



INSTITUTE OF FOOD AND  
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COOPERATIVE  
EXTENSION SERVICE

## PACKINGHOUSE NEWSLETTER

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### ELECTRICAL POWER PROBLEMS INVOLVING THE USE OF COMPUTERS

Electrical power problems have become a greater concern with the proliferation of computers, word processors and programmable controls. In regard to insurance claims with computer equipment, electrical power is ranked second; theft is first. All microprocessor-based equipment is more sensitive to sags, surges, spikes, interruptions, noise and static. What do these terms mean? and what can be done to remedy some of these electrical related problems? Some descriptions follow to help to clarify the terminology and to provide general background information on equipment to remedy specific problems encountered.

**Sag or Surge**--A sudden increase (surge) or decrease (sag) in the average voltage level. The typical duration is several milliseconds (msec) to several seconds. These unstable voltages can be caused by plant operations, e.g. starting a large motor. Chronic under or over voltage may be related to the user's position on the power grid, i.e. a user close to the generating facility may encounter overvoltage while those further away may experience undervoltage.

**Impulse (Spike or Dip)**--Very brief high or low voltage excursion. A duration of 8.3 msec is usually considered the breakpoint between impulse and sag/surge inputs. Some of these transients, typically 300 to 500 V, will occur routinely when electrical equipment is started or stopped. Lightning, with voltage spikes to 2000 V is a principal external source of impulses in Florida.

**Noise**--A contamination of the pure sine wave expected in electrical power circuits. Two general classifications of noise are EMI and RFI. EMI stands for electromagnetic interference. It is normally induced from a source in line with the computer equipment. Potential EMI noise-generating sources are switches, relays and faulty wiring connections. RFI represents radio frequency interference. RFI noise sources include nearby radar, broadcast transmitters, microwave equipment, spark gaps and other computers.

**Outage**--A loss of power for greater than 1 cycle (approx. 17 msec) through a fault in the in-house power network or by a breakdown of the electrical utility's transmission equipment. Without proper backup equipment, computer operations can not be continued, certain data in temporary memory storage will be lost, garbage data may be recorded and physical damage can occur to moving elements, e.g. head crash where magnetic head falls and scrapes floppy or hard disk.

What are some measures to counteract the above mentioned difficulties?

**Dedicated Lines**--A dedicated line is routed for sole use of the computer. Many of the problem areas (motors, relays, etc.) can be bypassed. However, any disturbances upstream from the point of connection will be transmitted to the computer.

**Suppressors**--Voltage suppressors are used to detect high-energy, high-speed abnormal voltages and to minimize their effects on computer equipment by absorbing the excess power. Response times, suppression power capacities and threshold voltages are considerations in specifying suppressor equipment.

**Filters**--Line filters are installed to eliminate the noise, EMI and RFI discussed above. Low-pass filters would pass 60-Hz power and attenuate higher frequencies, such as radio interference, which would interfere with computer logic circuits.

**Line Voltage Regulators**--Line voltage regulators are implemented to minimize line voltage fluctuations exceeding the self-contained computer's design range of voltage fluctuation. For example, a  $\pm 15\%$  variation might be reduced to  $\pm 3\%$ . Most of the voltage regulators designed for computer oriented applications also incorporate filtering and suppression of transients. In some cases, such units can also be used as the step-up or step-down unit to match nominal input voltages with required voltage for the computer equipment.

**Uninterruptible Power Source (UPS)**--UPS units are used to overcome the power outage problem. One configuration would be a stationary battery, battery charger and a solid state DC to AC inverter. When normal power is disrupted, the batteries provide power to the computer through the inverter. To provide an essentially no-interrupt setup, computer equipment may be served through the inverter at all times. Also, UPS units will incorporate voltage regulation, noise filtering and suppression of voltage spikes. Motor-generator sets are also utilized for UPS service. The flywheel option on these units allows the units to function for brief voltage interruptions. Note that emergency standby power via diesel engines takes 10 to 30 seconds to start. That time duration greatly exceeds the computer tolerance of power interruption, typically 10 to 20 msec.

Two other areas will be mentioned as considerations: if a computer system does shut-down, how is it restarted (manually, automatically)? Also, voltage disruptions are not limited to the main electrical power supply. Disruptive signals can be generated on data communication lines and through sensor connections when the computer is utilized for data acquisition or control functions.

Bill Miller  
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#### SOPP STATUS IN JAPAN

A telegram from the American Embassy in Tokyo to the Secretary of State is available on request (see Available Publications). The telegram is a translation of a Ministry of Health and Welfare press release, and reports the conclusions and recommendations of the Toxicity Committee of the Food Sanitation Investigation Council with regard to the use of SOPP on imported citrus. As you can see, no action was taken and none is contemplated until additional studies are done. These studies have not even been started and I would anticipate it will take quite some time to complete them, particularly if the Japanese intend to wait for the results of the studies requested by the World Health Organization. The end result is that SOPP continues to be an acceptable treatment for citrus fruit destined for Japan.

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#### MOBILE RESEARCH LABORATORY

A mobile research laboratory owned by Sea-Land Service, Inc. has been in operation for over 6 years. The laboratory is designed to monitor environmental conditions in and around products during transit aboard ships or on land. Monitoring continues 24 hours/day from up to 160 container vans or other locations. The lab is also equipped to run numerous tests and observations.

The laboratory runs on 60 cycle, 440 volts from its own power or on ship or shore power. Temperatures are measured from -20 to 80°F within 1/4°F and relative humidity  $\pm$  1% is recorded in the 60 to 100% range. Gas chromatography is available to monitor O<sub>2</sub>, CO<sub>2</sub>, N<sub>2</sub> and CO. The monitored information can be stored and analyzed by an onboard computer.

This mobile research laboratory is now available for rental or lease. Interested parties should contact Dr. Yilmaz Ilker, Sea-Land Service, Inc., Corbin & Fleet Streets, P. O. Box 1050, Elizabeth, NJ 07207, phone (201) 558-6000.

Will Wardowski  
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AVAILABLE PUBLICATIONS

Available from Dr. W. Wardowski, CREC, 700 Experiment Station Rd., Lake Alfred, FL 33850

Copy of telegram on SOPP translated from Japanese Ministry of Health and Welfare press release (see article in this issue: SOPP Status in Japan).

Available from Ing. Beatriz Stein, Estacion Experimental Agricola Seccion Fruticultura, C.C. 71 - 4.000 Tucuman, Argentina

"Effect of harvest and 2 aminobutane treatment on *Penicillium digitatum* sacc decay on lemon" by B. E. Stein, J. L. Foguet, J. L. Gonzalez and S. A. Campo. Rev. Ind. y Agricola de Tucuman 60(2):21-28. Spanish with English Summary.

"Post harvest control of lemon fruit decay produced by *Penicillium digitatum*" by B. E. Stein and J. L. Foguet. Rev. Ind. y Agricola de Tucuman 57(2):23-28. Spanish with English Summary.

"Temperature and humidity effect on injured lemon fruit and *Penicillium digitatum* infection before packing" by B. E. Stein, J. L. Foguet and S. A. Campo. Rev. Ind. y Agricola de Tucuman 60(2):89-93. Spanish with English Summary.

Available from the National Technical Information Service, U.S. Department of Commerce, Springfield, VA 22161

"Guideline on electrical power for ADP installations" by the U.S. Department of Commerce, National Bureau of Standards. FIPS PUB 94. Price \$13.00.

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