007	98.60821	81.3555	68.838	1010.757	84.22976
YR6	117.0324	109.3947	118.4622	97.4655	82.248	1226.757	102.2298
YR7	137.2104	127.9887	138.3162	113.5755	95.658	1442.757	120.2297
YR8	157.3884	146.5827	158.1702	129.6855	109.068	1658.757	138.2298
YR9	177.5664	165.1767	178.0242	145.7955	122.478	1874.757	156.2298
YR10	197.7444	183.7707	197.8782	161.9055	135.888	2090.757	174.2298

TABLE OF PERCENTAGES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	22.25884	33.77829	60.93339	76.51506	93.74027	109.2484
YR2	50.56674	59.2165	88.95872	97.28693	106.8755	113.9831
YR3	57.74486	65.66694	96.06519	102.5541	110.2063	115.1837
YR4	61.02122	68.61116	99.30885	104.9583	111.7265	115.7317
YR5	62.89725	70.29701	101.1661	106.3349	112.597	116.0454
YR6	64.11265	71.3892	102.3694	107.2267	113.161	116.2487
YR7	64.96413	72.15437	103.2124	107.8515	113.5561	116.3912
YR8	65.59383	72.72023	103.8358	108.3136	113.8483	116.4965
YR9	66.07845	73.15572	104.3156	108.6692	114.0732	116.5775
YR10	66.46294	73.50122	104.6962	108.9513	114.2515	116.6418
TOT	581.7009	660.4906	964.8618	1028.662	1104.036	1152.548
MEAN	58.17009	66.04906	96.48618	102.8662	110.4036	115.2548

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	117.7162	131.9929	134.3012	156.9305	138.3144	124.2707
YR2	114.0744	120.1479	115.8419	129.1648	109.2483	94.63525
YR3	113.1509	117.1443	111.1611	122.1242	101.878	87.1205
YR4	112.7294	115.7733	109.0246	118.9106	98.51388	83.69048
YR5	112.488	114.9883	107.8012	117.0705	96.58759	81.72646
YR6	112.3317	114.4798	107.0087	115.8784	95.33965	80.45407
YR7	112.2221	114.1235	106.4535	115.0433	94.4654	79.56268
YR8	112.1411	113.86	106.0428	114.4256	93.8188	78.90341
YR9	112.0788	113.6572	105.7268	113.9503	93.32121	78.39608
YR10	112.0293	113.4963	105.4761	113.5731	92.92643	77.99357
TOT	1130.962	1169.664	1108.838	1217.071	1014.414	866.7532
U	113.0962	116.9664	110.8838	121.7071	101.4414	86.67532

TABLE OF COMPUTED INDEX BY THE AVERAGE PERCENTAGE METHOD

MONTH	INDEX
jan	58.17009
feb	66.04906
mar	96.48618
apr	102.8662
may	110.4036
jun	115.2548
jul	113.0962
aug	116.9664
sep	110.8838
oct	121.7071
nov	101.4414
dec	86.67532

MEAN SQUARED ERROR FOR THE AVERAGE PERCENTAGE METHOD = 82.26396

TABLE OF MOVING TOTALS & 12-MONTH CENTRED MOVING AVERAGE

YEAR & MONTH	DATA	12-MONTH MT	2-MTH MT OF C3	12-MTH CMA
YEAR1				
jan	2.7222			
feb	4.131			
mar	7.452			
apr	9.357599			
may	11.4642			
jun	13.3608			
jul	14.3964	146.757	306.078	12.75325
aug	16.1424	159.321	332.412	13.8505
sep	16.4247	173.091	365.622	15.23425
oct	19.1922	192.531	405.114	16.87975
nov	16.9155	212.583	446.0099	18.58375
dec	15.198	233.427	487.95	20.33125
YEAR2				
jan	15.2862	254.523	529.134	22.04725
feb	17.901	274.611	569.4	23.725
mar	26.892	294.789	608.172	25.3405
apr	29.4096	313.383	646.62	26.9425
may	32.3082	333.237	682.584	28.441
jun	34.4568	349.347	712.104	29.671
jul	34.4844	362.757	738.078	30.75325
aug	36.3204	375.321	764.412	31.8505
sep	35.0187	389.091	797.622	33.23425
oct	39.0462	408.531	837.114	34.87975
nov	33.0255	428.583	878.01	36.58375
dec	28.608	449.427	919.95	38.33125
YEAR3				
jan	27.8502	470.523	961.134	40.04725
feb	31.671	490.611	1001.4	41.725
mar	46.332	510.789	1040.172	43.3405
apr	49.4616	529.383	1078.62	44.9425
may	53.1522	549.237	1114.584	46.441
jun	55.5528	565.347	1144.104	47.671
jul	54.5724	578.757	1170.078	48.75325

aug	56.4984	591.321	1196.412	49.85049
sep	53.6127	605.0909	1229.622	51.23425
oct	58.9002	624.531	1269.114	52.87975
nov	49.1355	644.5831	1310.01	54.58376
dec	42.018	665.4271	1351.95	56.33126
YEAR4				
jan	40.4142	686.5231	1393.134	58.04725
feb	45.441	706.611	1433.4	59.725
mar	65.772	726.789	1472.172	61.3405
apr	69.5136	745.3831	1510.62	62.9425
may	73.9962	765.2371	1546.584	64.441
jun	76.6488	781.347	1576.104	65.671
jul	74.6604	794.757	1602.078	66.75325
aug	76.6764	807.321	1628.412	67.85049
sep	72.2067	821.0909	1661.622	69.23425
oct	78.7542	840.5309	1701.114	70.87975
nov	65.2455	860.5829	1742.01	72.58375
dec	55.428	881.427	1783.95	74.33125
YEAR5				
jan	52.9782	902.5231	1825.134	76.04726
feb	59.211	922.6111	1865.4	77.72501
mar	85.212	942.7891	1904.172	79.34051
apr	89.56561	961.3831	1942.62	80.9425
may	94.8402	981.2371	1978.584	82.441
jun	97.7448	997.347	2008.104	83.67101
jul	94.7484	1010.757	2034.078	84.75326
aug	96.8544	1023.321	2060.412	85.8505
sep	90.8007	1037.091	2093.622	87.23425
oct	98.60821	1056.531	2133.114	88.87976
nov	81.3555	1076.583	2174.01	90.58376
dec	68.838	1097.427	2215.95	92.33126
YEAR6				
jan	65.54221	1118.523	2257.134	94.04725
feb	72.981	1138.611	2297.4	95.725
mar	104.652	1158.789	2336.172	97.34049
apr	109.6176	1177.383	2374.62	98.9425
may	115.6842	1197.237	2410.584	100.441
jun	118.8408	1213.347	2440.104	101.671
jul	114.8364	1226.757	2466.078	102.7533
aug	117.0324	1239.321	2492.412	103.8505
sep	109.3947	1253.091	2525.622	105.2343
oct	118.4622	1272.531	2565.114	106.8798
nov	97.4655	1292.583	2606.01	108.5837
dec	82.248	1313.427	2647.95	110.3312
YEAR7				
jan	78.1062	1334.523	2689.134	112.0472
feb	86.751	1354.611	2729.4	113.725
mar	124.092	1374.789	2768.172	115.3405
apr	129.6696	1393.383	2806.62	116.9425
may	136.5282	1413.237	2842.584	118.441
jun	139.9368	1429.347	2872.104	119.671
jul	134.9244	1442.757	2898.078	120.7532
aug	137.2104	1455.321	2924.412	121.8505
sep	127.9887	1469.091	2957.622	123.2342
oct	138.3162	1488.531	2997.114	124.8797
nov	113.5755	1508.583	3038.01	126.5837
dec	95.658	1529.427	3079.95	128.3313

YEAR8				
jan	90.6702	1550.523	3121.134	130.0473
feb	100.521	1570.611	3161.4	131.725
mar	143.532	1590.789	3200.172	133.3405
apr	149.7216	1609.383	3238.62	134.9425
may	157.3722	1629.237	3274.584	136.441
jun	161.0328	1645.347	3304.104	137.671
jul	155.0124	1658.757	3330.078	138.7533
aug	157.3884	1671.321	3356.412	139.8505
sep	146.5827	1685.091	3389.622	141.2343
oct	158.1702	1704.531	3429.114	142.8798
nov	129.6855	1724.583	3470.01	144.5838
dec	109.068	1745.427	3511.95	146.3312
YEAR9				
jan	103.2342	1766.523	3553.134	148.0472
feb	114.291	1786.611	3593.4	149.725
mar	162.972	1806.789	3632.172	151.3405
apr	169.7736	1825.383	3670.62	152.9425
may	178.2162	1845.237	3706.583	154.441
jun	182.1288	1861.347	3736.104	155.671
jul	175.1004	1874.757	3762.078	156.7533
aug	177.5664	1887.321	3788.412	157.8505
sep	165.1767	1901.091	3821.622	159.2343
oct	178.0242	1920.531	3861.114	160.8798
nov	145.7955	1940.583	3902.01	162.5838
dec	122.478	1961.427	3943.95	164.3313
YEAR10				
jan	115.7982	1982.523	3985.134	166.0472
feb	128.061	2002.611	4025.4	167.725
mar	182.412	2022.789	4064.172	169.3405
apr	189.8256	2041.383	4102.62	170.9425
may	199.0602	2061.237	4138.584	172.441
jun	203.2248	2077.347	4168.104	173.671
jul	195.1884	2090.757		
aug	197.7444			
sep	183.7707			
oct	197.8782			
nov	161.9055			
dec	135.888			

TABLE OF COMPUTED INDEX BY THE RATIO TO MOVING AVERAGE METHOD

MONTH	INDEX
jan	69.57169
feb	76.05262
mar	107.2066
apr	110.4462
may	114.8368
jun	116.6649
jul	111.8367
aug	113.2313
sep	104.5138
oct	111.2297
nov	89.89841
dec	74.5113

ERROR FOR RATIO TO MOVING AVERAGE METHOD = 35.34103

OUTPUT OF PROGRAM9

THE TREND EQUATION EMPLOYED IS :T = 100 - 1.5*I

TABLE OF TREND VALUES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	99.7	99.4	99.1	98.8	98.5	98.2
YR2	96.1	95.8	95.5	95.2	94.9	94.6
YR3	92.5	92.2	91.9	91.6	91.3	91
YR4	88.9	88.6	88.3	88	87.7	87.4
YR5	85.3	85	84.7	84.4	84.1	83.8
YR6	81.7	81.4	81.1	80.8	80.5	80.2
YR7	78.1	77.8	77.5	77.2	76.9	76.6
YR8	74.5	74.2	73.9	73.6	73.3	73
YR9	70.9	70.6	70.3	70	69.7	69.4
YR10	67.3	67	66.7	66.4	66.1	65.8

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	97.9	97.6	97.3	97	96.7	96.4
YR2	94.3	94	93.7	93.4	93.1	92.8
YR3	90.7	90.4	90.1	89.8	89.5	89.2
YR4	87.1	86.8	86.5	86.2	85.9	85.6
YR5	83.5	83.2	82.9	82.6	82.3	82
YR6	79.9	79.6	79.3	79	78.7	78.4
YR7	76.3	76	75.7	75.4	75.1	74.8
YR8	72.7	72.4	72.1	71.8	71.5	71.2
YR9	69.1	68.8	68.5	68.2	67.9	67.6
YR10	65.5	65.2	64.9	64.6	64.3	64

TABLE OF IMPOSED INDEX

MONTH	INDEX
jan	69.8
feb	76.5
mar	108
apr	111.4
may	115.8
jun	117.2
jul	111.6
aug	112.1
sep	103.3
oct	110.3
nov	89.5
dec	74.5

TABLE OF THEORITICAL SERIES I.E TRE*S

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY
YR1	69.5906	76.041	107.028	110.0632	114.063	115.0904	109.2564
YR2	67.0778	73.287	103.14	106.0528	109.8942	110.8712	105.2388
YR3	64.565	70.533	99.252	102.0424	105.7254	106.652	101.2212
YR4	62.0522	67.779	95.36401	98.032	101.5566	102.4328	97.2036
YR5	59.53941	65.025	91.476	94.02161	97.3878	98.2136	93.186
YR6	57.0266	62.271	87.588	90.01121	93.219	93.99439	89.1684
YR7	54.5138	59.517	83.7	86.0008	89.0502	89.77519	85.15079
YR8	52.001	56.763	79.812	81.9904	84.88139	85.556	81.13319
YR9	49.4882	54.009	75.924	77.98	80.7126	81.3368	77.1156
YR10	46.9754	51.255	72.036	73.9696	76.5438	77.11759	73.098

	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER	TOTAL	MEAN
YR1	109.4096	100.5109	106.991	86.54649	71.818	1176.409	98.03405
YR2	105.374	96.7921	103.0202	83.3245	69.136	1133.209	94.43405
YR3	101.3384	93.0733	99.04941	80.1025	66.45399	1090.009	90.83405
YR4	97.3028	89.3545	95.0786	76.8805	63.772	1046.809	87.23406
YR5	93.2672	85.6357	91.1078	73.6585	61.09	1003.609	83.63406
YR6	89.2316	81.9169	87.137	70.4365	58.408	960.4086	80.03405
YR7	85.196	78.1981	83.16621	67.2145	55.726	917.2086	76.43405
YR8	81.1604	74.4793	79.1954	63.9925	53.044	874.0086	72.83405
YR9	77.12479	70.76051	75.2246	60.7705	50.362	830.8087	69.23405
YR10	73.0892	67.0417	71.2538	57.5485	47.68	787.6085	65.63404

TABLE OF PERCENTAGES

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
YR1	70.98615	77.56591	109.1743	112.2704	116.3504	117.3984
YR2	71.03137	77.60654	109.2191	112.3036	116.3714	117.4059
YR3	71.08018	77.6504	109.2674	112.3394	116.394	117.4141
YR4	71.133	77.69786	109.3197	112.3781	116.4185	117.4229
YR5	71.19038	77.74943	109.3765	112.4202	116.4452	117.4325
YR6	71.25292	77.80563	109.4384	112.4661	116.4742	117.443
YR7	71.32136	77.86713	109.5062	112.5163	116.5059	117.4544
YR8	71.39655	77.93469	109.5806	112.5715	116.5408	117.467
YR9	71.47957	78.0093	109.6628	112.6324	116.5793	117.4809
YR10	71.5717	78.0921	109.754	112.7001	116.6221	117.4963
TOT	712.4432	777.9789	1094.299	1124.598	1164.702	1174.416
MEAN	71.24432	77.7979	109.4299	112.4598	116.4702	117.4416

	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
YR1	111.4474	111.6037	102.5265	109.1366	88.28207	73.25822
YR2	111.4416	111.5847	102.497	109.0922	88.23565	73.21088
YR3	111.4353	111.5643	102.4652	109.0444	88.18555	73.15979
YR4	111.4285	111.5422	102.4307	108.9925	88.13129	73.10447
YR5	111.4211	111.5182	102.3933	108.9362	88.07238	73.0444
YR6	111.4131	111.492	102.3526	108.8749	88.00816	72.97894
YR7	111.4043	111.4634	102.3079	108.8078	87.9379	72.9073
YR8	111.3946	111.4319	102.2589	108.734	87.86069	72.82857
YR9	111.3839	111.3972	102.2048	108.6526	87.77544	72.74166
YR10	111.3721	111.3587	102.1447	108.5623	87.68087	72.64523
TOT	1114.142	1114.957	1023.582	1088.833	880.17	729.8794
U	111.4142	111.4957	102.3582	108.8833	88.01701	72.98794

TABLE OF COMPUTED INDEX BY THE AVERAGE PERCENTAGE METHOD

MONTH	INDEX
jan	71.24432
feb	77.7979
mar	109.4299
apr	112.4598
may	116.4702
jun	117.4416
jul	111.4142
aug	111.4957
sep	102.3582
oct	108.8834
nov	88.01701
dec	72.98795

MEAN SQUARED ERROR FOR THE AVERAGE PERCENTAGE METHOD = 1.268767

TABLE OF MOVING TOTALS & 12-MONTH CENTRED MOVING AVERAGE

YEAR & MONTH	DATA	12-MONTH MT	2-MTH MT OF C3	12-MTH CMA
YEAR1				
jan	69.5906			
feb	76.041			
mar	107.028			
apr	110.0632			
may	114.063			
jun	115.0904			
jul	109.2564	1176.409	2350.304	97.92934
aug	109.4096	1173.896	2345.038	97.7099
sep	100.5109	1171.142	2338.396	97.43316
oct	106.991	1167.254	2330.497	97.10406
nov	86.54649	1163.243	2322.318	96.76324
dec	71.818	1159.075	2313.93	96.41376
YEAR2				
jan	67.0778	1154.855	2305.693	96.07056
feb	73.287	1150.838	2297.64	95.73501
mar	103.14	1146.802	2289.886	95.4119
apr	106.0528	1143.083	2282.196	95.09151
may	109.8942	1139.113	2275.003	94.79181
jun	110.8712	1135.891	2269.099	94.5458
jul	105.2388	1133.209	2263.904	94.32935
aug	105.374	1130.696	2258.638	94.1099
sep	96.7921	1127.942	2251.996	93.83315
oct	103.0202	1124.054	2244.097	93.50405
nov	83.3245	1120.043	2235.918	93.16325
dec	69.136	1115.875	2227.53	92.81376
YEAR3				
jan	64.565	1111.656	2219.293	92.47056
feb	70.533	1107.638	2211.24	92.135
mar	99.252	1103.602	2203.485	91.81189
apr	102.0424	1099.883	2195.796	91.49149
may	105.7254	1095.912	2188.603	91.1918
jun	106.652	1092.691	2182.699	90.9458
jul	101.2212	1090.009	2177.504	90.72935

aug	101.3384	1087.496	2172.238	90.50991
sep	93.0733	1084.742	2165.595	90.23315
oct	99.04941	1080.854	2157.697	89.90405
nov	80.1025	1076.843	2149.518	89.56326
dec	66.45399	1072.675	2141.13	89.21375
YEAR4				
jan	62.0522	1068.455	2132.893	88.87054
feb	67.779	1064.438	2124.84	88.535
mar	95.36401	1060.402	2117.086	88.21191
apr	98.032	1056.683	2109.396	87.8915
may	101.5566	1052.713	2102.203	87.5918
jun	102.4328	1049.491	2096.299	87.3458
jul	97.2036	1046.809	2091.104	87.12936
aug	97.3028	1044.296	2085.837	86.90989
sep	89.3545	1041.542	2079.196	86.63315
oct	95.0786	1037.654	2071.297	86.30405
nov	76.8805	1033.643	2063.118	85.96326
dec	63.772	1029.475	2054.73	85.61375
YEAR5				
jan	59.53941	1025.255	2046.493	85.27056
feb	65.025	1021.238	2038.44	84.93501
mar	91.476	1017.202	2030.686	84.6119
apr	94.02161	1013.483	2022.996	84.2915
may	97.3878	1009.513	2015.803	83.9918
jun	98.2136	1006.291	2009.899	83.7458
jul	93.186	1003.609	2004.704	83.52935
aug	93.2672	1001.096	1999.438	83.3099
sep	85.6357	998.3418	1992.796	83.03315
oct	91.1078	994.4539	1984.897	82.70406
nov	73.6585	990.4435	1976.718	82.36326
dec	61.09	986.2747	1968.33	82.01376
YEAR6				
jan	57.0266	982.0554	1960.093	81.67056
feb	62.271	978.0378	1952.04	81.335
mar	87.588	974.0022	1944.286	81.01189
apr	90.01121	970.2833	1936.596	80.6915
may	93.219	966.3126	1929.403	80.3918
jun	93.99439	963.0906	1923.499	80.14581
jul	89.1684	960.4086	1918.304	79.92935
aug	89.2316	957.8959	1913.038	79.70991
sep	81.9169	955.1418	1906.396	79.43316
oct	87.137	951.2538	1898.497	79.10406
nov	70.4365	947.2434	1890.318	78.76325
dec	58.408	943.0746	1881.93	78.41375
YEAR7				
jan	54.5138	938.8554	1873.693	78.07055
feb	59.517	934.8378	1865.64	77.73499
mar	83.7	930.8022	1857.886	77.4119
apr	86.0008	927.0834	1850.196	77.0915
may	89.0502	923.1126	1843.003	76.7918
jun	89.77519	919.8906	1837.099	76.5458
jul	85.15079	917.2086	1831.904	76.32935
aug	85.196	914.6958	1826.638	76.1099
sep	78.1981	911.9418	1819.996	75.83315
oct	83.16621	908.0538	1812.097	75.50405
nov	67.2145	904.0434	1803.918	75.16325
dec	55.726	899.8746	1795.53	74.81375

YEAR8				
jan	52.001	895.6554	1787.293	74.47055
feb	56.763	891.6378	1779.24	74.135
mar	79.812	887.6022	1771.486	73.8119
apr	81.9904	883.8834	1763.796	73.49149
may	84.88139	879.9126	1756.603	73.1918
jun	85.556	876.6906	1750.699	72.9458
jul	81.13319	874.0086	1745.504	72.72935
aug	81.1604	871.4958	1740.238	72.5099
sep	74.4793	868.7418	1733.595	72.23315
oct	79.1954	864.8538	1725.697	71.90405
nov	63.9925	860.8434	1717.518	71.56325
dec	53.044	856.6746	1709.13	71.21375
YEAR9				
jan	49.4882	852.4553	1700.893	70.87054
feb	54.009	848.4377	1692.84	70.535
mar	75.924	844.4022	1685.086	70.2119
apr	77.98	840.6834	1677.396	69.8915
may	80.7126	836.7126	1670.203	69.5918
jun	81.3368	833.4906	1664.299	69.3458
jul	77.1156	830.8087	1659.104	69.12936
aug	77.12479	828.2958	1653.838	68.9099
sep	70.76051	825.5418	1647.196	68.63315
oct	75.2246	821.6538	1639.297	68.30405
nov	60.7705	817.6434	1631.118	67.96325
dec	50.362	813.4746	1622.73	67.61375
YEAR10				
jan	46.9754	809.2554	1614.493	67.27055
feb	51.255	805.2379	1606.44	66.93501
mar	72.036	801.2023	1598.686	66.6119
apr	73.9696	797.4833	1590.996	66.2915
may	76.5438	793.5125	1583.803	65.9918
jun	77.11759	790.2906	1577.899	65.7458
jul	73.098	787.6085		
aug	73.0892			
sep	67.0417			
oct	71.2538			
nov	57.5485			
dec	47.68			

TABLE OF COMPUTED INDEX BY THE RATIO TO MOVING AVERAGE METHOD

MONTH	INDEX
jan	69.82455
feb	76.56089
mar	108.1175
apr	111.5503
may	115.9564
jun	117.2787
jul	111.5587
aug	111.9487
sep	103.1308
oct	110.1579
nov	89.42914
dec	74.48631

I SQUARED ERROR FOR RATIO TO MOVING AVERAGE METHOD = .5321693

E MSE1\MSE2 RATIO TO MOVING AVERAGE ESTIMATES THE