AUTOMATIC FORECASTING SYSTEMS
HATBORO PA 19040
215-675-0652
VERSION: 11/30/2010 13:47 AFS RULES
072 AluPE_Total AUTOBOX.EXE

Time=13:51:15

Date=11/30/2010

MODEL IDENTIFICATION

Analysis of Original Data

```
     THE MAXIMUM NUMBER OF OBSERVATIONS
1000
     THE MAXIMUM NUMBER OF SERIES ALLOWED
30
     THE SERIAL NUMBER IS:
10001
     THE PRODUCT NUMBER IS:
6
```

AUTOBOX 6.01000 30 ABP10001 2 USER 2 10001

```
 AUTOCORRELATION OF DEPENDENT SERIES.
AluPE_Total


     VALUE  RATIO  -1         0         +1
VALUE  RATIO  -1         0         +1

   1   .416   3.06         {  ***}*
.416   3.06         {  ***}*
   2   .384   2.43         {  ***}*
.255   1.87         {  ***}
   3   .327   1.87         {  ***}
.131    .97         {  ** }
   4   .188   1.01         {  *** }
-.052   -.38         {  **  }
```

```
   5   .152    .81        {    *** }
-.012   -.09         {   *   }
   6   .167    .88        {    *** }
.075    .55         {   ** }
   7  -.017   -.09        {    *    }
-.163  -1.20         {***   }
   8   .096    .50        {    **   }
.099    .73         {   ** }
   9   .244   1.26        {    *** }
.281   2.07         {   ***}
  10   .073    .37        {    **   }
-.098   -.72         {  **   }
  11   .144    .72        {    **   }
-.010   -.07         {   *   }
  12   .276   1.36        {    ****}
.234   1.72         {   ***}
  13   .074    .35        {    **   }
-.136  -1.00         {  **   }
  14   .182    .87        {    *** }
.002    .01         {   *   }
  15  -.086   -.40        {   **    }
-.329  -2.42         {***   }
  16  -.163   -.76        {  ***    }
-.074   -.54         {  **   }
  17  -.130   -.60        {   **    }
-.032   -.24         {   *   }
  18  -.071   -.33        {   **    }
.058    .42         {   ** }
  19  -.150   -.69        {  ***    }
.088    .65         {   ** }
```

```
  20  -.070   -.32        {  **   }
-.036   -.27         {  *  }
  21  -.077   -.35        {  **   }
-.060   -.44         { **  }
  22  -.051   -.23        {  **   }
.021    .15          {  *  }
  23   .079    .36        {   **  }
.058    .43          {  ** }
  24  -.050   -.23        {  **   }
-.079   -.58         { **  }
```

A HISTOGRAM OF THE PREDICTAND: AluPE_Total

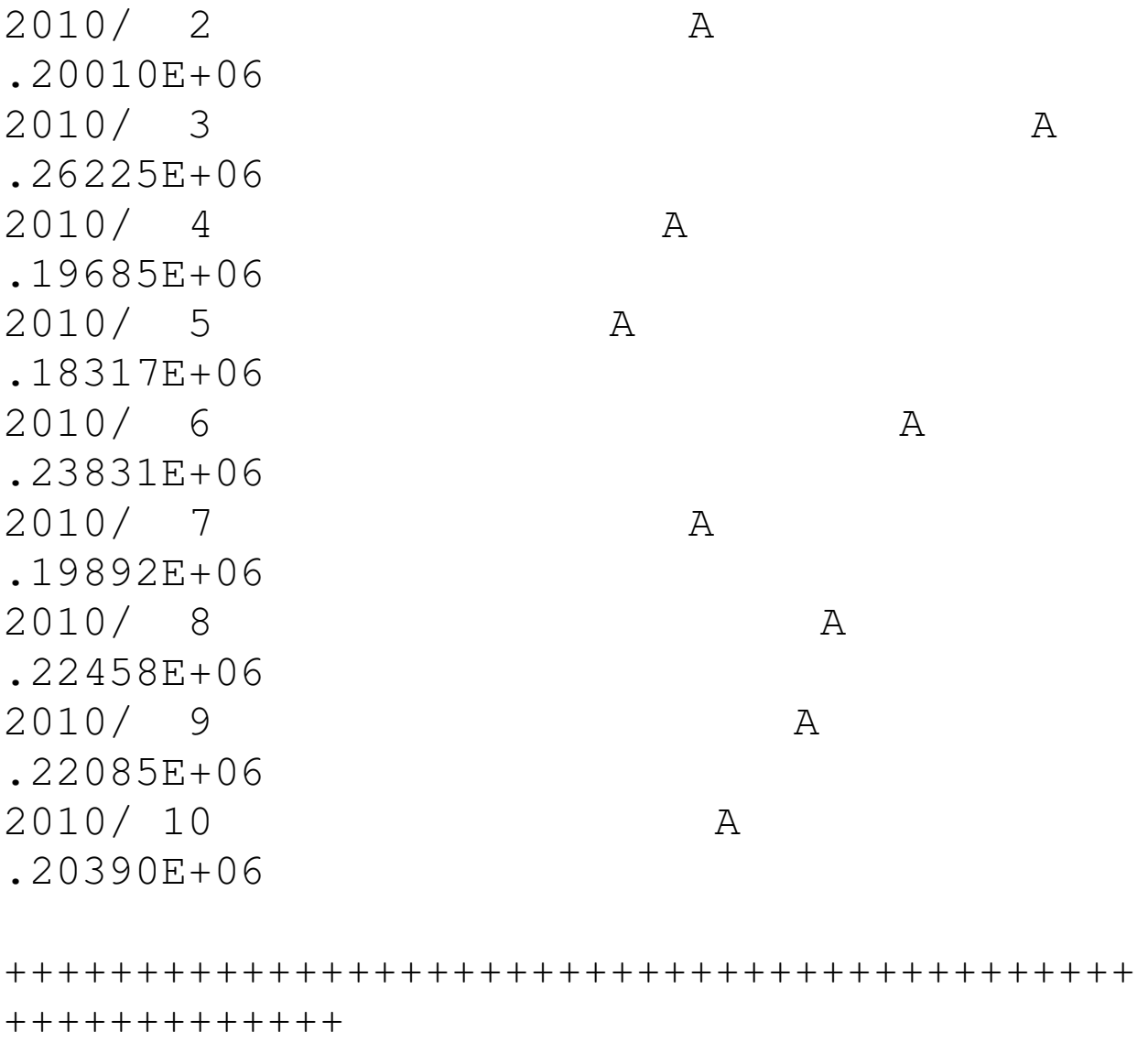
```
     LOWER        UPPER  CUM-PCT #

    .117E+06      .142E+06   .04     2.
IIII
    .142E+06      .166E+06   .09     3.
IIIIIIII
    .166E+06      .190E+06   .20     6.
IIIIIIIIIIIIIIIIIII
    .190E+06      .215E+06   .35     8.
IIIIIIIIIIIIIIIIIIIIIIIIIII
```

```
    .215E+06       .239E+06   .50      8.
IIIIIIIIIIIIIIIIIIIIIIIIIIIIII
    .239E+06       .264E+06   .72     12.
IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
III
    .264E+06       .288E+06   .87      8.
IIIIIIIIIIIIIIIIIIIIIIIIIIIIII
    .288E+06       .313E+06   .93      3.
IIIIIIII
    .313E+06       .337E+06   .94      1.
    .337E+06       .361E+06   .96      1.
    .361E+06       .386E+06  1.00      2.
IIII


 THE AVERAGE IS =           235862.093
 THE MEDIAN  IS =           374957.000
 THE STD DEV IS =            56781.661
 THE MINIMUM IS =           117229.000
 THE MAXIMUM IS =           385753.000
 THE # OF OBS   =               54


 GRAPH KEY

      .11723E+06
.38575E+06
  DATE
++++++++++++++++++++++++++++++++++++++++++++++
+++++++++++++
```

2006/ 5   A
.27097E+06
2006/ 6
A   .32573E+06
2006/ 7
A   .30908E+06
2006/ 8
A   .28988E+06
2006/ 9   A
.23908E+06
2006/ 10
A   .28542E+06
2006/ 11   A
.24411E+06
2006/ 12   A
.20110E+06
2007/ 1   A
.21570E+06
2007/ 2   A
.26720E+06
2007/ 3   A
.25985E+06
2007/ 4   A
.21080E+06
2007/ 5
A   .28359E+06
2007/ 6   A
.25758E+06
2007/ 7
A   .35565E+06

2007/ 8   A
.27499E+06
2007/ 9   A
.24686E+06
2007/ 10   A
.25185E+06
2007/ 11   A
.25155E+06
2007/ 12   A
.15382E+06
2008/ 1   A
.26893E+06
2008/ 2   A
.25907E+06
2008/ 3   A
.25620E+06
2008/ 4
A .38575E+06
2008/ 5
A   .29671E+06
2008/ 6   A
.24119E+06
2008/ 7
A   .37496E+06
2008/ 8   A
.26571E+06
2008/ 9
A   .28099E+06
2008/ 10   A
.19173E+06

```
2008/ 11                          A
.22298E+06
2008/ 12 A
.11723E+06
2009/  1                                A
.24451E+06
2009/  2              A
.17629E+06
2009/  3            A
.16736E+06
2009/  4                        A
.21735E+06
2009/  5            A
.16544E+06
2009/  6                   A
.19349E+06
2009/  7               A
.17967E+06
2009/  8             A
.16893E+06
2009/  9                                A
.24540E+06
2009/ 10                             A
.23410E+06
2009/ 11               A
.17520E+06
2009/ 12  A
.12257E+06
2010/  1           A
.16109E+06
```



AUTOCORRELATION OF DEPENDENT SERIES.
AluPE_Total

```
     VALUE  RATIO  -1         0         +1
VALUE  RATIO  -1         0         +1

   1   .416   3.06         {   ***}*
.416   3.06         {   ***}*
   2   .384   2.43         {   ***}*
.255   1.87         {   ***}
   3   .327   1.87         {   ***}
.131    .97         {   ** }
   4   .188   1.01         {   *** }
-.052   -.38         {  **  }
   5   .152    .81         {   *** }
-.012   -.09         {   *  }
   6   .167    .88         {   *** }
.075    .55         {   ** }
   7  -.017   -.09         {   *   }
-.163  -1.20         {***   }
   8   .096    .50         {   **  }
.099    .73         {   ** }
   9   .244   1.26         {   *** }
.281   2.07         {   ***}
  10   .073    .37         {   **  }
-.098   -.72         {  **  }
  11   .144    .72         {   **  }
-.010   -.07         {   *  }
  12   .276   1.36         {   ****}
.234   1.72         {   ***}
  13   .074    .35         {   **  }
-.136  -1.00         {  **  }
```

```
  14   .182    .87        {   *** }
.002    .01          {  *  }
  15  -.086   -.40        {  **   }
-.329  -2.42         {***  }
  16  -.163   -.76        { ***   }
-.074   -.54          { **  }
  17  -.130   -.60        {  **   }
-.032   -.24          {  *  }
  18  -.071   -.33        {  **   }
.058    .42          {  ** }
  19  -.150   -.69        { ***   }
.088    .65          {  ** }
  20  -.070   -.32        {  **   }
-.036   -.27          {  *  }
  21  -.077   -.35        {  **   }
-.060   -.44          { **  }
  22  -.051   -.23        {  **   }
.021    .15          {  *  }
  23   .079    .36        {   **  }
.058    .43          {  ** }
  24  -.050   -.23        {  **   }
-.079   -.58          { **  }
```

To do science is to search for repeated patterns.
To detect anomalies is to identify values that do not follow repeated patterns.

For whoever knows the ways of Nature will more easily notice her deviations and, on the other hand, whoever knows her deviations will more accurately describe her ways.

One learns the rules by observing when the current rules fail.

AUTOBOX WILL ANSWER THE FOLLOWING QUESTION

Can you tell me the probability that a single data point (e.g. the latest reading) came from the distribution represented by all the previous data points?

A discussion of the history of time series. Early models much like the Holt-Winters models that include "fixed effects" (seasonal dummies and a trend) ignored autoprojective(ie memory) structure. These models did not incorporate level shifts and assumed one and only one trend and actually ignored outliers (ie pulse and seasonal pulses).

The work of Box-Jenkins essentially discarded the idea of depending on fixed effects and focused on how to use memory (previous values) to create an adequate model. In these ARIMA models, there was no provision for a mean that may have changed level other than for the user to introduce a pre-specified dummy variable.

In practice, both approaches are possible solutions and one has to evaluate alternative model structures before making a decision about optimality. The series we are going to be analyzing has structure that would suggest that fixed effects play a dominant role. The consistent low December effect suggests false Autoprojective structure at lag 12. The shift in level does not suggest a trend, but rather a deterministic structure called a "level shift".

The work of Box-Jenkins was extended in the early 1980's to explictly identify the need for seasonal dummies providing then a clue to the deficiency of a pure memory based approach. The science of modeling then grew to provide this insight.

At this point AUTOBOX has tried and compared two different approaches:

MEMORY IE autoprojective models where previous values are used to predict "future values"

And then Interventions are identified and incorporated as needed

INTERVENTION variables i.e. Seasonal Pulses , Level Shifts , Pulses , Local Time Trends

Are identified (see swiss.ppt for details) and then memory is added to the model as needed.

In this case the second approach was found by experimentation (tournament) to be the better choice.

```
AUTOMATIC MODELLING IS PROCEEDING WITHOUT
ANY PRE-SUGGESTED MODEL.
MODEL STAGE:   7     3EST    2
MODEL STATISTICS AND EQUATION FOR THE
CURRENT EQUATION (DETAILS FOLLOW).

Estimation/Diagnostic Checking for Variable
Y    AluPE_Total
                :  NEWLY IDENTIFIED VARIABLE
X1   I~L00030 2008/ 10    LEVEL
```

: NEWLY IDENTIFIED VARIABLE
X2 I~S00008 2006/ 12 SEASP

In this case strategy 2 was found to be the BEST STRATEGY. So, AUTOBOX incorporated two predictor variables into the model.

A LEVEL SHIFT AT TIME PERIOD 30 thus X1 = 0 FROM I=1,19 AND X1 = 1 FOR PERIOD 30 THROUGH 58.

A SEASONAL PULSE AT TIME PERIOD 8 thus X2 = 0 AND X2 = 1 FOR 2006/12 , 2007/12 , 2008/12 , 2009/12

Following is the statistical characteristics of the residuals (54 in number) from the simple OLS model

Number of Residuals (R)	=n	54
Number of Degrees of Freedom	=n-m	51
Residual Mean	=Sum R / n	.188213E-06
Sum of Squares	=Sum R**2	.678839E+11

```
 Variance                          =SOS/(n)
.186952E+15
 Adjusted Variance                 =SOS/(n-m)
.133106E+10
 Standard Deviation RMSE           =SQRT(Adj
Var)             36483.6
 Standard Error of the Mean        =Standard
Dev/ (n-m)       5108.73
 Mean / its Standard Error         =Mean/SEM
.368413E-10
 Mean Absolute Deviation
=Sum(ABS(R))/n              27189.0
 AIC Value ( Uses var )            =nln  +2m
1137.41
 SBC Value ( Uses var )            =nln
+m*lnn                 1143.38
 BIC Value ( Uses var )            =see Wei
p153                949.910
 R Square                          =
.602740
 Durbin-Watson Statistic           =[-A(T-
1)]**2/A**2          2.17724

     D-W STATISTIC SUGGESTS NO SIGNIFICANT
AUTOCORRELATION for lag1.

 THE DURBIN-WATSON STATISTIC IS VALID ONLY
FOR MODELS THAT HAVE A WHITE NOISE
 ERROR TERM AND NO LAGS OF THE Y SERIES.
OTHERWISE IT IS INVALID.
 IN THIS CASE THE TEST IS VALID.
```

We now present this initial model. Tests of necessity (t-value)are always presented.

THE INITIAL MODEL

	MODEL COMPONENT		LAG	
COEFF	STANDARD	P	T	
#			(BOP)	
ERROR	VALUE	VALUE		
1	CONSTANT			
.276E+06	.671E+04	.0000	41.17	
INPUT SERIES X1	I~L00030	2008/ 10		
LEVEL				
2	Omega (input) -Factor #	1	0	-
.723E+05	.968E+04	.0000	-7.47	
INPUT SERIES X2	I~S00008	2006/ 12		
SEASP				
3	Omega (input) -Factor #	2	0	-
.913E+05	.184E+05	.0000	-4.95	

MODEL STAGE: 16   4EST   3
MODEL STATISTICS AND EQUATION FOR THE CURRENT EQUATION (DETAILS FOLLOW).

Estimation/Diagnostic Checking for Variable Y   AluPE_Total
                : NEWLY IDENTIFIED VARIABLE
X1   I~L00030 2008/ 10   LEVEL
                : NEWLY IDENTIFIED VARIABLE
X2   I~S00008 2006/ 12   SEASP

Number of Residuals (R)	=n	54
Number of Degrees of Freedom	=n-m	51
Residual Mean	=Sum R / n	.191270E-06
Sum of Squares	=Sum R**2	.678839E+11
Variance	=SOS/(n)	.186952E+15
Adjusted Variance	=SOS/(n-m)	.133106E+10
Standard Deviation RMSE	=SQRT(Adj Var)	36483.6

```
 Standard Error of the Mean     =Standard
Dev/ (n-m)      5108.73
 Mean / its Standard Error      =Mean/SEM
.374398E-10
 Mean Absolute Deviation
=Sum(ABS(R))/n            27189.0
 AIC Value ( Uses var )         =nln  +2m
1137.41
 SBC Value ( Uses var )         =nln
+m*lnn              1143.38
 BIC Value ( Uses var )         =see Wei
p153             949.910
 R Square                       =
.602740
 Durbin-Watson Statistic        =[-A(T-
1)]**2/A**2        2.17724

     D-W STATISTIC SUGGESTS NO SIGNIFICANT
AUTOCORRELATION for lag1.

 THE DURBIN-WATSON STATISTIC IS VALID ONLY
FOR MODELS THAT HAVE A WHITE NOISE
 ERROR TERM AND NO LAGS OF THE Y SERIES.
OTHERWISE IT IS INVALID.
 IN THIS CASE THE TEST IS VALID.
```

THE INITIAL MODEL

```
           MODEL COMPONENT          LAG
COEFF      STANDARD       P         T
  #                                 (BOP)
ERROR       VALUE    VALUE

    1CONSTANT
.276E+06    .671E+04    .0000     41.17

  INPUT SERIES X1   I~L00030 2008/ 10
LEVEL

    2Omega (input) -Factor #  1     0   -
.723E+05    .968E+04    .0000     -7.47

  INPUT SERIES X2   I~S00008 2006/ 12
SEASP

    3Omega (input) -Factor #  2     0   -
.913E+05    .184E+05    .0000     -4.95


MODEL STAGE:   1    1 DIAG
```

DIAGNOSTIC CHECKING which addresses the SUFFICIENCY (COMPLETENESS) OF THE MODEL

The residuals appear to be free of significant auto-correlative structure

LAG	ACF	STND. ERROR	T-RATIO	CHI-SQUARE & PROBABILITY	PACF VALUE	STND. ERROR	T-RATIO
1	-.089	.136	-.65	.5 NA	-.089	.136	-.65
2	-.012	.137	-.09	.5 NA	-.020	.136	-.15
3	.136	.137	.99	1.6 NA	.134	.136	.99
4	-.155	.140	-1.11	3.0 .0826	-.135	.136	-.99
5	.011	.143	.08	3.0 .2207	-.009	.136	-.07
6	.010	.143	.07	3.0 .3873	-.010	.136	-.07
7	-.209	.143	-1.46	5.8 .2110	-.180	.136	-1.32
8	-.051	.148	-.34	6.0 .3047	-.108	.136	-.79
9	.253	.149	1.70	10.3 .1114	.260	.136	1.91
10	-.237	.157	-1.51	14.2 .0481	-.183	.136	-1.35

	11	.036	.163	.22	14.3
.0750	-.031	.136	-.23		
	12	.010	.163	.06	14.3
.1129	-.057	.136	-.42		
	13	-.173	.163	-1.06	16.5
.0865	-.086	.136	-.64		
	14	.117	.167	.70	17.5
.0934	.002	.136	.01		
	15	-.242	.168	-1.44	22.1
.0367	-.282	.136	-2.07		
	16	-.103	.174	-.59	22.9
.0427	-.043	.136	-.32		
	17	.109	.176	.62	23.9
.0472	.031	.136	.22		
	18	-.064	.177	-.36	24.2
.0613	-.134	.136	-.98		
	19	-.092	.177	-.52	25.0
.0706	-.104	.136	-.76		
	20	.028	.178	.16	25.0
.0941	-.122	.136	-.90		
	21	-.015	.178	-.08	25.0
.1236	-.019	.136	-.14		
	22	-.042	.178	-.23	25.2
.1537	-.142	.136	-1.05		
	23	.224	.178	1.26	30.1
.0679	.056	.136	.41		
	24	-.138	.184	-.75	32.1
.0578	-.020	.136	-.15		

AUTOBOX WILL NOW ANALYZE THE RESIDUALS IN ORDER TO ASSESS THE SUFFICIENCY AND TO DETERMINE POSSIBLE MODEL IMPROVEMENTS.

DIAGNOSTIC CHECK #2: THE SUFFICIENCY TEST

DIAGNOSTIC CHECK #2: THE SUFFICIENCY TEST

The Critical Value used for this test : 1.00

For the NOISE model :
ACF lags that are significant 9, 10,

WE WILL RE-EXAMINE THE NEED TO AUGMENT THE MODEL WITH PULSE INTERVENTIONS(A).

An analysis of the residuals from this model suggest an unusual value at period 24 (2008/4)

AUTOBOX remedies this by adding a third dummy predictor variable

X3=0 for period 1 to 58 and a 1 for period 24

```
MODEL STAGE: 451     5EST    4
MODEL STATISTICS AND EQUATION FOR THE
CURRENT EQUATION (DETAILS FOLLOW).

Estimation/Diagnostic Checking for Variable
Y    AluPE_Total
                :  NEWLY IDENTIFIED VARIABLE
X1   I~L00030 2008/ 10    LEVEL
                :  NEWLY IDENTIFIED VARIABLE
X2   I~S00008 2006/ 12    SEASP
                :  NEWLY IDENTIFIED VARIABLE
X3   I~P00024 2008/  4    PULSE



 Number of Residuals (R)          =n
54
 Number of Degrees of Freedom    =n-m
50
 Residual Mean                    =Sum R / n
-.115159
 Sum of Squares                   =Sum R**2
.554135E+11
```

```
 Variance                          =SOS/(n)
.149616E+15
 Adjusted Variance                 =SOS/(n-m)
.110827E+10
 Standard Deviation RMSE           =SQRT(Adj
Var)            33290.7
 Standard Error of the Mean        =Standard
Dev/ (n-m)      4708.01
 Mean / its Standard Error         =Mean/SEM
-.244602E-04
 Mean Absolute Deviation
=Sum(ABS(R))/n             24583.7
 AIC Value ( Uses var )            =nln  +2m
1128.45
 SBC Value ( Uses var )            =nln
+m*lnn               1136.41
 BIC Value ( Uses var )            =see Wei
p153              959.771
 R Square                          =
.675718
 Durbin-Watson Statistic           =[-A(T-
1)]**2/A**2        2.22970

     D-W STATISTIC SUGGESTS NO SIGNIFICANT
AUTOCORRELATION for lag1.

 THE DURBIN-WATSON STATISTIC IS VALID ONLY
FOR MODELS THAT HAVE A WHITE NOISE
 ERROR TERM AND NO LAGS OF THE Y SERIES.
OTHERWISE IT IS INVALID.
 IN THIS CASE THE TEST IS VALID.
```

An analysis of the residuals from this model suggest an unusual value at period 24 (2008/4)

AUTOBOX remedies this by adding a third dummy predictor variable

X3=0 for period 1 to 58 and a 1 for period 24

AUTOMATICALLY REVISING MODEL

	MODEL COMPONENT		LAG
COEFF	STANDARD	P	T
#			(BOP)
ERROR	VALUE	VALUE	
1CONSTANT			
.272E+06	.617E+04	.0000	44.09

INPUT SERIES X1 I~L00030 2008/ 10
LEVEL

```
    2Omega (input) -Factor #  1    0  -
.684E+05   .882E+04   .0000    -7.76

  INPUT SERIES X2  I~S00008 2006/ 12
SEASP

    3Omega (input) -Factor #  2    0  -
.891E+05   .167E+05   .0000    -5.35

  INPUT SERIES X3  I~P00024 2008/  4
PULSE

    4Omega (input) -Factor #  3    0
.114E+06   .326E+05   .0010     3.49


   6.757175289683226E-001           4
```

An analysis of the residuals from this model suggest an unusual value at period 27 (2008/7)

AUTOBOX remedies this by adding a third dummy predictor variable

X3=0 for period 1 to 58 and a 1 for period 24

```
MODEL STAGE: 452     6EST    5
```

MODEL STATISTICS AND EQUATION FOR THE CURRENT EQUATION (DETAILS FOLLOW).

Estimation/Diagnostic Checking for Variable Y AluPE_Total

: NEWLY IDENTIFIED VARIABLE
X1 I~L00030 2008/ 10 LEVEL
: NEWLY IDENTIFIED VARIABLE
X2 I~S00008 2006/ 12 SEASP
: NEWLY IDENTIFIED VARIABLE
X3 I~P00024 2008/ 4 PULSE
: NEWLY IDENTIFIED VARIABLE
X4 I~P00027 2008/ 7 PULSE

Number of Residuals (R)	=n	54
Number of Degrees of Freedom	=n-m	49
Residual Mean	=Sum R / n	-.117867
Sum of Squares	=Sum R**2	.444114E+11
Variance	=SOS/(n)	.117512E+15
Adjusted Variance	=SOS/(n-m)	.906355E+09
Standard Deviation RMSE	=SQRT(Adj Var)	30105.7

```
 Standard Error of the Mean     =Standard
Dev/ (n-m)      4300.82
 Mean / its Standard Error      =Mean/SEM
-.274058E-04
 Mean Absolute Deviation
=Sum(ABS(R))/n            22223.4
 AIC Value ( Uses var )         =nln  +2m
1118.50
 SBC Value ( Uses var )         =nln
+m*lnn              1128.44
 BIC Value ( Uses var )         =see Wei
p153             968.504
 R Square                       =
.740102
 Durbin-Watson Statistic        =[-A(T-
1)]**2/A**2        2.12270

     D-W STATISTIC SUGGESTS NO SIGNIFICANT
AUTOCORRELATION for lag1.

 THE DURBIN-WATSON STATISTIC IS VALID ONLY
FOR MODELS THAT HAVE A WHITE NOISE
 ERROR TERM AND NO LAGS OF THE Y SERIES.
OTHERWISE IT IS INVALID.
 IN THIS CASE THE TEST IS VALID.
```

AUTOMATICALLY REVISING MODEL

	MODEL COMPONENT		LAG	
COEFF #	STANDARD ERROR	P VALUE	T (BOP) VALUE	
1	CONSTANT			
.268E+06	.563E+04	.0000	47.62	
INPUT SERIES X1	I~L00030 2008/ 10			LEVEL
2	Omega (input) -Factor # 1		0	-
.646E+05	.796E+04	.0000	-8.12	
INPUT SERIES X2	I~S00008 2006/ 12			SEASP
3	Omega (input) -Factor # 2		0	-
.871E+05	.149E+05	.0000	-5.83	
INPUT SERIES X3	I~P00024 2008/ 4			PULSE
4	Omega (input) -Factor # 3		0	
.118E+06	.292E+05	.0002	4.03	

INPUT SERIES X4 I~P00027 2008/ 7
PULSE

5Omega (input) -Factor # 4 0
.107E+06 .292E+05 .0006 3.66

7.401024710381385E-001 5

An analysis of the residuals from this model suggest an unusual value at period 15 (2007/7)

AUTOBOX remedies this by adding a third dummy predictor variable

X3=0 for period 1 to 58 and a 1 for period 15

MODEL STAGE: 453 7EST 6
MODEL STATISTICS AND EQUATION FOR THE CURRENT EQUATION (DETAILS FOLLOW).

Estimation/Diagnostic Checking for Variable Y AluPE_Total
: NEWLY IDENTIFIED VARIABLE
X1 I~L00030 2008/ 10 LEVEL
: NEWLY IDENTIFIED VARIABLE
X2 I~S00008 2006/ 12 SEASP

```
                :  NEWLY IDENTIFIED VARIABLE
X3    I~P00024 2008/  4    PULSE
                :  NEWLY IDENTIFIED VARIABLE
X4    I~P00027 2008/  7    PULSE
                :  NEWLY IDENTIFIED VARIABLE
X5    I~P00015 2007/  7    PULSE



 Number of Residuals (R)          =n
54
 Number of Degrees of Freedom    =n-m
48
 Residual Mean                    =Sum R / n
-.109652
 Sum of Squares                   =Sum R**2
.364330E+11
 Variance                         =SOS/(n)
.944344E+14
 Adjusted Variance                =SOS/(n-m)
.759021E+09
 Standard Deviation RMSE          =SQRT(Adj
Var)             27550.3
 Standard Error of the Mean       =Standard
Dev/ (n-m)       3976.55
 Mean / its Standard Error        =Mean/SEM
-.275747E-04
 Mean Absolute Deviation
=Sum(ABS(R))/n              20442.5
```

```
 AIC Value ( Uses var )          =nln  +2m
1109.81
 SBC Value ( Uses var )          =nln
+m*lnn              1121.74
 BIC Value ( Uses var )          =see Wei
p153             975.600
 R Square                        =
.786792
 Durbin-Watson Statistic         =[-A(T-
1)]**2/A**2         2.14364

     D-W STATISTIC SUGGESTS NO SIGNIFICANT
AUTOCORRELATION for lag1.

 THE DURBIN-WATSON STATISTIC IS VALID ONLY
FOR MODELS THAT HAVE A WHITE NOISE
 ERROR TERM AND NO LAGS OF THE Y SERIES.
OTHERWISE IT IS INVALID.
 IN THIS CASE THE TEST IS VALID.
```

AUTOMATICALLY REVISING MODEL

	MODEL COMPONENT		LAG		
COEFF	STANDARD	P	T		
#			(BOP)		
ERROR	VALUE	VALUE			
1	CONSTANT				
.265E+06	.520E+04	.0000	50.88		
INPUT SERIES X1	I~L00030	2008/ 10	LEVEL		
2	Omega (input) -Factor #	1	0	-	
.612E+05	.728E+04	.0000	-8.42		
INPUT SERIES X2	I~S00008	2006/ 12	SEASP		
3	Omega (input) -Factor #	2	0	-	
.853E+05	.135E+05	.0000	-6.30		
INPUT SERIES X3	I~P00024	2008/ 4	PULSE		
4	Omega (input) -Factor #	3	0		
.121E+06	.265E+05	.0000	4.58		
INPUT SERIES X4	I~P00027	2008/ 7	PULSE		
5	Omega (input) -Factor #	4	0		
.110E+06	.265E+05	.0001	4.17		

```
  INPUT SERIES X5  I~P00015 2007/  7
PULSE

    6Omega (input) -Factor #  5    0
.911E+05   .265E+05   .0012     3.44


   7.867922044996182E-001           6
MODEL STAGE:  77     8EST    7
MODEL STATISTICS AND EQUATION FOR THE
CURRENT EQUATION (DETAILS FOLLOW).

Estimation/Diagnostic Checking for Variable
Y    AluPE_Total
                :  NEWLY IDENTIFIED VARIABLE
X1   I~L00030 2008/ 10    LEVEL
                :  NEWLY IDENTIFIED VARIABLE
X2   I~S00008 2006/ 12    SEASP
                :  NEWLY IDENTIFIED VARIABLE
X3   I~P00024 2008/  4    PULSE
                :  NEWLY IDENTIFIED VARIABLE
X4   I~P00027 2008/  7    PULSE
                :  NEWLY IDENTIFIED VARIABLE
X5   I~P00015 2007/  7    PULSE



 Number of Residuals (R)         =n
54
```

Number of Degrees of Freedom	=n-m	48
Residual Mean	=Sum R / n	-.377255E-02
Sum of Squares	=Sum R**2	.364330E+11
Variance	=SOS/(n)	.944344E+14
Adjusted Variance	=SOS/(n-m)	.759021E+09
Standard Deviation RMSE	=SQRT(Adj Var)	27550.3
Standard Error of the Mean	=Standard Dev/ (n-m)	3976.55
Mean / its Standard Error	=Mean/SEM	-.948700E-06
Mean Absolute Deviation	=Sum(ABS(R))/n	20442.5
AIC Value (Uses var)	=nln +2m	1109.81
SBC Value (Uses var)	=nln +m*lnn	1121.74
BIC Value (Uses var)	=see Wei p153	975.600
R Square	=	.786792
Durbin-Watson Statistic	=[-A(T-1)]**2/A**2	2.14364

D-W STATISTIC SUGGESTS NO SIGNIFICANT AUTOCORRELATION for lag1.

THE DURBIN-WATSON STATISTIC IS VALID ONLY FOR MODELS THAT HAVE A WHITE NOISE
ERROR TERM AND NO LAGS OF THE Y SERIES.
OTHERWISE IT IS INVALID.
IN THIS CASE THE TEST IS VALID.

AUTOMATICALLY REVISING MODEL

	MODEL COMPONENT		LAG	
COEFF #	STANDARD ERROR	P VALUE	T (BOP) VALUE	
1	CONSTANT			
.265E+06	.520E+04	.0000	50.88	
INPUT SERIES X1	I~L00030 2008/ 10			
LEVEL				
2	Omega (input) -Factor #	1	0	-
.612E+05	.728E+04	.0000	-8.42	

```
  INPUT SERIES X2  I~S00008 2006/ 12
SEASP

    3Omega (input) -Factor #  2    0  -
.853E+05   .135E+05   .0000    -6.30

  INPUT SERIES X3  I~P00024 2008/  4
PULSE

    4Omega (input) -Factor #  3    0
.121E+06   .265E+05   .0000     4.58

  INPUT SERIES X4  I~P00027 2008/  7
PULSE

    5Omega (input) -Factor #  4    0
.110E+06   .265E+05   .0001     4.17

  INPUT SERIES X5  I~P00015 2007/  7
PULSE

    6Omega (input) -Factor #  5    0
.911E+05   .265E+05   .0012     3.44


MODEL STAGE:   7     9EST    8
MODEL STATISTICS AND EQUATION FOR THE
CURRENT EQUATION (DETAILS FOLLOW).

Estimation/Diagnostic Checking for Variable
Y    AluPE_Total
```

```
                :  NEWLY IDENTIFIED VARIABLE
X1    I~L00030 2008/ 10    LEVEL
                :  NEWLY IDENTIFIED VARIABLE
X2    I~S00008 2006/ 12    SEASP
                :  NEWLY IDENTIFIED VARIABLE
X3    I~P00024 2008/  4    PULSE
                :  NEWLY IDENTIFIED VARIABLE
X4    I~P00027 2008/  7    PULSE
                :  NEWLY IDENTIFIED VARIABLE
X5    I~P00015 2007/  7    PULSE



 Number of Residuals (R)         =n
54
 Number of Degrees of Freedom   =n-m
48
 Residual Mean                   =Sum R / n
.178768E-02
 Sum of Squares                  =Sum R**2
.364330E+11
 Variance                        =SOS/(n)
.944344E+14
 Adjusted Variance               =SOS/(n-m)
.759021E+09
 Standard Deviation RMSE         =SQRT(Adj
Var)            27550.3
 Standard Error of the Mean      =Standard
Dev/ (n-m)      3976.55
```

```
 Mean / its Standard Error      =Mean/SEM
.449557E-06
 Mean Absolute Deviation
=Sum(ABS(R))/n            20442.5
 AIC Value ( Uses var )         =nln  +2m
1109.81
 SBC Value ( Uses var )         =nln
+m*lnn              1121.74
 BIC Value ( Uses var )         =see Wei
p153             975.600
 R Square                       =
.786792
 Durbin-Watson Statistic        =[-A(T-
1)]**2/A**2        2.14364

     D-W STATISTIC SUGGESTS NO SIGNIFICANT
AUTOCORRELATION for lag1.

 THE DURBIN-WATSON STATISTIC IS VALID ONLY
FOR MODELS THAT HAVE A WHITE NOISE
 ERROR TERM AND NO LAGS OF THE Y SERIES.
OTHERWISE IT IS INVALID.
 IN THIS CASE THE TEST IS VALID.
```

AUTOMATICALLY REVISING MODEL

	MODEL COMPONENT		LAG		
COEFF	STANDARD	P	T		
#			(BOP)		
ERROR	VALUE	VALUE			
1	CONSTANT				
.265E+06	.520E+04	.0000	50.88		
INPUT SERIES X1	I~L00030	2008/ 10			
LEVEL					
2	Omega (input) -Factor #	1	0	-	
.612E+05	.728E+04	.0000	-8.42		
INPUT SERIES X2	I~S00008	2006/ 12			
SEASP					
3	Omega (input) -Factor #	2	0	-	
.853E+05	.135E+05	.0000	-6.30		
INPUT SERIES X3	I~P00024	2008/ 4			
PULSE					
4	Omega (input) -Factor #	3	0		
.121E+06	.265E+05	.0000	4.58		
INPUT SERIES X4	I~P00027	2008/ 7			
PULSE					

```
    5Omega (input) -Factor #  4    0
.110E+06   .265E+05   .0001     4.17

  INPUT SERIES X5  I~P00015 2007/  7
PULSE

    6Omega (input) -Factor #  5    0
.911E+05   .265E+05   .0012     3.44


MODEL STAGE:  16    10EST    9
MODEL STATISTICS AND EQUATION FOR THE
CURRENT EQUATION (DETAILS FOLLOW).

Estimation/Diagnostic Checking for Variable
Y    AluPE_Total
                :  NEWLY IDENTIFIED VARIABLE
X1   I~L00030 2008/ 10    LEVEL
                :  NEWLY IDENTIFIED VARIABLE
X2   I~S00008 2006/ 12    SEASP
                :  NEWLY IDENTIFIED VARIABLE
X3   I~P00024 2008/  4    PULSE
                :  NEWLY IDENTIFIED VARIABLE
X4   I~P00027 2008/  7    PULSE
                :  NEWLY IDENTIFIED VARIABLE
X5   I~P00015 2007/  7    PULSE
```

Number of Residuals (R)	=n	54
Number of Degrees of Freedom	=n-m	48
Residual Mean	=Sum R / n	.615042E-04
Sum of Squares	=Sum R**2	.364330E+11
Variance	=SOS/(n)	.944344E+14
Adjusted Variance	=SOS/(n-m)	.759021E+09
Standard Deviation RMSE	=SQRT(Adj Var)	27550.3
Standard Error of the Mean	=Standard Dev/ (n-m)	3976.55
Mean / its Standard Error	=Mean/SEM	.154667E-07
Mean Absolute Deviation	=Sum(ABS(R))/n	20442.5
AIC Value (Uses var)	=nln +2m	1109.81
SBC Value (Uses var)	=nln +m*lnn	1121.74
BIC Value (Uses var)	=see Wei p153	975.600
R Square	=	.786792
Durbin-Watson Statistic	=[-A(T-1)]**2/A**2	2.14364

D-W STATISTIC SUGGESTS NO SIGNIFICANT AUTOCORRELATION for lag1.

THE DURBIN-WATSON STATISTIC IS VALID ONLY FOR MODELS THAT HAVE A WHITE NOISE
ERROR TERM AND NO LAGS OF THE Y SERIES.
OTHERWISE IT IS INVALID.
IN THIS CASE THE TEST IS VALID.

AUTOMATICALLY REVISING MODEL

	MODEL COMPONENT		LAG	
COEFF	STANDARD	P	T	
#			(BOP)	
ERROR	VALUE	VALUE		
1	CONSTANT			
.265E+06	.520E+04	.0000	50.88	

INPUT SERIES X1 I~L00030 2008/ 10
LEVEL

2Omega (input) -Factor # 1 0 -
.612E+05 .728E+04 .0000 -8.42

INPUT SERIES X2 I~S00008 2006/ 12
SEASP

3Omega (input) -Factor # 2 0 -
.853E+05 .135E+05 .0000 -6.30

INPUT SERIES X3 I~P00024 2008/ 4
PULSE

4Omega (input) -Factor # 3 0
.121E+06 .265E+05 .0000 4.58

INPUT SERIES X4 I~P00027 2008/ 7
PULSE

5Omega (input) -Factor # 4 0
.110E+06 .265E+05 .0001 4.17

INPUT SERIES X5 I~P00015 2007/ 7
PULSE

6Omega (input) -Factor # 5 0
.911E+05 .265E+05 .0012 3.44

MODEL STAGE: 2 2 DIAG

DIAGNOSTIC CHECKING which addresses the SUFFICIENCY (COMPLETENESS) OF THE MODEL

The residuals appear to be free of significant auto-correlative structure

LAG	ACF	STND. ERROR	T-RATIO	CHI-SQUARE & PROBABILITY	PACF VALUE	STND. ERROR	T-RATIO
1	-.072	.136	-.53	.3 NA	-.072	.136	-.53
2	.012	.137	.09	.3 NA	.007	.136	.05
3	.114	.137	.84	1.1 NA	.116	.136	.86
4	-.150	.139	-1.08	2.4 NA	-.136	.136	-1.00
5	.105	.142	.74	3.1 NA	.086	.136	.63
6	.074	.143	.52	3.5 NA	.079	.136	.58
7	-.289	.144	-2.01	8.9 .0029	-.267	.136	-1.96
8	.085	.154	.55	9.3 .0094	.022	.136	.16

	9	-.006	.155	-.04	9.3
.0251	.029	.136	.21		
	10	-.151	.155	-.97	10.9
.0276	-.112	.136	-.83		
	11	.140	.158	.89	12.3
.0310	.048	.136	.36		
	12	-.106	.160	-.66	13.1
.0415	-.033	.136	-.24		
	13	-.141	.161	-.87	14.6
.0420	-.128	.136	-.94		
	14	.068	.164	.42	14.9
.0608	-.059	.136	-.44		
	15	-.097	.164	-.59	15.6
.0747	-.007	.136	-.05		
	16	-.124	.165	-.75	16.9
.0775	-.159	.136	-1.17		
	17	.081	.167	.49	17.4
.0966	-.015	.136	-.11		
	18	-.075	.168	-.45	17.9
.1196	.044	.136	.33		
	19	.050	.168	.30	18.1
.1541	.005	.136	.04		
	20	-.025	.168	-.15	18.1
.2002	-.145	.136	-1.06		
	21	-.039	.169	-.23	18.3
.2481	.042	.136	.31		
	22	.040	.169	.24	18.4
.2989	-.011	.136	-.08		
	23	.151	.169	.89	20.6
.2425	.082	.136	.60		

```
       24   -.238    .171   -1.39     26.3
.0922   -.247    .136   -1.81
```

AUTOBOX WILL NOW ANALYZE THE RESIDUALS IN ORDER TO ASSESS THE SUFFICIENCY AND TO DETERMINE POSSIBLE MODEL IMPROVEMENTS.

DIAGNOSTIC CHECK #2: THE SUFFICIENCY TEST

DIAGNOSTIC CHECK #2: THE SUFFICIENCY TEST

The Critical Value used for this test : 1.00

For the NOISE model :
ACF lags that are significant 7,

MODEL STAGE: 31 11EST 1001
MODEL STATISTICS AND EQUATION FOR THE CURRENT EQUATION (DETAILS FOLLOW).

```
Estimation/Diagnostic Checking for Variable
Y    AluPE_Total
                :  NEWLY IDENTIFIED VARIABLE
X1   I~L00030 2008/ 10    LEVEL
                :  NEWLY IDENTIFIED VARIABLE
X2   I~S00008 2006/ 12    SEASP
                :  NEWLY IDENTIFIED VARIABLE
X3   I~P00024 2008/  4    PULSE
                :  NEWLY IDENTIFIED VARIABLE
X4   I~P00027 2008/  7    PULSE
                :  NEWLY IDENTIFIED VARIABLE
X5   I~P00015 2007/  7    PULSE



 Number of Residuals (R)         =n
54
 Number of Degrees of Freedom   =n-m
48
 Residual Mean                   =Sum R / n
.215257E-05
 Sum of Squares                  =Sum R**2
.364330E+11
 Variance                        =SOS/(n)
.944344E+14
 Adjusted Variance               =SOS/(n-m)
.759021E+09
 Standard Deviation RMSE         =SQRT(Adj
Var)           27550.3
```

```
 Standard Error of the Mean     =Standard
Dev/ (n-m)      3976.55
 Mean / its Standard Error      =Mean/SEM
.541316E-09
 Mean Absolute Deviation
=Sum(ABS(R))/n            20442.5
 AIC Value ( Uses var )         =nln  +2m
1109.81
 SBC Value ( Uses var )         =nln
+m*lnn              1121.74
 BIC Value ( Uses var )         =see Wei
p153             975.600
 R Square                       =
.786792
 Durbin-Watson Statistic        =[-A(T-
1)]**2/A**2        2.14364

     D-W STATISTIC SUGGESTS NO SIGNIFICANT
AUTOCORRELATION for lag1.

 THE DURBIN-WATSON STATISTIC IS VALID ONLY
FOR MODELS THAT HAVE A WHITE NOISE
 ERROR TERM AND NO LAGS OF THE Y SERIES.
OTHERWISE IT IS INVALID.
 IN THIS CASE THE TEST IS VALID.
```

AUTOMATICALLY REVISING MODEL

```
          MODEL COMPONENT        LAG
COEFF     STANDARD      P        T
  #                              (BOP)
ERROR      VALUE    VALUE

    1CONSTANT
.265E+06   .520E+04   .0000    50.88

  INPUT SERIES X1  I~L00030 2008/ 10
LEVEL

    2Omega (input) -Factor #  1    0  -
.612E+05   .728E+04   .0000    -8.42

  INPUT SERIES X2  I~S00008 2006/ 12
SEASP

    3Omega (input) -Factor #  2    0  -
.853E+05   .135E+05   .0000    -6.30

  INPUT SERIES X3  I~P00024 2008/  4
PULSE

    4Omega (input) -Factor #  3    0
.121E+06   .265E+05   .0000     4.58
```

INPUT SERIES X4 I~P00027 2008/ 7
PULSE

5Omega (input) -Factor # 4 0
.110E+06 .265E+05 .0001 4.17

INPUT SERIES X5 I~P00015 2007/ 7
PULSE

6Omega (input) -Factor # 5 0
.911E+05 .265E+05 .0012 3.44

MODEL STAGE: 3 3 DIAG

LAG	ACF VALUE	STND. ERROR	T-RATIO	CHI-SQUARE & PROBABILITY	PACF VALUE	STND. ERROR	T-RATIO
1	-.072	.136	-.53	.3 NA	-.072	.136	-.53
2	.012	.137	.09	.3 NA	.007	.136	.05
3	.114	.137	.84	1.1 NA	.116	.136	.86
4	-.150	.139	-1.08	2.4 NA	-.136	.136	-1.00

	5	.105	.142	.74	3.1			
NA		.086	.136	.63				
	6	.074	.143	.52	3.5			
NA		.079	.136	.58				
	7	-.289	.144	-2.01	8.9			
.0029		-.267	.136	-1.96				
	8	.085	.154	.55	9.3			
.0094		.022	.136	.16				
	9	-.006	.155	-.04	9.3			
.0251		.029	.136	.21				
	10	-.151	.155	-.97	10.9			
.0276		-.112	.136	-.83				
	11	.140	.158	.89	12.3			
.0310		.048	.136	.36				
	12	-.106	.160	-.66	13.1			
.0415		-.033	.136	-.24				
	13	-.141	.161	-.87	14.6			
.0420		-.128	.136	-.94				
	14	.068	.164	.42	14.9			
.0608		-.059	.136	-.44				
	15	-.097	.164	-.59	15.6			
.0747		-.007	.136	-.05				
	16	-.124	.165	-.75	16.9			
.0775		-.159	.136	-1.17				
	17	.081	.167	.49	17.4			
.0966		-.015	.136	-.11				
	18	-.075	.168	-.45	17.9			
.1196		.044	.136	.33				
	19	.050	.168	.30	18.1			
.1541		.005	.136	.04				

```
       20   -.025    .168    -.15     18.1
.2002   -.145    .136   -1.06
       21   -.039    .169    -.23     18.3
.2481    .042    .136     .31
       22    .040    .169     .24     18.4
.2989   -.011    .136    -.08
       23    .151    .169     .89     20.6
.2425    .082    .136     .60
       24   -.238    .171   -1.39     26.3
.0922   -.247    .136   -1.81
```

AUTOBOX WILL NOW ANALYZE THE RESIDUALS IN ORDER TO ASSESS THE SUFFICIENCY AND TO DETERMINE POSSIBLE MODEL IMPROVEMENTS.

DIAGNOSTIC CHECK #2: THE SUFFICIENCY TEST

The Critical Value used for this test : 1.00

For the NOISE model :
ACF lags that are significant 7,

AUTOMATICALLY REVISING MODEL

MODEL COMPONENT		LAG		
COEFF #	STANDARD ERROR	P VALUE	T (BOP) VALUE	
1CONSTANT	.265E+06	.520E+04	.0000	50.88
INPUT SERIES X1 LEVEL	I~L00030 2008/ 10			
2Omega (input) -Factor #	1	0	-.612E+05	.728E+04
INPUT SERIES X2 SEASP	I~S00008 2006/ 12			
3Omega (input) -Factor #	2	0	-.853E+05	.135E+05
INPUT SERIES X3 PULSE	I~P00024 2008/ 4			
4Omega (input) -Factor #	3	0	.121E+06	.265E+05
INPUT SERIES X4 PULSE	I~P00027 2008/ 7			

```
    5Omega (input) -Factor #  4    0
.110E+06   .265E+05   .0001     4.17

  INPUT SERIES X5  I~P00015 2007/  7
PULSE

    6Omega (input) -Factor #  5    0
.911E+05   .265E+05   .0012     3.44


Y(T) =  .26456E+06
       +[X1(T)][(-  61245.    )]
       +[X2(T)][(-  85252.    )]
       +[X3(T)][(+  .12120E+06)]
       +[X4(T)][(+  .11040E+06)]
       +[X5(T)][(+  91093.    )]
      +       [A(T)]


      LAG   ACF    STND.     T-    CHI-
SQUARE &    PACF    STND.     T-
           VALUE   ERROR   RATIO
PROBABILITY     VALUE   ERROR   RATIO

        1   -.072    .136    -.53       .3
NA     -.072    .136    -.53
        2    .012    .137     .09       .3
NA      .007    .136     .05
        3    .114    .137     .84      1.1
NA      .116    .136     .86
```

	4	-.150	.139	-1.08	2.4	NA	-.136	.136	-1.00	
	5	.105	.142	.74	3.1	NA	.086	.136	.63	
	6	.074	.143	.52	3.5	NA	.079	.136	.58	
	7	-.289	.144	-2.01	8.9	.0029	-.267	.136	-1.96	
	8	.085	.154	.55	9.3	.0094	.022	.136	.16	
	9	-.006	.155	-.04	9.3	.0251	.029	.136	.21	
	10	-.151	.155	-.97	10.9	.0276	-.112	.136	-.83	
	11	.140	.158	.89	12.3	.0310	.048	.136	.36	
	12	-.106	.160	-.66	13.1	.0415	-.033	.136	-.24	
	13	-.141	.161	-.87	14.6	.0420	-.128	.136	-.94	
	14	.068	.164	.42	14.9	.0608	-.059	.136	-.44	
	15	-.097	.164	-.59	15.6	.0747	-.007	.136	-.05	
	16	-.124	.165	-.75	16.9	.0775	-.159	.136	-1.17	
	17	.081	.167	.49	17.4	.0966	-.015	.136	-.11	
	18	-.075	.168	-.45	17.9	.1196	.044	.136	.33	

```
       19    .050    .168     .30     18.1
.1541    .005    .136     .04
       20   -.025    .168    -.15     18.1
.2002   -.145    .136   -1.06
       21   -.039    .169    -.23     18.3
.2481    .042    .136     .31
       22    .040    .169     .24     18.4
.2989   -.011    .136    -.08
       23    .151    .169     .89     20.6
.2425    .082    .136     .60
       24   -.238    .171   -1.39     26.3
.0922   -.247    .136   -1.81
```

```
     VALUE  RATIO  -1         0         +1
VALUE  RATIO  -1         0         +1

   1  -.072   -.53           {*}
-.072   -.53           {*}
   2   .012    .09           {*}
.007    .05           {*}
   3   .114    .84           {*}
.116    .86           {*}
   4  -.150  -1.08          *{*}
-.136  -1.00           {*}
   5   .105    .74           {*}
.086    .63           {*}
   6   .074    .52           {*}
.079    .58           {*}
```

```
   7  -.289  -2.01          **{*}
-.267  -1.96          **{*}
   8   .085    .55           { **}
.022    .16            {*}
   9  -.006   -.04           { * }
.029    .21            {*}
  10  -.151   -.97           {** }
-.112   -.83            {*}
  11   .140    .89           { **}
.048    .36            {*}
  12  -.106   -.66           {** }
-.033   -.24            {*}
  13  -.141   -.87           {** }
-.128   -.94            {*}
  14   .068    .42           { **}
-.059   -.44            {*}
  15  -.097   -.59           {** }
-.007   -.05            {*}
  16  -.124   -.75           {** }
-.159  -1.17          *{*}
  17   .081    .49           { **}
-.015   -.11            {*}
  18  -.075   -.45           {** }
.044    .33            {*}
  19   .050    .30           { **}
.005    .04            {*}
  20  -.025   -.15           { * }
-.145  -1.06            {*}
  21  -.039   -.23           { * }
.042    .31            {*}
```

```
  22    .040     .24          { * }
-.011   -.08          {*}
  23    .151     .89          { **}
.082     .60          {*}
  24   -.238   -1.39          {** }
-.247   -1.81          *{*}
```

DIAGNOSTIC CHECKING which addresses the SUFFICIENCY (COMPLETENESS) OF THE MODEL

The residuals appear to be free of significant auto-correlative structure

A HISTOGRAM OF THE MODEL RESIDUALS

```
      LOWER          UPPER   CUM-PCT #

   -.538E+05      -.433E+05    .04      2.
   -.433E+05      -.329E+05    .11      4.
IIIIIIIIIII
   -.329E+05      -.224E+05    .22      6.
IIIIIIIIIIIIIIIIIIIII
   -.224E+05      -.120E+05    .31      5.
IIIIIIIIIIIIIII
```

```
   -.120E+05     -.152E+04   .48     9.
IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
   -.152E+04      .893E+04   .67    10.
IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII
III
    .893E+04      .194E+05   .76     5.
IIIIIIIIIIIIIIII
    .194E+05      .298E+05   .85     5.
IIIIIIIIIIIIIIII
    .298E+05      .403E+05   .91     3.
IIIIII
    .403E+05      .507E+05   .96     3.
IIIIII
    .507E+05      .612E+05  1.00     2.


 THE AVERAGE IS =                .000
 THE MEDIAN  IS =                .000
 THE MINIMUM IS =          -53758.512
 THE MAXIMUM IS =           61175.488
 THE # OF OBS   =              54


 PLOT OF THE FINAL MODEL RESIDUALS
 GRAPH KEY

     -53759.
61175.
  DATE
++++++++++++++++++++++++++++++++++++++++++++
++++++++++++
```

2006/ 5   A
6410.5
2006/ 6
A 61175.
2006/ 7
A   44521.
2006/ 8
A   25328.
2006/ 9   A
-25474.
2006/ 10
A   20866.
2006/ 11   A
-20446.
2006/ 12
A   21800.
2007/ 1   A
-48856.
2007/ 2   A
2647.5
2007/ 3   A
-4705.5
2007/ 4 A
-53759.
2007/ 5
A   19032.
2007/ 6   A
-6971.5
2007/ 7   A
-.10418E-06

2007/ 8   A
10432.
2007/ 9   A
-17697.
2007/ 10   A
-12708.
2007/ 11   A
-13010.
2007/ 12   A
-25482.
2008/ 1   A
4370.5
2008/ 2   A
-5490.5
2008/ 3   A
-8355.5
2008/ 4   A
-.10418E-06
2008/ 5
A   32153.
2008/ 6   A
-23370.
2008/ 7   A
-.10418E-06
2008/ 8   A
1150.5
2008/ 9
A   16431.
2008/ 10   A
-11576.

2008/ 11
A 19666.
2008/ 12 A
-829.64
2009/ 1
A 41201.
2009/ 2 A
-27019.
2009/ 3 A
-35955.
2009/ 4 A
14037.
2009/ 5 A
-37870.
2009/ 6 A
-9818.3
2009/ 7 A
-23636.
2009/ 8 A
-34378.
2009/ 9
A 42091.
2009/ 10
A 30786.
2009/ 11 A
-28109.
2009/ 12 A
4511.4
2010/ 1 A
-42222.

```
2010/  2                                A
-3214.3
2010/  3
A   58939.
2010/  4                              A
-6463.3
2010/  5                     A
-20145.
2010/  6
A                35003.
2010/  7                               A
-4389.3
2010/  8
A                       21270.
2010/  9
A                         17538.
2010/ 10                                  A
587.71

++++++++++++++++++++++++++++++++++++++++++++
++++++++++++
```

DIAGNOSTIC CHECKING which addresses the SUFFICIENCY (COMPLETENESS) OF THE MODEL

The residuals appear to be free of significant auto-correlative structure

FINAL FITTED VALUES

WE ARE FINISHED MODELLING AND NOW REPORT THE FITTED VALUES AND RESIDUALS

TIME (T)	DATE	H-WEIGHTS TO STABILIZE	ACTUAL OBSERVATION	FORECAST(FIT)	RESIDUAL ERROR	%
1	2006/ 5	1.00000	.27097E+06	.26456E+06	.641E+04	2.37
2	2006/ 6	1.00000	.32573E+06	.26456E+06	.612E+05	18.78
3	2006/ 7	1.00000	.30908E+06	.26456E+06	.445E+05	14.40
4	2006/ 8	1.00000	.28988E+06	.26456E+06	.253E+05	8.74
5	2006/ 9	1.00000	.23908E+06	.26456E+06	-.255E+05	-10.65
6	2006/ 10	1.00000	.28542E+06	.26456E+06	.209E+05	7.31
7	2006/ 11	1.00000	.24411E+06	.26456E+06	-.204E+05	-8.38
8	2006/ 12	1.00000	.20110E+06	.17930E+06	.218E+05	10.84
9	2007/ 1	1.00000	.21570E+06	.26456E+06	-.489E+05	-22.65
10	2007/ 2	1.00000	.26720E+06	.26456E+06	.265E+04	.99

```
    11  2007/  3  1.00000        .25985E+06
.26456E+06  -.471E+04    -1.81
    12  2007/  4  1.00000        .21080E+06
.26456E+06  -.538E+05   -25.50
    13  2007/  5  1.00000        .28359E+06
.26456E+06   .190E+05     6.71
    14  2007/  6  1.00000        .25758E+06
.26456E+06  -.697E+04    -2.71
    15  2007/  7  1.00000        .35565E+06
.35565E+06  -.104E-06      .00
    16  2007/  8  1.00000        .27499E+06
.26456E+06   .104E+05     3.79
    17  2007/  9  1.00000        .24686E+06
.26456E+06  -.177E+05    -7.17
    18  2007/ 10  1.00000        .25185E+06
.26456E+06  -.127E+05    -5.05
    19  2007/ 11  1.00000        .25155E+06
.26456E+06  -.130E+05    -5.17
    20  2007/ 12  1.00000        .15382E+06
.17930E+06  -.255E+05   -16.57
    21  2008/  1  1.00000        .26893E+06
.26456E+06   .437E+04     1.63
    22  2008/  2  1.00000        .25907E+06
.26456E+06  -.549E+04    -2.12
    23  2008/  3  1.00000        .25620E+06
.26456E+06  -.836E+04    -3.26
    24  2008/  4  1.00000        .38575E+06
.38575E+06  -.104E-06      .00
    25  2008/  5  1.00000        .29671E+06
.26456E+06   .322E+05    10.84
```

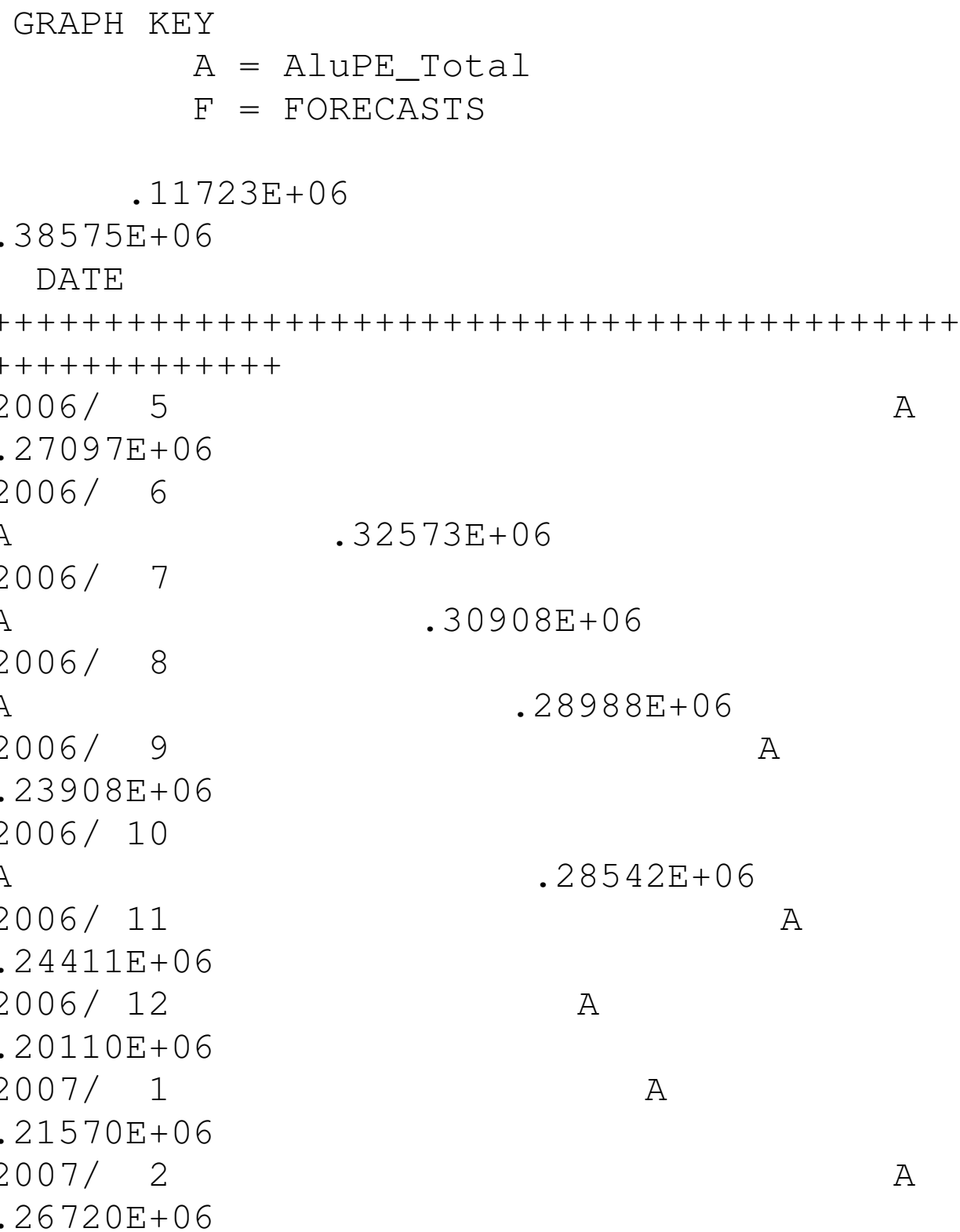
```
    26  2008/  6  1.00000        .24119E+06
.26456E+06  -.234E+05    -9.69
    27  2008/  7  1.00000        .37496E+06
.37496E+06  -.104E-06       .00
    28  2008/  8  1.00000        .26571E+06
.26456E+06   .115E+04       .43
    29  2008/  9  1.00000        .28099E+06
.26456E+06   .164E+05     5.85
    30  2008/ 10  1.00000        .19173E+06
.20331E+06  -.116E+05    -6.04
    31  2008/ 11  1.00000        .22298E+06
.20331E+06   .197E+05     8.82
    32  2008/ 12  1.00000        .11723E+06
.11806E+06  -830.           -.71
    33  2009/  1  1.00000        .24451E+06
.20331E+06   .412E+05    16.85
    34  2009/  2  1.00000        .17629E+06
.20331E+06  -.270E+05   -15.33
    35  2009/  3  1.00000        .16736E+06
.20331E+06  -.360E+05   -21.48
    36  2009/  4  1.00000        .21735E+06
.20331E+06   .140E+05     6.46
    37  2009/  5  1.00000        .16544E+06
.20331E+06  -.379E+05   -22.89
    38  2009/  6  1.00000        .19349E+06
.20331E+06  -.982E+04    -5.07
    39  2009/  7  1.00000        .17967E+06
.20331E+06  -.236E+05   -13.16
    40  2009/  8  1.00000        .16893E+06
.20331E+06  -.344E+05   -20.35
```

```
    41  2009/  9  1.00000        .24540E+06
.20331E+06   .421E+05    17.15
    42  2009/ 10  1.00000        .23410E+06
.20331E+06   .308E+05    13.15
    43  2009/ 11  1.00000        .17520E+06
.20331E+06  -.281E+05   -16.04
    44  2009/ 12  1.00000        .12257E+06
.11806E+06   .451E+04     3.68
    45  2010/  1  1.00000        .16109E+06
.20331E+06  -.422E+05   -26.21
    46  2010/  2  1.00000        .20010E+06
.20331E+06  -.321E+04    -1.61
    47  2010/  3  1.00000        .26225E+06
.20331E+06   .589E+05    22.47
    48  2010/  4  1.00000        .19685E+06
.20331E+06  -.646E+04    -3.28
    49  2010/  5  1.00000        .18317E+06
.20331E+06  -.201E+05   -11.00
    50  2010/  6  1.00000        .23831E+06
.20331E+06   .350E+05    14.69
    51  2010/  7  1.00000        .19892E+06
.20331E+06  -.439E+04    -2.21
    52  2010/  8  1.00000        .22458E+06
.20331E+06   .213E+05     9.47
    53  2010/  9  1.00000        .22085E+06
.20331E+06   .175E+05     7.94
    54  2010/ 10  1.00000        .20390E+06
.20331E+06   588.          .29
```

MODEL MEAN ABS PCT ERROR =
.092546
RANDOM WALK MEAN ABS PCT ERROR =
.214357
AVERAGE MEAN ABS PCT ERROR =
.206852

MODEL STAGE: 1 FORE

TIME (T)	DATE	LOWER 80% LIMIT	UPPER 80% LIMIT	FORECAST	ACTUAL (IF KNOWN)	RESIDUAL	% ERROR
55	2010/ 11	.1680E+06	.2386E+06	.2033E+06			
56	2010/ 12	.8279E+05	.1533E+06	.1181E+06			
57	2011/ 1	.1680E+06	.2386E+06	.2033E+06			
58	2011/ 2	.1680E+06	.2386E+06	.2033E+06			
TOTAL		.5869E+06	.8690E+06	.7280E+06			


GRAPH KEY
A = AluPE_Total
F = FORECASTS
.11723E+06
.38575E+06
DATE
2006/ 5
A
.27097E+06
2006/ 6
A
.32573E+06
2006/ 7
A
.30908E+06
2006/ 8
A
.28988E+06
2006/ 9
A
.23908E+06
2006/ 10
A
.28542E+06
2006/ 11
A
.24411E+06
2006/ 12
A
.20110E+06
2007/ 1
A
.21570E+06
2007/ 2
A
.26720E+06

2007/ 3   A
.25985E+06
2007/ 4   A
.21080E+06
2007/ 5
A   .28359E+06
2007/ 6   A
.25758E+06
2007/ 7
A   .35565E+06
2007/ 8   A
.27499E+06
2007/ 9   A
.24686E+06
2007/ 10   A
.25185E+06
2007/ 11   A
.25155E+06
2007/ 12   A
.15382E+06
2008/ 1   A
.26893E+06
2008/ 2   A
.25907E+06
2008/ 3   A
.25620E+06
2008/ 4
A .38575E+06
2008/ 5
A   .29671E+06

2008/ 6   A
.24119E+06
2008/ 7
A   .37496E+06
2008/ 8   A
.26571E+06
2008/ 9
A   .28099E+06
2008/ 10   A
.19173E+06
2008/ 11   A
.22298E+06
2008/ 12 A
.11723E+06
2009/ 1   A
.24451E+06
2009/ 2   A
.17629E+06
2009/ 3   A
.16736E+06
2009/ 4   A
.21735E+06
2009/ 5   A
.16544E+06
2009/ 6   A
.19349E+06
2009/ 7   A
.17967E+06
2009/ 8   A
.16893E+06

```
2009/  9                                  A
.24540E+06
2009/ 10                                A
.23410E+06
2009/ 11                 A
.17520E+06
2009/ 12  A
.12257E+06
2010/  1              A
.16109E+06
2010/  2                    A
.20010E+06
2010/  3                                      A
.26225E+06
2010/  4                   A
.19685E+06
2010/  5                 A
.18317E+06
2010/  6                              A
.23831E+06
2010/  7                    A
.19892E+06
2010/  8                          A
.22458E+06
2010/  9                        A
.22085E+06
2010/ 10                      A
.20390E+06
2010/ 11                      F
.20331E+06
```

```
2010/ 12 F
.11806E+06
2011/  1                    F
.20331E+06
2011/  2                    F
.20331E+06

++++++++++++++++++++++++++++++++++++++++++++++++++
++++++++++++

 THE WORK WAS STARTED AT:
Time=13:51:15
 IT IS TIME TO STOP AND ADMIRE THE WORK !
Time=13:51:16
```