

**Welcome to Electronic Specialists Tutorials - Electronic Equipment Care and Maintenance saga**

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**INDUSTRIAL ELECTRONICS • FRIEND OR FOE?**  
Health Care ideas for Friendlier Electronic Equipment  
**Special Tutorial <>< VOLTAGE REGULATORS**

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## Is Your AC Power Line Going Wild ???

Think "Voltage Regulators" !

A few short years ago those "in the know" said "The Voltage Regulator Market is Dead!".

Computer gurus figured that a UPS under every desk would solve all power problems.

**Whoa !!**

**First**, most UPS units sold today, were, in the "good old days", more properly called SPS or Standby Power Supplies.

When AC Power is at normal levels, all present day lower cost UPS units merely pass AC Power directly from the wall sockets to operating equipment. Your delicate equipment, operating directly off the power line, is still blasted with power line fluctuations, electrical noise interference and surges.

Only when line voltage falls to a threshold level - usually about 105 Volts - is operating equipment switched to the battery operated portion - the UPS. You then have 5 - 10 minutes to save your work, exit programs and shut down.

If the UPS is preceded by a good Voltage Regulator, the battery operated UPS will not kick in until Power Line voltage falls to about 85 or 90 Volts. This is particularly important during brown out conditions, when line voltage may hover between 103 Volts and 107 Volts for extended periods.

Your poor UPS is snapping between internal battery and commercial power all day long. Internal battery is never fully recharged before it is called upon to supply power to connected equipment.

Your lights are still "on", so you're getting power; all seems well. Suddenly, for no apparent reason, your system crashes.

### What Happened ?

What happened is that your UPS battery became discharged by the intermittent demands and was unable to continue generating power during one of those low voltage brown out swings.

A voltage regulator can prevent this from happening to you by maintaining normal line voltage to your equipment - even when your AC Power sinks to an abysmal 85 - 90 volts !



### Typical Electronic Specialists Voltage Regulator

This unit is shown with (4) US NEMA 5-15 (125 Volts, 15 Amp) sockets

Our Larger units have (4) US NEMA 5-20 (125 Volts, 20 Amp) sockets

Other socket configurations for different voltage situations are available

### Brown Out Surges and Electrical Disturbances

As mentioned earlier, except during low voltage intervals, with lower cost "UPS" systems, your equipment is connected directly to commercial power.

Man made surges created by commercial and home equipment increase dramatically during brown out periods. Electrical spikes and interference also increase greatly during brown outs. This is the stuff that can cause occasional erratic system performance.

A high performance voltage regulator can prevent this from happening to you by soaking up surges, spikes and disruptive electrical interference. Your system will retain the silky smooth performance you need.

Indeed, a voltage regulator will extend your equipment operating life in addition to the many benefits it provides during brown outs by keeping your equipment operating smoothly.

### Is a Voltage Regulator worth the Cost ?

We all know - Time is Money

It is generally felt that preventing just one system crash saves more than enough time to pay for the Voltage Regulator. In addition, extended equipment operating life yields savings more than equal the Regulator cost.

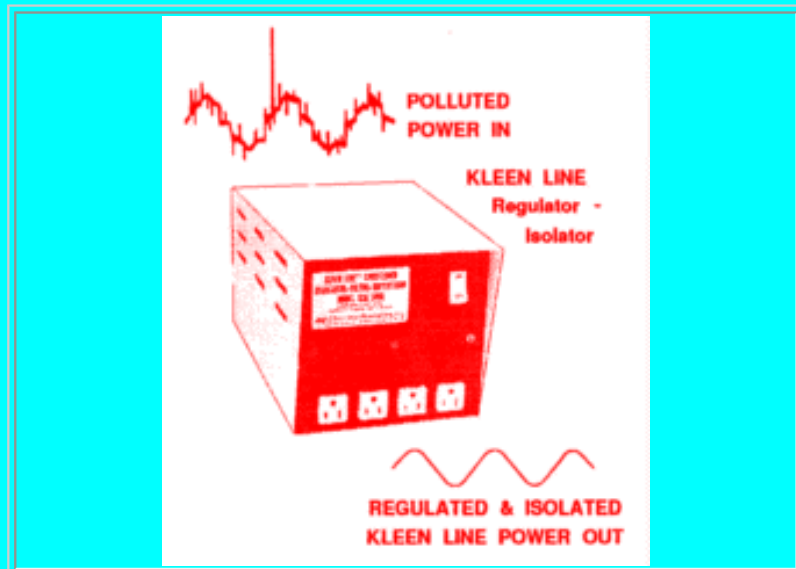
## What about other Voltage Regulator applications ?

Modern electronic equipment is becoming more sensitive to AC power variations, and many technical managers turn to Power Line Voltage Regulators to tame erratic system performance.

Field installations often obtain operating electricity from either field generators, or long commercial feeds. Voltage often varies wildly. A voltage regulator can tame this beast before it gets to your equipment.

Sensitive Test and Measurement instrumentation programs often find regulator installation provides added stability.

Lighting used for TV or movie recording is often regulator controlled to provide consistent color renditions.

	<h3>Illustration of Regulator Results</h3> <p>Ferroresonant Voltage Regulator effect on power quality</p> <p>Not only are large spikes and surges eliminated, but most low level electrical noise and hash are also suppressed</p> <p>Actually 4 protective features in 1 unit -</p> <ul style="list-style-type: none"><li>● Voltage Regulator</li><li>● Interference Filter</li><li>● Surge / Spike Suppressor</li><li>● Isolation Transformer</li></ul>
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## What Voltage Regulator types are available ?

Basically two voltage regulator operating modes are currently manufactured.

- Ferroresonant Regulator
- Tap-Changer (aka Voltage-Jumper) Regulator

### The Differences ?

Ferroresonant Regulators:

1. Correct (regulate) output voltage continuously
2. Hold output voltage constant for input voltage down to about 85 volts
3. Transformer primary isolated from secondary to prevent line noise transfer to equipment
4. Provide massive absorption of power line spikes, surges, transients and electrical noise
5. Are a tad expensive

Tap-Changer (Voltage-Jumper) Regulators:

1. Correct (regulate) output voltage in 8 to 10 Volt steps (or jumps)
2. Provide voltage correction down to about 95 Volts
3. Equipment essentially connected to incoming power line
4. Use with Hi-Performance Filter-Suppressor for RFI & Surge suppression
5. Are quite modestly priced

**In conclusion:**

This segment has pointed up reasons to consider voltage regulators in your system protection planning.

Several application scenarios were presented to illustrate present day regulator usage.

The 2 major categories of regulators were discussed, with major points for each itemized.

With this information you will be able to decide if a regulator will provide cost-effective benefits for your system. Should you decide to include a Voltage Regulator in your line of defense against spikes, surges, transients and electrical interference pollution, comparison drawn between the two major regulator categories will help you determine which best will serve your needs.

**Special Voltage Regulator Tutorial Page**

Although part of our regular tutorial series, this page is offered as a Stand Alone Voltage Regulator Tutorial to accommodate the many request we have had for basic information on the subject.

You are invited to subscribe to our **Free Tutorial (\$400 Value)** series. [Sign up HERE](#) for over 20 insightful, practical segments designed to help you get maximum service from your Hi-Tech equipment

Also, our FAQ pages discuss a wide range of practical problems and solutions based upon countless hours I have spent beating spikes, transients, surges and interference into submission. [Check 'em out!](#)

In particular, we have a number of FAQs and Application Notes dedicated to Voltage Regulators:

**More Voltage Regulator Information to help you grasp the protection potential of these devices**

[Kleen Line Regulator-Isolator-Conditioners](#) ..... **the Ultimate System Protection**  
..... **the Ultimate System Protection**

Learn why these units provide **an isle of tranquility** in a sea of Power Pollution  
● transients, surges suppression ● lightning arrestors ● ground loops security

[Specifications - Kleen Line Regulator-Isolator-Conditioners](#) ... **Can't be Beat**  
Compare performance specifications & you'll agree ... **Buy 'em & You'll Love 'em!**

[UPS operation in Deep Brown-out Zone](#) ....**Application Note**  
Deep Brown-out zone operation offers a Severe Challenge. **Here's how to do it**



[The Case for Voltage Regulators, even if you have a UPS ... Application Note](#)

What you don't Know can (and will) hurt you, if you think a UPS will solve all Power Line problems.  
**Learn why** they're widely used for telecommunications, automation, security

Comparison

[Kleen Line Regulator-Isolator-Condition vs Tap Changer/Voltage Jumper ...Amazing !!](#)

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