

# Power Meter Testing



- Power Meter Testing is expensive
- 50% of all Power Meters don't work!
  - It's difficult to keep all variables constant
- Use data from tests we've already done

## Power Meter Testing



# Annual Savings 14.5%

- **General Mills**

- **Before Performance Planner**

- File C:\GenMills1603B-B4.log
- Test began at 3/14/05 9:14:28
- Test ended at 3/14/05 9:31:51

- **Measurement**

• Voltage, A Phase, Ave:	274.5
• Voltage, B Phase, Ave:	274.3
• Voltage, C Phase, Ave:	272.5
• Current, A Phase, Ave:	16.9
• Current, B Phase, Ave:	17.6
• Current, C Phase, Ave:	22.6
• Current, Neutral, Ave:	0.0
• True Power, A Phase, Ave:	2926.9
• True Power, B Phase, Ave:	1452.9
• True Power, C Phase, Ave:	3100.9
• Total True Power:	7480.7
• VA Power, A Phase, Ave:	4648.4
• VA Power, B Phase, Ave:	4836.4
• VA Power, C Phase, Ave:	6153.4
• Total VA Power:	15638.3
• Power Factor, A Phase, Ave:	0.63
• Power Factor, B Phase, Ave:	0.30
• Power Factor, C Phase, Ave:	0.50
• Total Power Factor:	0.48
• Frequency, Ave:	60.0
• Energy, A Phase:	0.848
• Energy, B Phase:	0.421
• Energy, C Phase:	0.898
• Energy, Total Elapsed:	2.167
• Energy, estimated per month:	5464.7
• Cost, Total Elapsed:	\$0.13
• Cost, estimated per month:	\$338.81
• (at \$0.06200/KWH)	

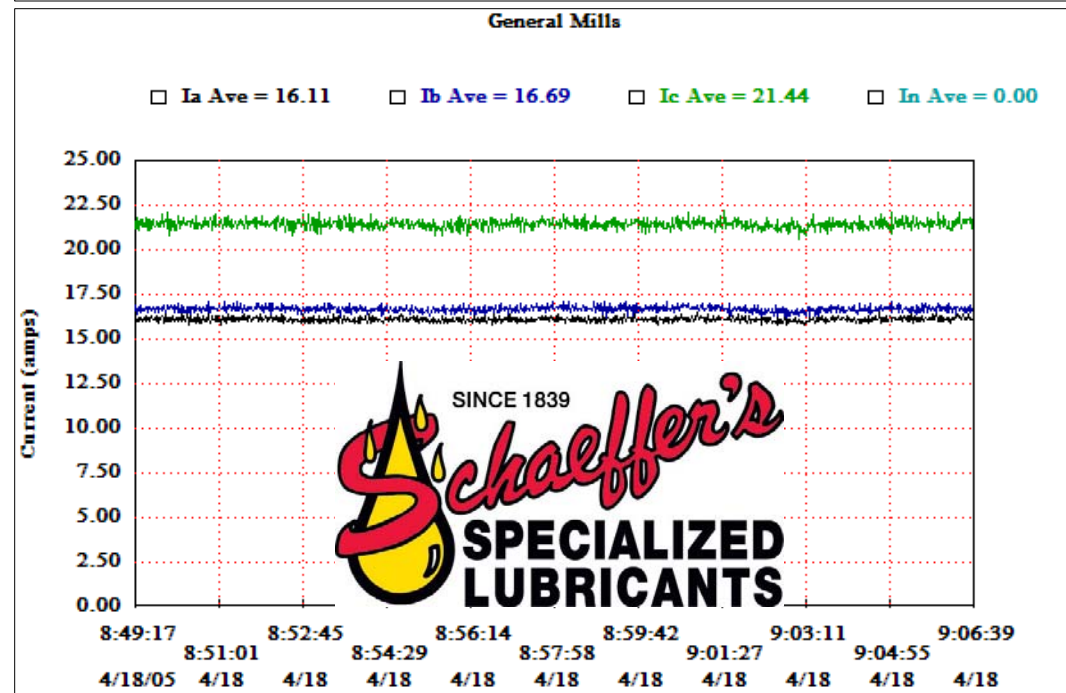
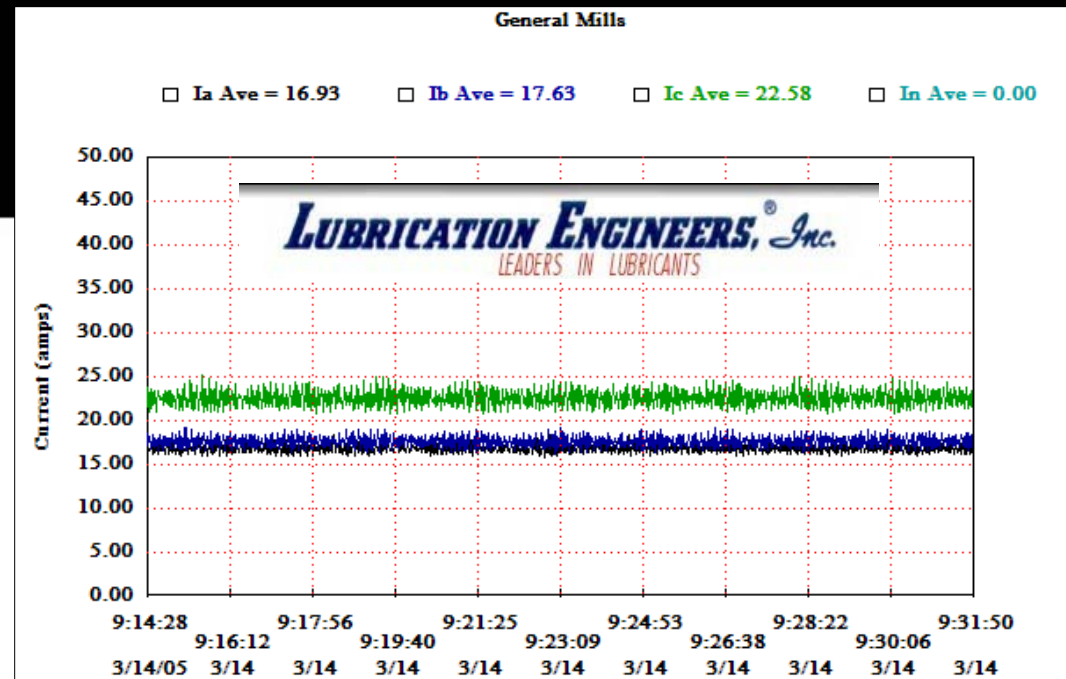
- **After Performance Planner**

- File C:\GenMills1603B-AFTR.log
- Test began at 4/18/05 8:49:17
- Test ended at 4/18/05 9:06:40

	<b><u>Before</u></b>	<b><u>After</u></b>	<b><u>Units</u></b>	<b><u>Change</u></b>	<b><u>%Change</u></b>
• Voltage, A Phase, Ave:	274.5	273.0	volts	-1.5	-0.6 %
• Voltage, B Phase, Ave:	274.3	273.3	volts	-1.0	-0.4 %
• Voltage, C Phase, Ave:	272.5	271.1	volts	-1.4	-0.5 %
• Current, A Phase, Ave:	16.9	16.1	amps	-0.8	-4.9 %
• Current, B Phase, Ave:	17.6	16.7	amps	-0.9	-5.3 %
• Current, C Phase, Ave:	22.6	21.4	amps	-1.1	-5.0 %
• Current, Neutral, Ave:	0.0	0.0	amps	0.0	0.0 %
• True Power, A Phase, Ave:	2926.9	2592.6	Watts	-334.3	-11.4 %
• True Power, B Phase, Ave:	1452.9	1136.3	Watts	-316.5	-21.8 %
• True Power, C Phase, Ave:	3100.9	2666.8	Watts	-434.2	-14.0 %
• Total True Power:	7480.7	6395.7	Watts	-1085.0	-14.5 %
• VA Power, A Phase, Ave:	4648.4	4397.9	VA	-250.6	-5.4 %
• VA Power, B Phase, Ave:	4836.4	4561.7	VA	-274.8	-5.7 %
• VA Power, C Phase, Ave:	6153.4	5816.5	VA	-337.0	-5.5 %
• Total VA Power:	15638.3	14776.0	VA	-862.3	-5.5 %
• Power Factor, A Phase, Ave:	0.63	0.59		-0.04	-6.2 %
• Power Factor, B Phase, Ave:	0.30	0.25		-0.05	-16.6 %
• Power Factor, C Phase, Ave:	0.50	0.46		-0.04	-8.6 %
• Total Power Factor:	0.48	0.43		-0.05	-9.5 %
• Frequency, Ave:	60.0	60.0	Hz	-0.0	-0.0 %
• Energy, A Phase:	0.848	0.751	KWH	-0.097	-11.4 %
• Energy, B Phase:	0.421	0.329	KWH	-0.092	-21.8 %
• Energy, C Phase:	0.898	0.773	KWH	-0.126	-14.0 %
• Energy, Total Elapsed:	2.167	1.853	KWH	-0.314	-14.5 %
• Energy, estimated per month:	5464.7	4672.1	KWH	-792.6	-14.5 %
• Cost, Total Elapsed:	\$0.13	\$0.11		\$-0.02	-14.5 %
• Cost, estimated per month:	\$338.81	\$289.67		\$-49.14	-14.5 %

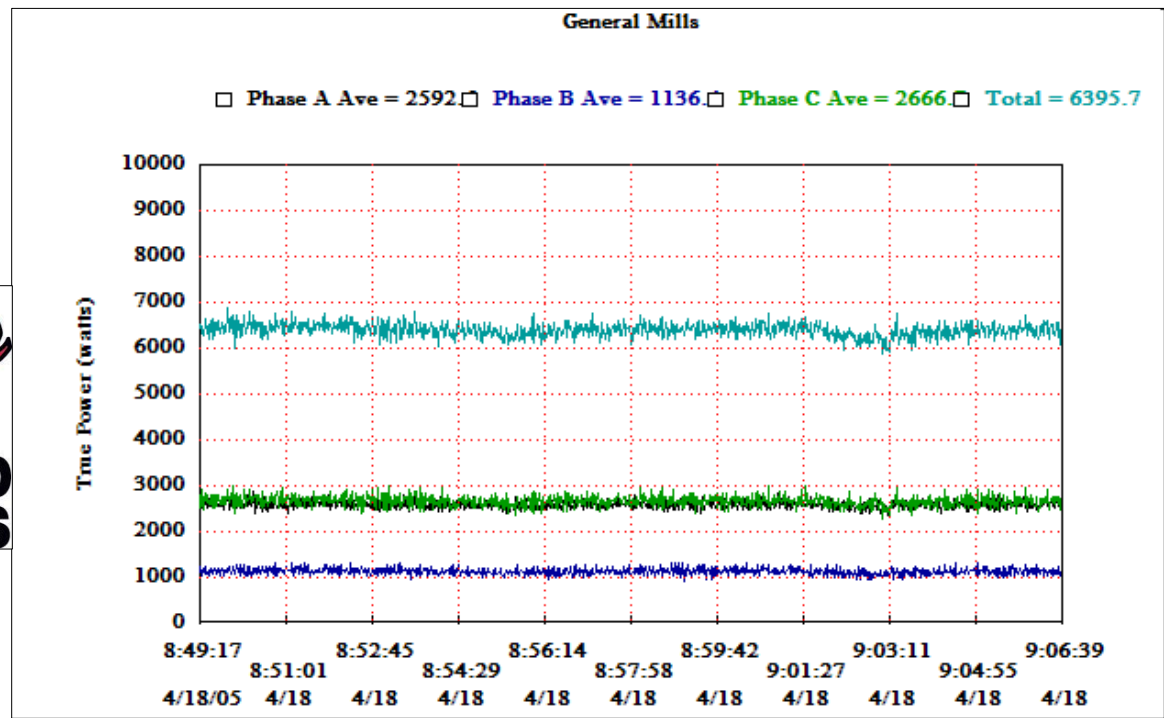
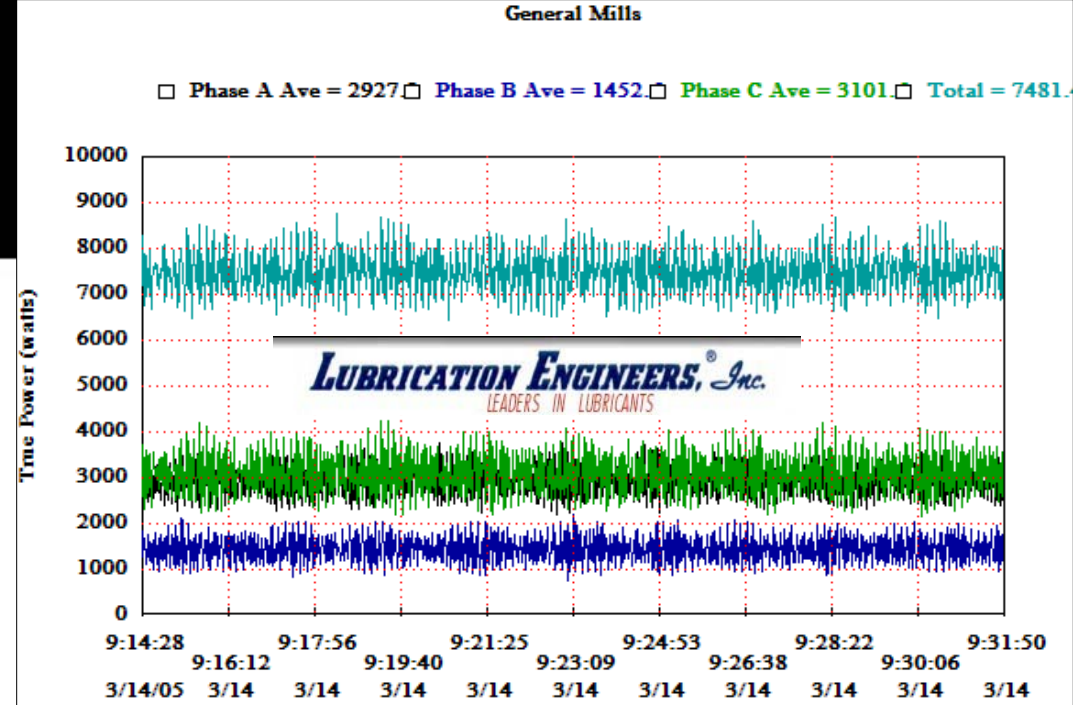
# Current (amps)

The rate of flow of charges, usually through a metal wire or some other electrical conductor.



# True Power (watts)

In an AC circuit, true power is the actual power consumed. It is distinguished from apparent power by eliminating the reactive power component that may be present.





# Power Meter Testing

- Opens doors to customers that might otherwise be difficult to meet with.
- Brings 3<sup>rd</sup> party verification.
- Establishes Credibility.
- Quantitative Data
- Everyone is looking for ways to conserve energy.
  - Corporate rewards for new and innovative ways to conserve.

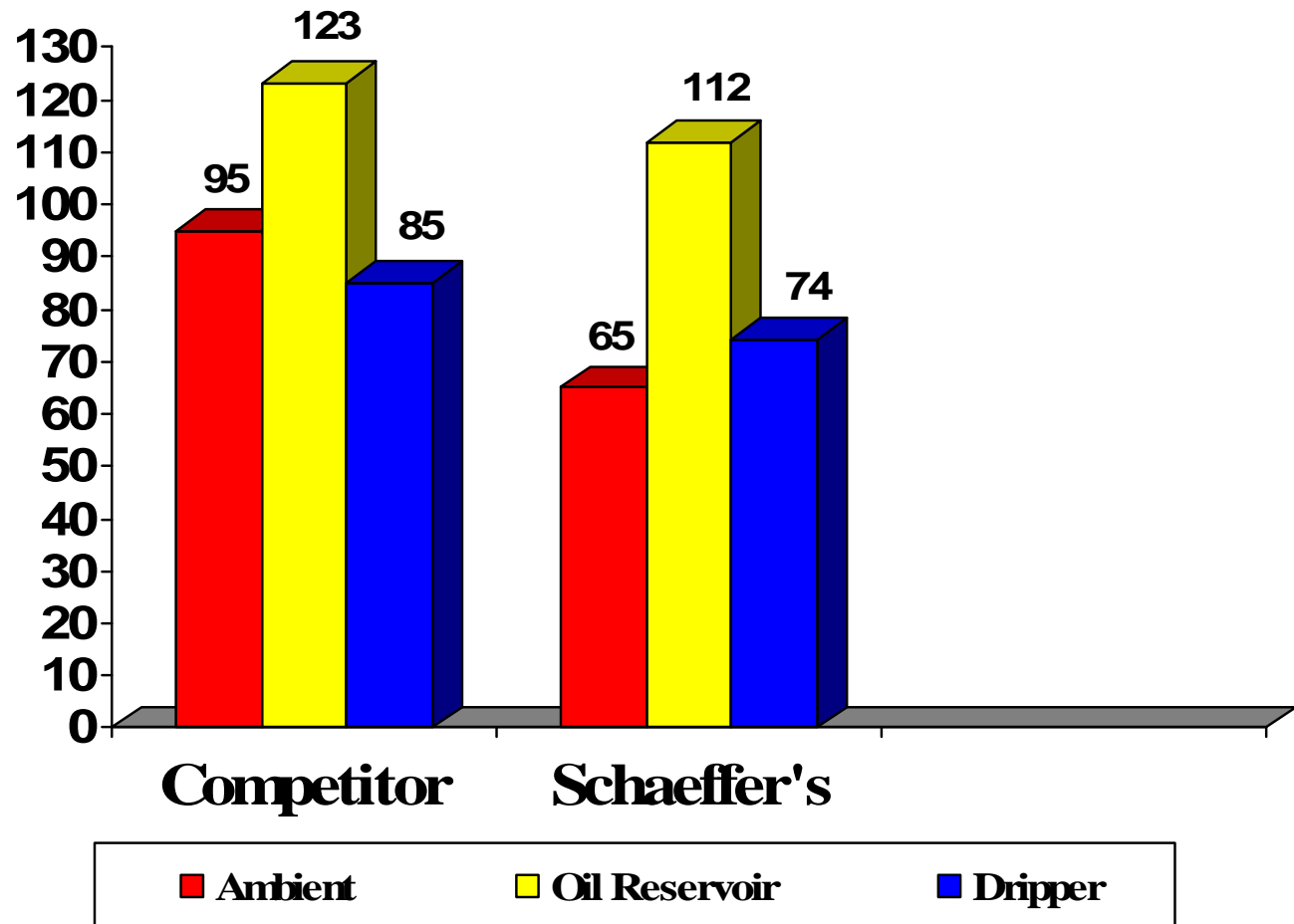
# What happens when a Power Meter Test “doesn’t work”?

- What about temperature?



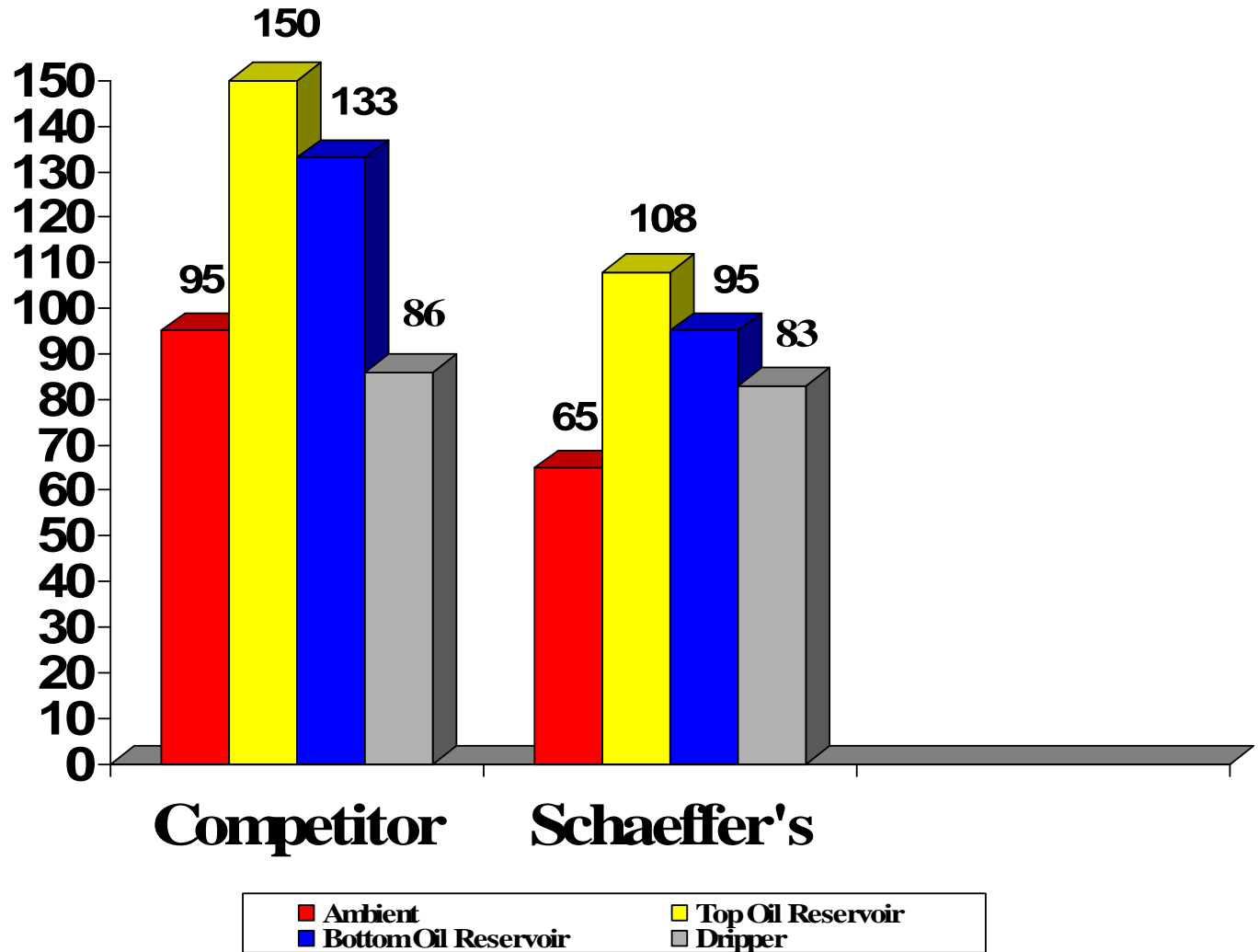
# G & H Farms

## Temperature...Before & After



# Jim Reimann

## Temperature..Before & After



# What happens when a Power Meter Test “doesn’t work”?

- What about Harmonic Distortion?

WINNEMUCCA FARMS, INC.



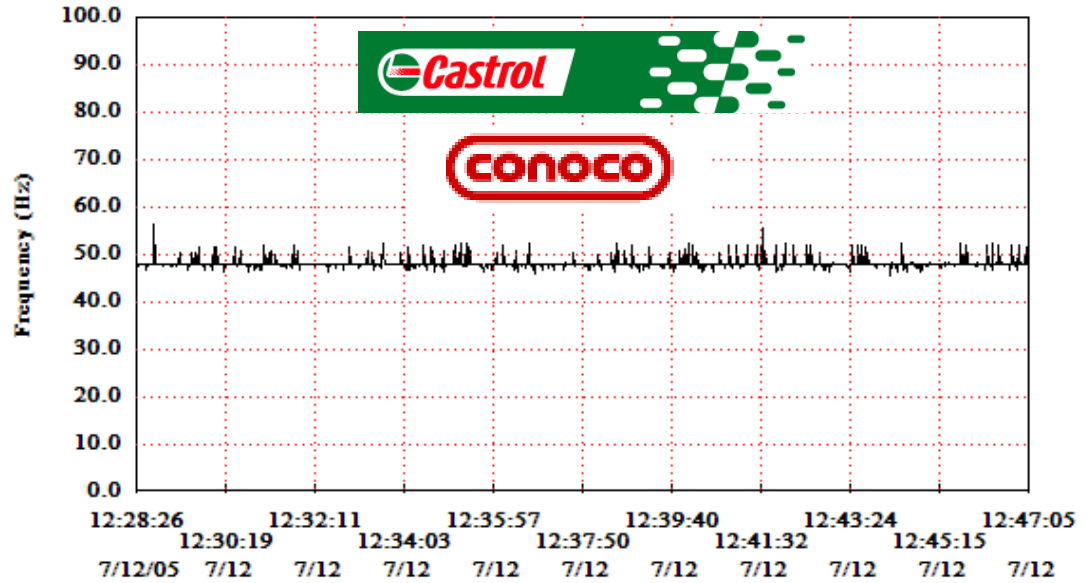
*One Potato Place  
Winnemucca, NV 89445*

# Frequency (Hz)

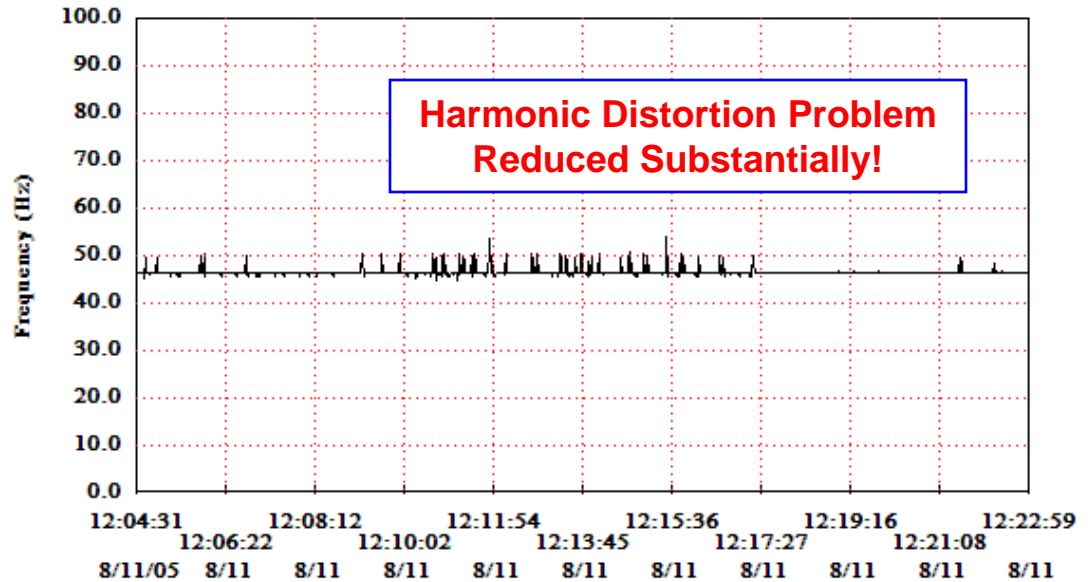
Hertz is a unit of frequency (of change in state or cycle in a sound wave, alternating current, or other cyclical waveform) of one cycle per second.



□ Ave Freq = 48.24



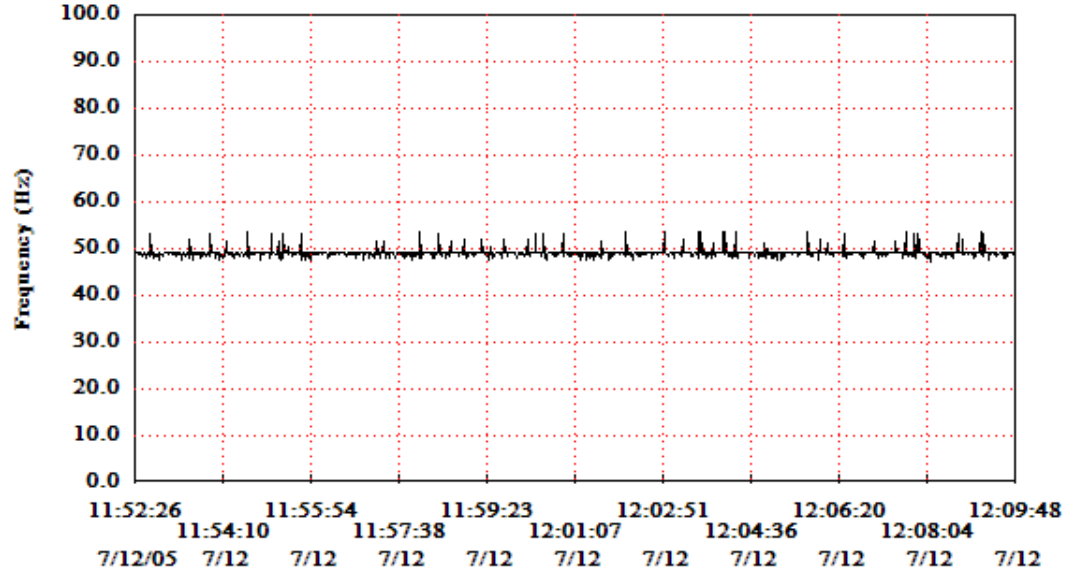
□ Ave Freq = 46.62



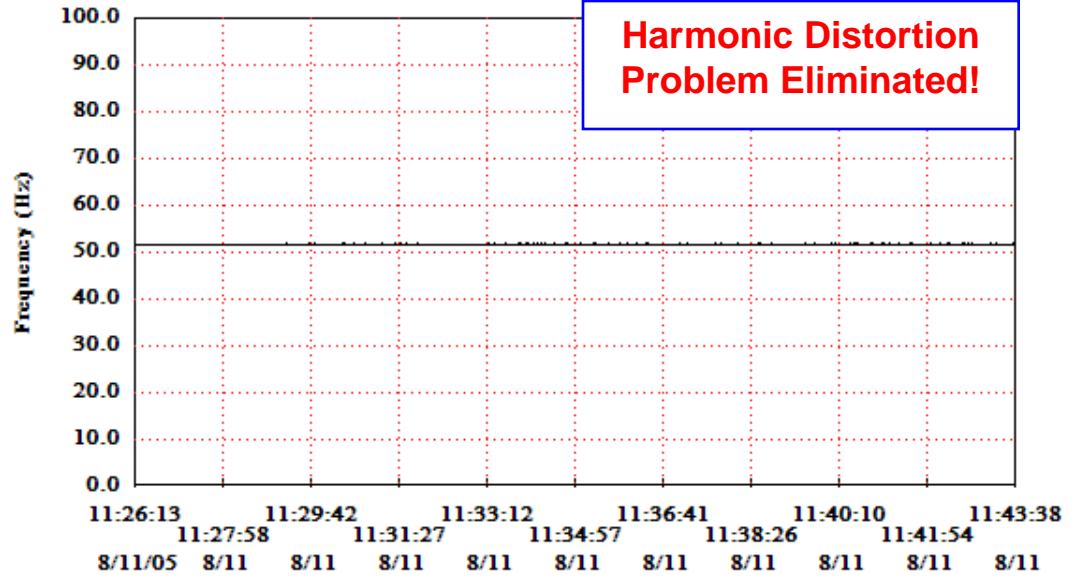
# Frequency (Hz)



□ Ave Freq = 49.09



□ Ave Freq = 51.74





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