

## Elasticities For All

Posted on Jun 09, Posted by [Tom Reilly](#) Category [Forecasting](#)

Announcing the Option to run Autobox with where it will calculate Price elasticities automatically. Why is this so powerful? If you have ever calculated a price elasticity, you might already know the modeling tradeoffs by using LOGS for a simplistic trick to quickly build the model to get the elasticity and the downside of doing so. We aren't trading off anything here and using Autobox's power to do build a robust model automatically and considering the impact of lags, autocorrelation and outliers.

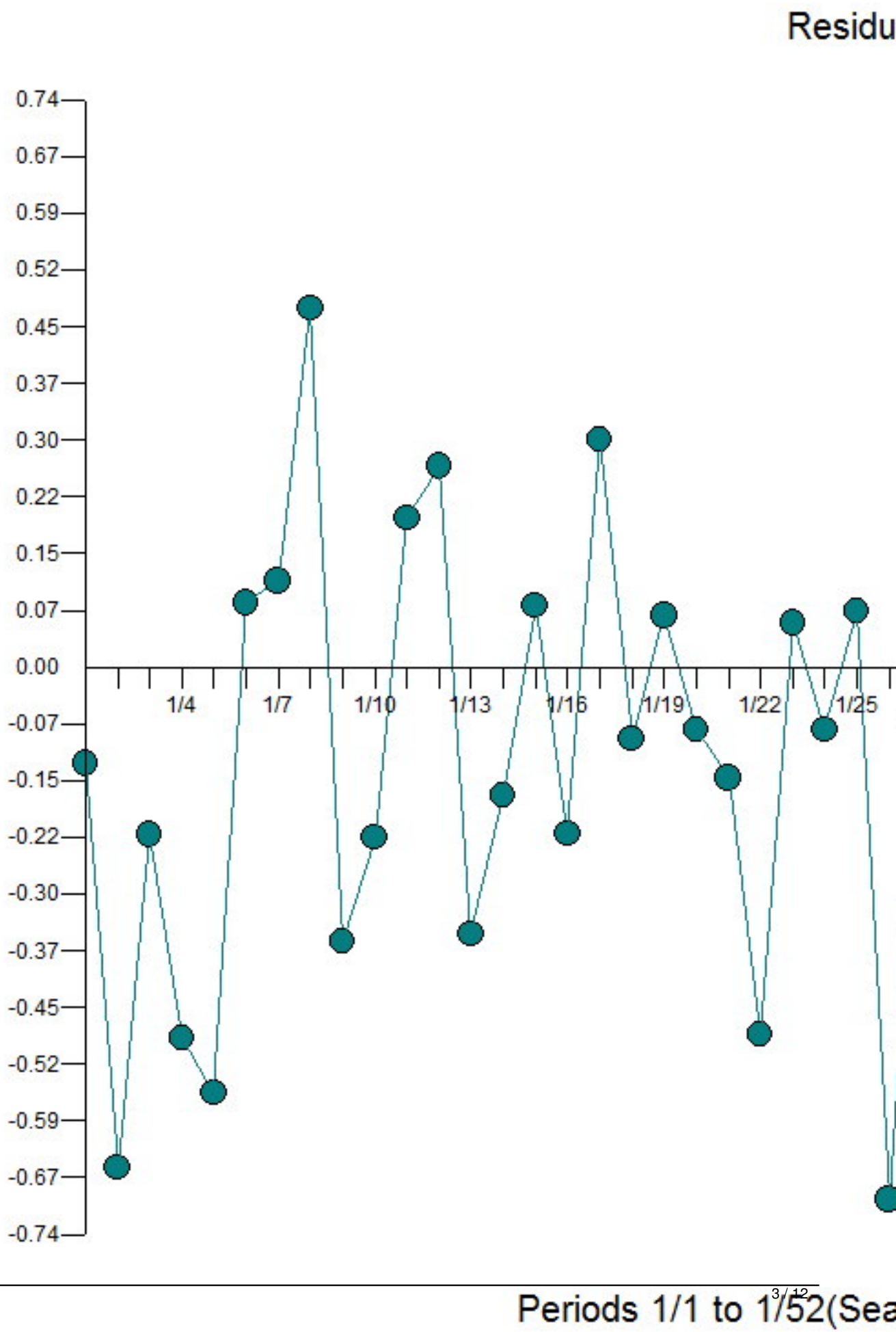
We are rolling out an Option for Autobox 7.0 [Command Line Batch](#) to calculate "Short-Run" Price Elasticities. The Price Elasticity Option can be purchased to produce Price elasticities automatically AND done the right way (we will explain that below) as opposed to assuming the model form to get a fast, but sub-standard econometric approach to calculating Price elasticities. The Option allows you to specify what % change in price, specify the problems you want to run and then let Autobox run and model the data and produce a one period out forecast. Autobox will run again on the same data, but this time using the change in price and generate another forecast and then calculate the elasticity with the supporting math used to calculate it stored in a report file for further use to prepare pricing strategy. That introduction is great, but now let's dive into the importance of modeling the data the right way and what this means for a more accurate calculation of elasticities!

Click on the hyperlinks when you see them to follow the example.

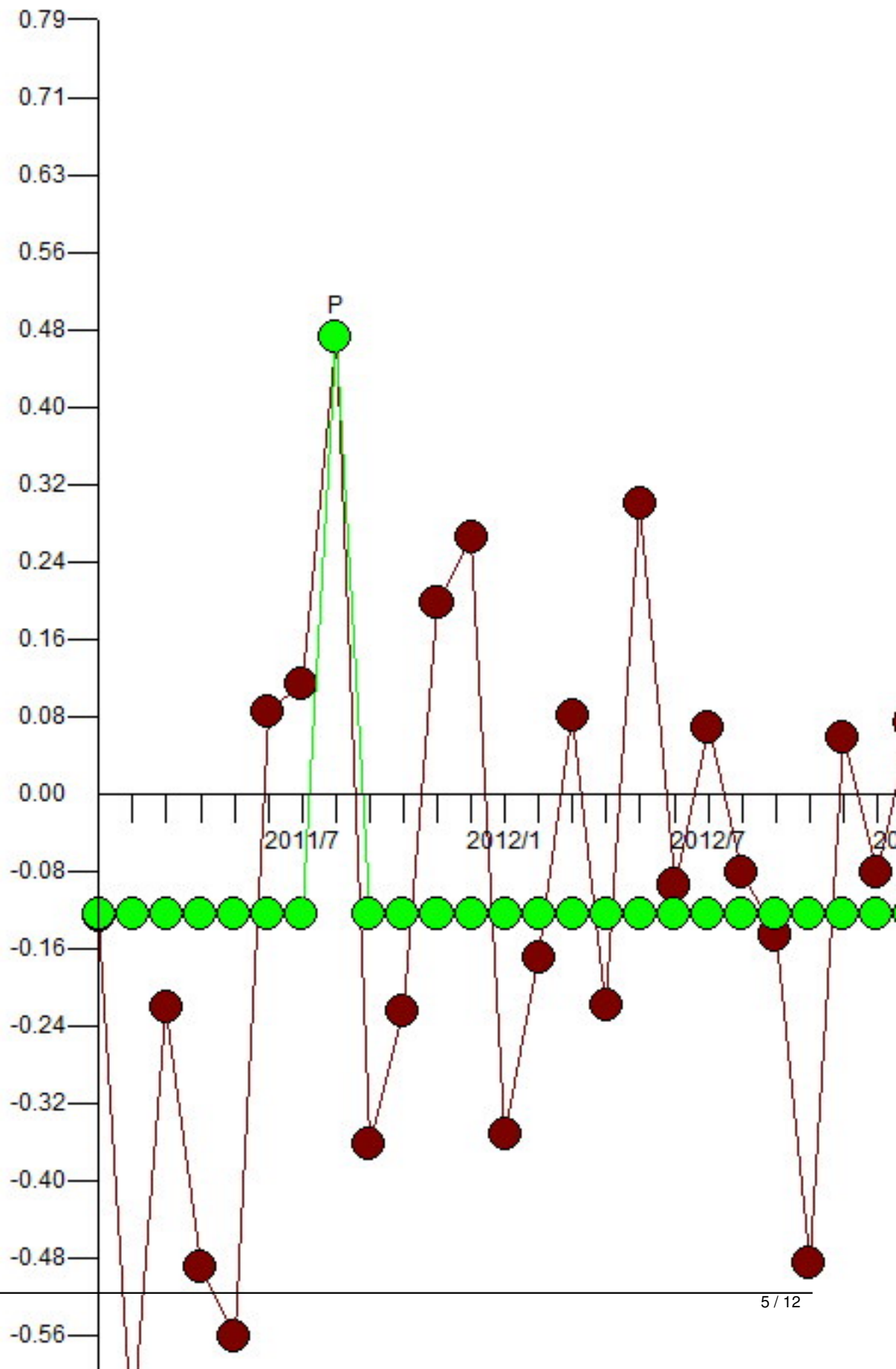
For anyone who has calculated a price [elasticity](#) like this it was in your Econ101 class. You may have then been introduced to the "LOG" based approach which is a clean and simple approach to modeling the data in order to do this calculation of elasticity as the coefficient will be the elasticity. Life isn't that simple and with the simplicity there are some tradeoffs you may not be aware that came with this simplicity. We like to explain these tradeoffs like this "closing the door, shutting the blinds, lowering the lights and doing voodoo modeling". Most of the examples you see in books and literally just about everywhere well intentioned analysts try and do their calculations using a simple Sales (Quantity) and Price model. There typically is no concern for any other causals as it will complicate this simplistic world. Why didn't your analyst tell you about these tradeoffs? You probably didn't ask. If you did, the analyst would say to you in a Brooklyn accent "Hey, read a book!" as the books show it done this way. Analysts take [LOGS](#) of both variables and then can easily skip the steps needed in the first link above and calculate the elasticity, running a simple regression ignoring the impact of autocorrelation or other

important causals and voila you have the elasticity which is simply found as the coefficient in the model. The process is short and sweet and "convenient", but what happens when you have an outlier in the data? What happens if you need to include a dummy variable? What about the other causals? What about lags in the X? What about autocorrelation? Does their impact just magically disappear? No. No and no.

Let's review an [example](#) that Shazam uses from a text book to show how to model elasticity. The "Canned Tuna" example comes from a textbook called "Learning and Practicing Econometrics" and it does try account for other causals so *some* credit is due here as most just use Price as the only causal. We thought this was a good example to delve into as it actually tried to consider more complexities with dummies. In the end, you will still want to forget everything you learned in that example and wish for a robust solution. Here they only take LOGS of the Y variable as there are two causal dummy variables plus two competitor price variables. They report the elasticity as -2.91%. They also do some kind of gyrations to get the elasticities of the dummies. Now, we know that there is no precisely right answer when it comes to modeling unless we actually simulate the data from a model we specified. What we do know is that all models are wrong and some are useful per George Box. With that said, the elasticity from a model with little effort to model the relationships in the data and robustified to outliers is too simple to be accurate. Later on, we estimate an elasticity using the default of -2.41% but take no LOGS. Is it that different? Well, yes, it is. It is about 20% different. Is that extra effort worth it? I think so. As for the model used in the text book and estimated in Shazam, the ACF/PACF of the residuals look well behaved and if you look at the t-values of the model everything is significant, but what about the residuals? Are they random??? No. The residual graph shows pattern in that it is not random at all.

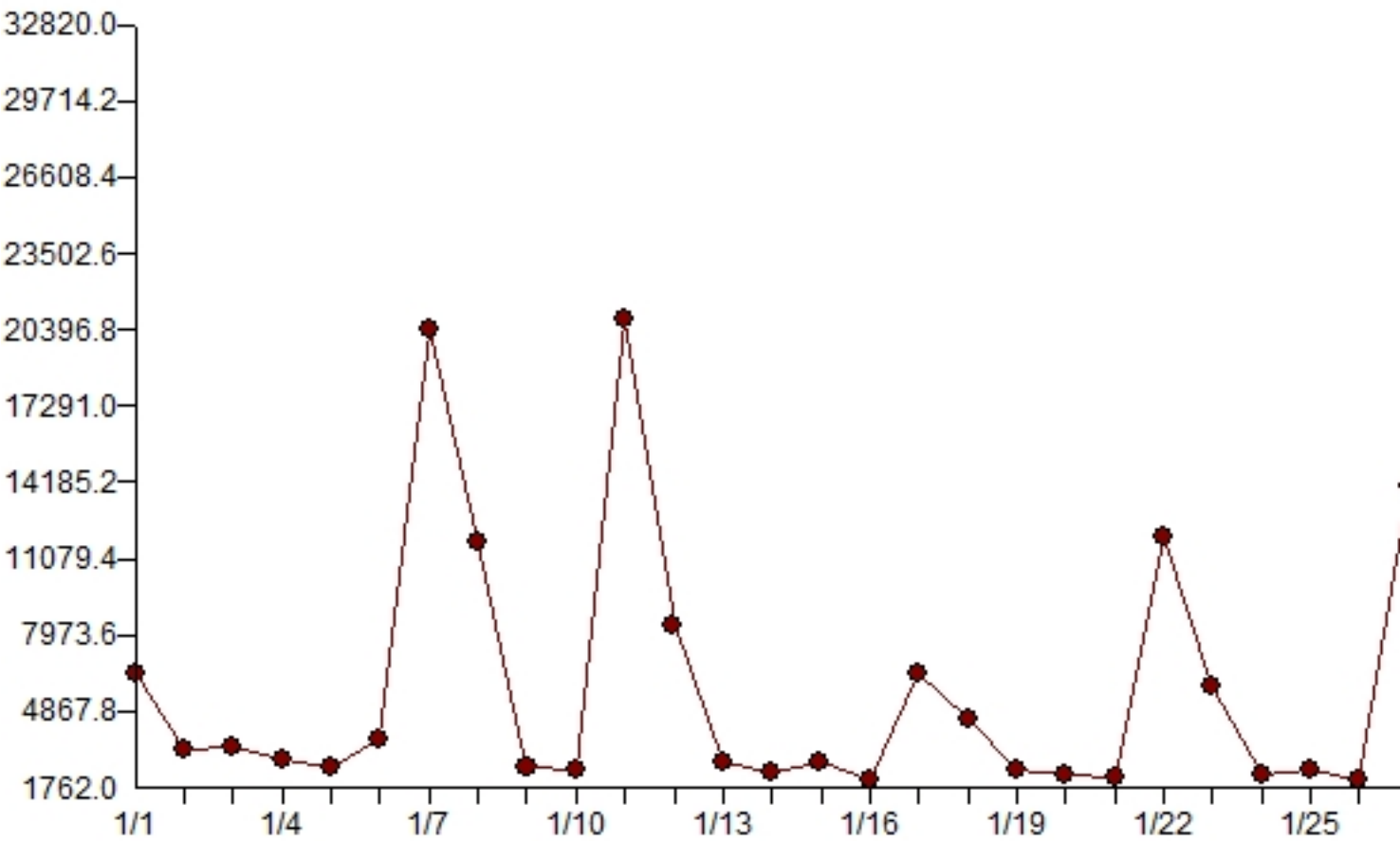


suggesting that cereals still protect them from malaria, even if it is insufficient and needs more care.



Horizontal line at 8091.9, and vertical lines at 1/7, 1/10, 1/13, 1/16, 1/19, 1/22, 1/25, 1/28, 1/31, 1/34, 1/37, 1/40, 1/43, 1/46, 1/49, 1/52

Actuals - Y

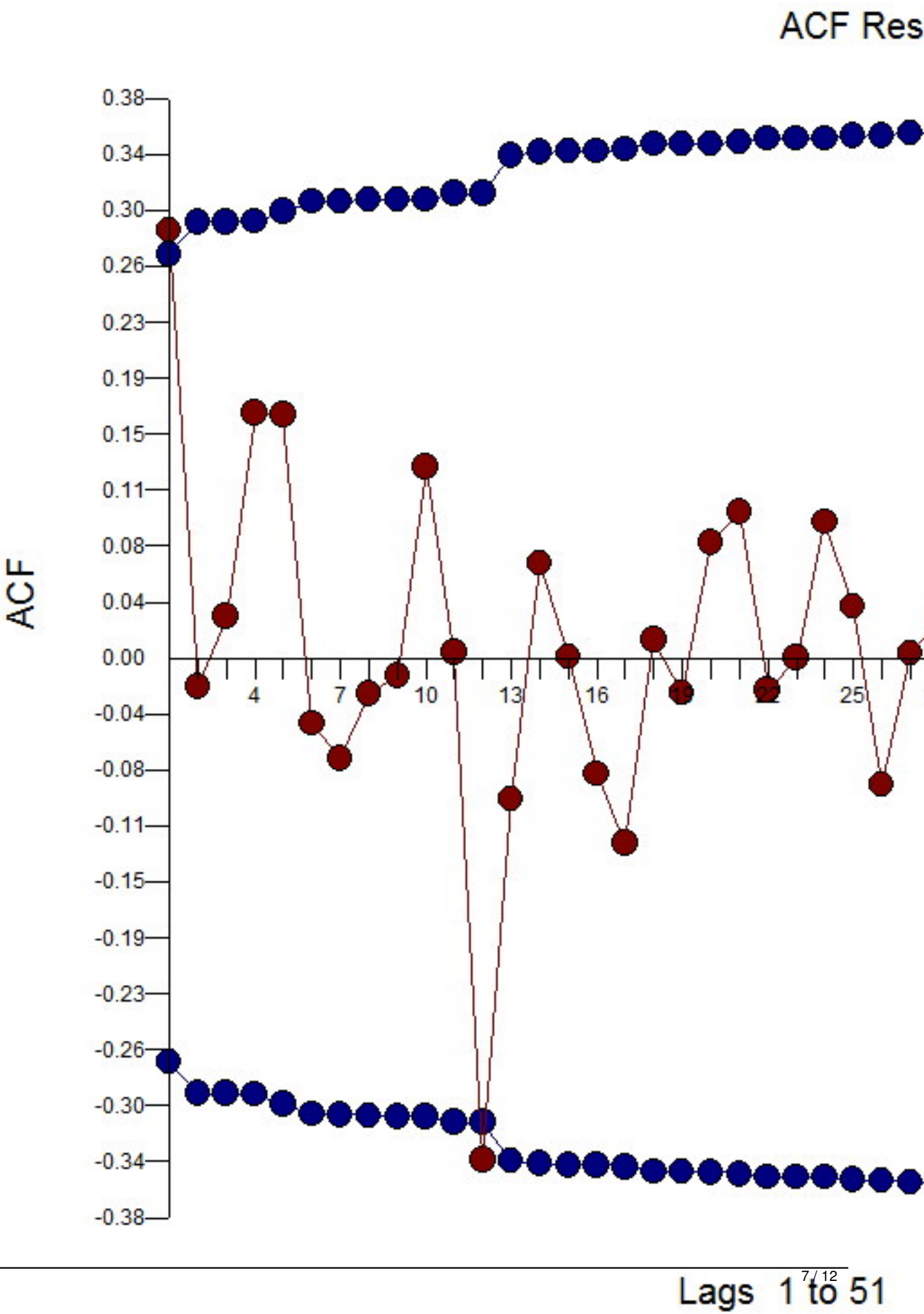


Periods 1/1 to 1/52(Season

Horizontal line at 8091.9, and vertical lines at 1/7, 1/10, 1/13, 1/16, 1/19, 1/22, 1/25, 1/28, 1/31, 1/34, 1/37, 1/40, 1/43, 1/46, 1/49, 1/52

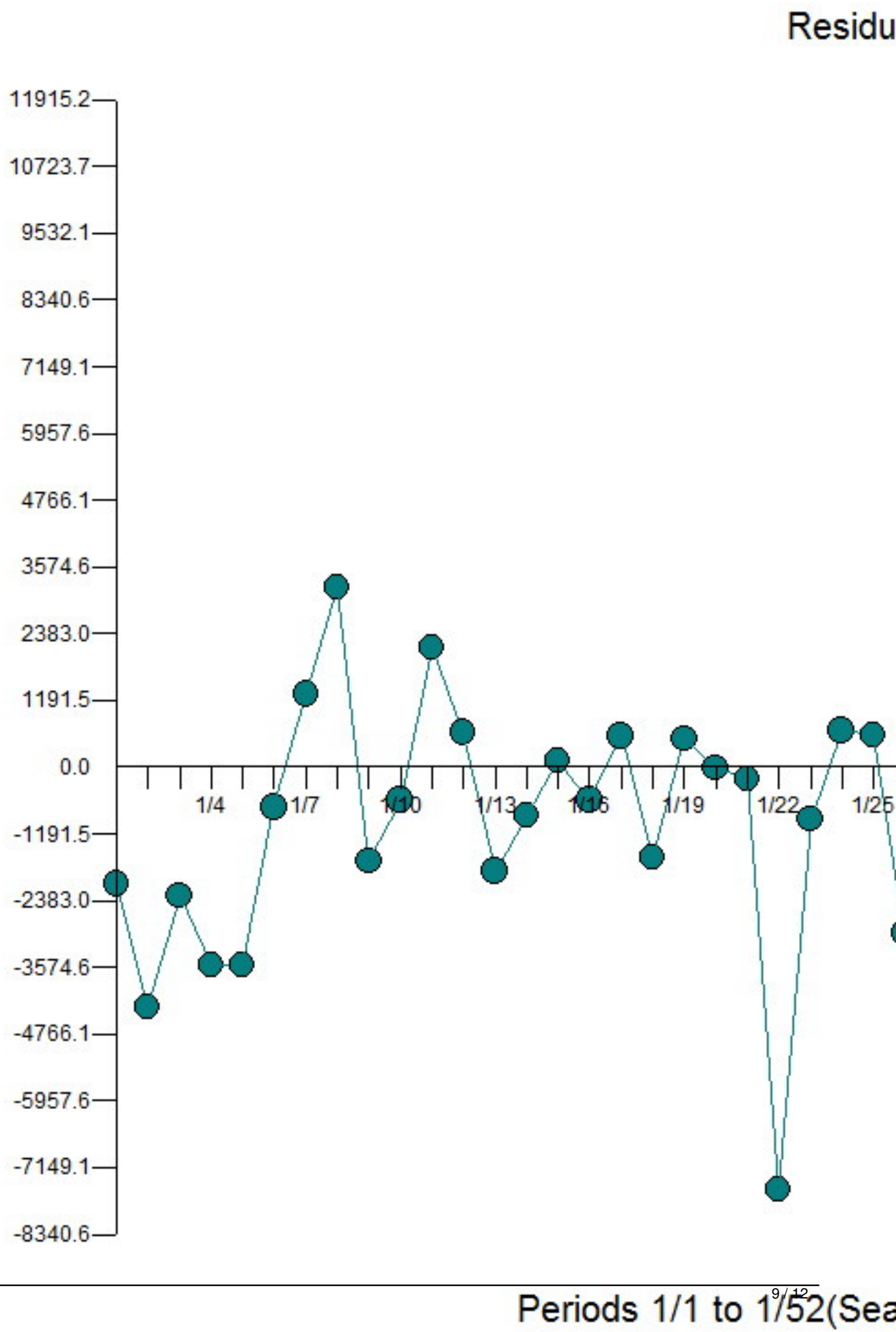
Y(T) =	8091.9				Y
	+ [X1 (T) ] [ (+	5875.0	) ]		comp1
	+ [X2 (T) ] [ (+	7750.2	) ]		comp2
	+ [X3 (T) ] [ (+	2132.7	) ]		Dummy1
	+ [X4 (T) ] [ (+	13586.	) ]		Dummy2
	+ [X5 (T) ] [ (-	19895.	) ]		PRICE1
	+ [X6 (T) ] [ (+	12247.	) ]		: PULSE
				1/ 39	3
	+ [X7 (T) ] [ (-	7353.5	) ]		: PULSE
				1/ 22	2
	+ [X8 (T) ] [ (+	7097.9	) ]		: PULSE
				1/ 34	3
	+ [X9 (T) ] [ (-	5827.2	) ]		: PULSE
				1/ 43	4
	+ [X10 (T) ] [ (-	5426.9	) ]		: PULSE
				1/ 51	5
	+ [A (T) ]				

After as they take ACF of the residuals, a small blip at 1 and 12 which really are not worth going



The residuals show what looks to be outliers. While outlier detection was used, there are some



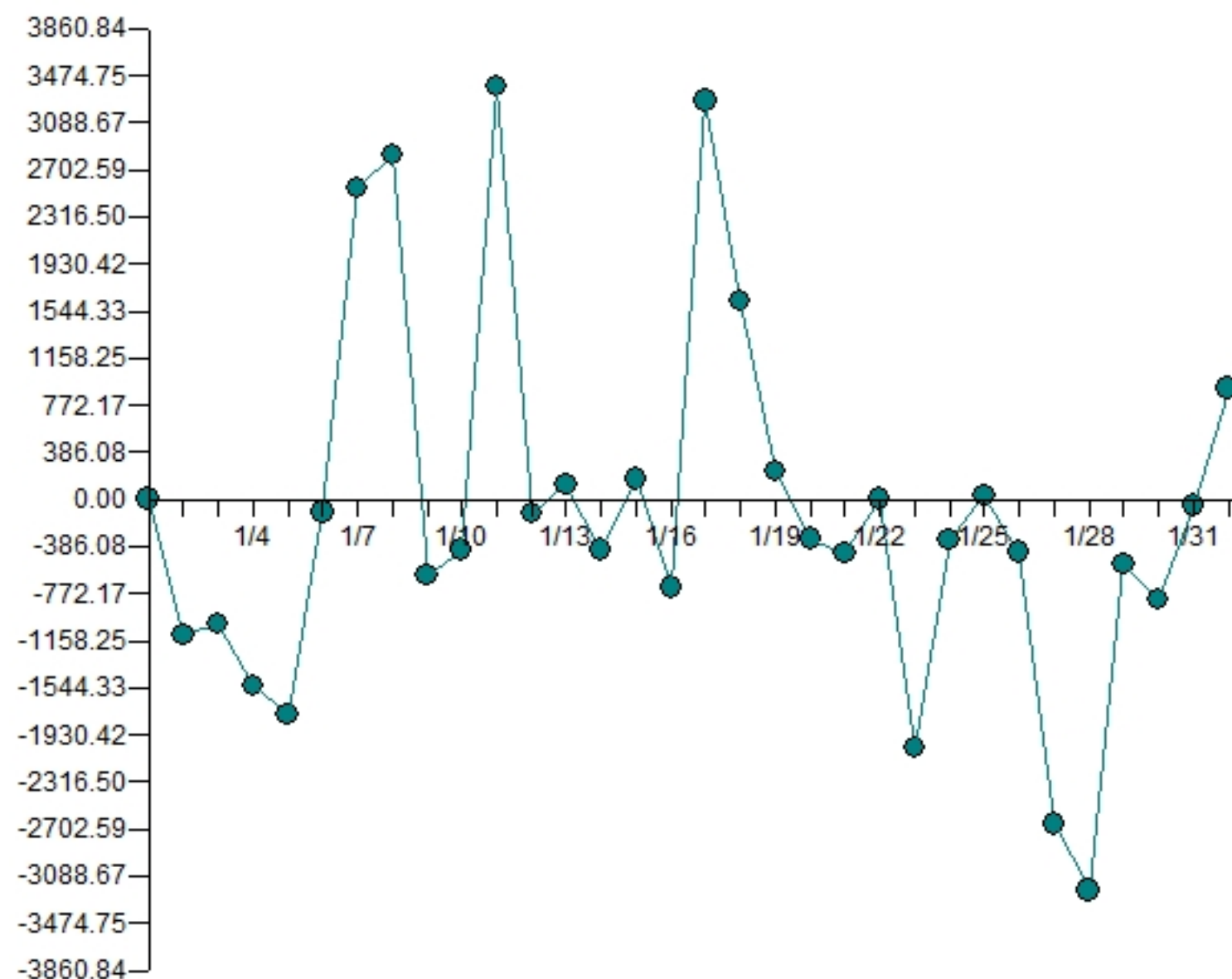


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Y(T) = 9662.6
+ [X1(T)] [(+ 13435. + 4709.3 B** 1)] Dummy2
+ [X2(T)] [(- 8327.2 )] PRICE1
+ [X3(T)] [(+ 14802. )] :PULSE
+ [X4(T)] [(+ 9902.4 )] :PULSE
+ [X5(T)] [(- 5189.0 )] :PULSE
+ [X6(T)] [(- 4783.3 )] :PULSE
+ [X7(T)] [(+ 5502.9 )] :PULSE
+ [A(T)]

```

## Residuals - Y



Here are the model statistics.

Periods 1/1 to 1/52(Seasonality of

NOLOG.ASC Autobox Professional Build: 6.0.9

File Preferences View Process Series Help

Historical Data

Future Values

Auxiliaries

Graph

**Reports**

WhatIf

Reports

.....DETAILS.HTM  
 .....INTRVENT.HTM  
 .....EQUATION.TXT  
 .....VERBAL.TXT  
 .....STAT.HTM  
 .....RH SIDE.TXT  
 .....ADJUSTED.TXT  
 .....SAFETY.TXT

#	MODEL COMPONENT	LAG (BOP)	COEFF
1	CONSTANT		.959E+04
INPUT SERIES X1 Dummy2			
2	Omega (input) -Factor # 1	0	.134E+05
3		1	-.472E+04
INPUT SERIES X2 PRICE1			
4	Omega (input) -Factor # 2	0	-.824E+04
INPUT SERIES X3 I~P00039 PULSE			
5	Omega (input) -Factor # 3	0	.148E+05
INPUT SERIES X4 I~P00034 PULSE			
6	Omega (input) -Factor # 4	0	.990E+04
INPUT SERIES X5 I~P00022 PULSE			
7	Omega (input) -Factor # 5	0	-.519E+04
INPUT SERIES X6 I~P00043 PULSE			
8	Omega (input) -Factor # 6	0	-.478E+04
INPUT SERIES X7 I~P00035 PULSE			
9	Omega (input) -Factor # 7	0	.551E+04

