THE ELECTRICAL WATCH DOG
USES®

An Introduction To the

USES® SHUNT EFFICIENCY SYSTEM

The patented **USES® Shunt Efficiency System** provides power conditioning and protection from potentially damaging power line surges and spikes. Additionally, the **USES® Shunt Efficiency System** can reduce the electrical energy costs associated with the operation of inductive loads - motor driven equipment and appliances and magnetically ballasted lighting systems.

USES® technology capabilities include:

- protection from surges and spikes, including secondary lightning effects;
- power conditioning, dynamic power factor correction, RF noise reduction, and reduction of the total current content including harmonic current; and
- reduction of the electrical power drawn from the utility to operate inductive loads such as air conditioning and ventilation systems, pumps, compressors, & magnetically ballasted fluorescent & high pressure sodium lighting systems.

The benefits derived from **USES®** units include:

- improved equipment reliability, including computer and electronic systems;
- reduced life cycle maintenance, repair, and replacement costs; and
- an average return on investment is from 6 to 36 months.

The **USES®** approach is superior to other methods for improving electrical system performance, reliability, and efficiency from both an operational and cost standpoint. The technology's patent and listing by UL and CSA attest to the validity of **USES®'** capabilities. The devices are maintenance-free, have a three year limited warranty, and have a projected life of 10 years. Models range from 120/240 volt residential units up to three-phase 600 volt industrial units.

USES® works, it works very well, and it saves energy and money. The unique application of the wrap-around magnetic chokes enables wasted magnetic energy to be converted to useful energy which is then supplied to the electrical system. This reduces the electrical power that the utility must provide resulting in lower electric bills. The units consistently provide real power (KW) savings when installed in systems with inductive loads. These savings exceed the KW reduction achieved merely from the reduction of I^2R losses. Specific savings are contingent on the electrical load configuration, equipment operating hours, and KWH cost. Additional savings can be realized from the reduction of demand charges and the reduction or elimination of power factor penalties. Units generally pay for themselves through utility cost savings in approximately 2 years.

USES MFG INC. PO Box 156, 152 Old Colchester Road, Quaker Hill, Connecticut, USA 06375 • Telephone (860) 443-8737 Fax (860) 439-1515

THE ELECTRICAL WATCH DOG

USES®

USES MFG INC.

CORPORATE BACKGROUND

Description: USES MFG INC. is the manufacturer and marketer of a line of electrical energy conservation and power conditioning products. It is a licensee of USES, Inc., developer of the product's technologies.

Products: The company's principal product is the **USES® Shunt Efficiency System**, a solid state, power conditioning device which reduces the electrical energy that must be supplied by the utility company to operate inductive electrical loads. It also offers protection from voltage transient surges and spikes and from secondary lightning effects.

Technology: **USES®** technology consists of parallel, wrap-around magnetic chokes oriented to couple magnetic forces generated across each electrical phase by the current. On the basis of the magnetic fields sensed, a signal is generated that enhances the AC wave form and matches it to the requirements of the inductive load. The peak portion of the current wave on the line side is decreased and electrical system inefficiencies that originate in the supplying transformer are reduced. The complementary winding technique, used with chokes and capacitors, lowers kilowatt-hour (KWH) consumption, energy usage and demand rate, when connected to inductive loads.

Benefits: **USES®** systems lessen electrical energy waste by: matching voltage and current phases in inductive systems; converting harmonics, spikes and noise to useful energy; reducing I^2R losses; and balancing loads across all phases. The immediate benefit is verifiable reduction of electric utility bills. Additionally, equipment life is increased while maintenance and down time are reduced. The average return on investment is 6 to 36 months.
It has been found that the unique arrangement of chokes provides substantial reductions in power usage, particularly for inductive loads in industrial applications.

Applications: **USES®** units are installed at electrical panels supplying inductive loads and at the disconnect links for large motors. Units also are installed at any panel for which surge protection is needed.

Validation: USES, Inc. was granted U.S. patent 5,105,327 on April 14, 1992; patents are pending in foreign countries. **USES®** products are UL and CSA listed and NYC approved. USES MFG INC. is a member of the Alliance to Save Energy and is an EPA Green Lights Ally. **USES®** products have been evaluated by the State of Connecticut Advisory Committee on Standards for Electrical Hardware and Supplies and approved for installation in state facilities.

Distribution: The **USES® Shunt Efficiency System** is sold through a national network of authorized dealers. Seventeen models are available for residential, commercial, industrial, and recreational applications.

History: The corporation's lineage is traced to establishment, in 1980, of a Connecticut-based, electronic design and electrical contracting company. The shunt efficiency system has evolved, in part, from a lightning surge protector specifically designed and built for a client. Based upon the success of that design, USES, Inc. was formed in 1990 to further pursue development of electrical energy conservation and power conditioning products. USES MFG INC. was formed in 1993 to concentrate on manufacturing and marketing the **USES®** products along with other research and development efforts focused on further applications of the **USES®** technology.

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US005105327A

United States Patent [19]

Wohlforth

[11] Patent Number: 5,105,327

[45] Date of Patent: Apr. 14, 1992

[54] AC POWER CONDITIONING CIRCUIT

[75] Inventor: E. Brian Wohlforth, Quaker Hill, Conn.

[73] Assignee: USES, Inc., Quaker Hill, Conn.

[21] Appl. No.: 521,577

[22] Filed: May 10, 1990

[51] Int. Cl.[5] H02H 9/04

[52] U.S. Cl. 361/56; 323/208; 336/174; 336/184

[58] Field of Search 361/50, 54, 56, 58, 361/111, 113, 118; 323/212, 214, 218, 208; 333/177, 181, 185; 307/105, 154, 157; 336/174, 173, 184

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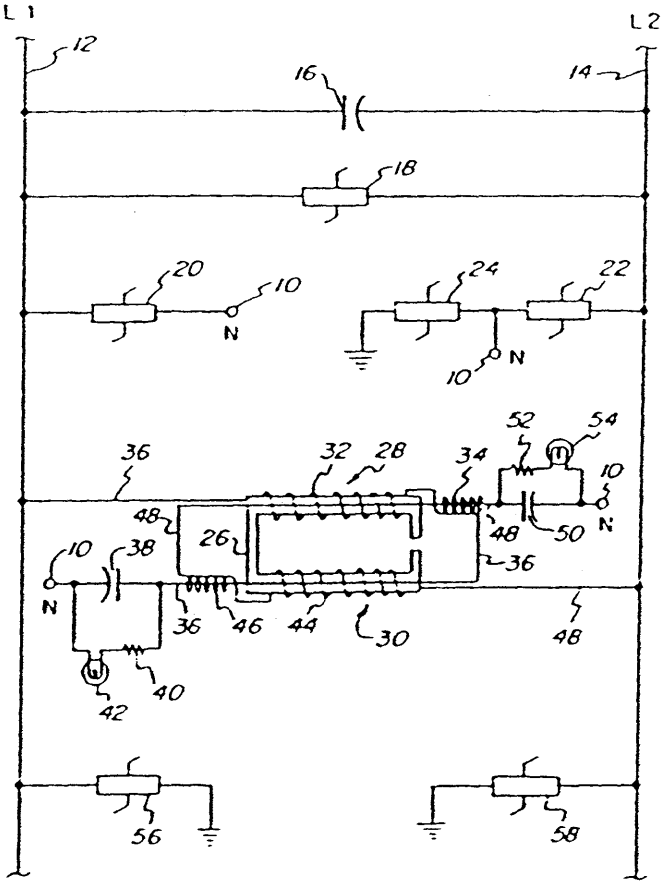
Primary Examiner—Geoffrey S. Evans
Attorney, Agent, or Firm—Barry R. Lipsitz

[57] ABSTRACT

A power conditioner for AC power lines has a choke and capacitor coupled in series across the power lines. The choke comprises a coil terminating in a line, with the line looped back through the coil. The power lines are thereby balanced to provide greater operating efficiency. Capacitors and transient suppressors (e.g., varistors) are used for transient suppression and power factor correction.

23 Claims, 5 Drawing Sheets



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Underwriters Laboratories Inc.®

USES INC
152 OLD COLCHESTER RD
P O BOX 156
QUAKER HILL CT 06375

Date: March 9, 1992
File No: E132743

Product: MISCELLANEOUS APPARATUS

The following material resulting from the investigation under the above numbers is enclosed.

Issue Date	Vol	Sec		Pages	Revised Date
1/ 3/91	1	001	Revised	Description Page(s) 1,4,5,6	3/ 9/92
1/ 3/91	1	001	Revised	Illustrations 1,2,3,4	3/ 9/92
1/ 3/91	1	001	New	Illustrations 5	3/ 9/92

Please file revised pages and illustrations in place of material of like identity. New material should be filed in its proper numerical order.

NOTE: Follow-Up Service Procedure revisions DO NOT include Cover Pages, Test Records and Conclusion Pages. Report revisions DO NOT include Authorization Pages, Indices, Section General Pages and Appendixes.

cc:
Melville File

UNDERWRITERS LABORATORIES INC -Contact: MR. ROBERT McCARTEY
UL INSPECTION CENTER HARTFORD
UNIT 6
BLDG B
200 W CENTER ST
MANCHESTER CT 06040

D E S C R I P T I O N

PRODUCT COVERED:

Miscellaneous Apparatus, Power factor correction unit with surge suppression, Model Nos. RDES-1, CMES-1, CMES-3Y, CMES-3Y480, CMES-3D, CMES-3D480, BL-120, BL-208/240, BL-300, BLM-3Y, BLM-3Y480, BLM-3D, BLM-3D480, CABO-120, CABO-240R, EBB-3D and EBE-3Y.

GENERAL:

These devices are closed type power factor correction units with surge suppression. They use a polymeric enclosure. They function as a solid state surge and spike suppressors for voltage. They are intended to limit the max amplitude of voltage spikes and surges on power lines to specified values. The devices intend to reduce line transmitted interference or noise generated by motors or appliances. They improve voltage regulation. They reduce magnetic fields through wire and equipment from the point of connection of the Unit back to the source by reducing current. When these devices are connected to inductive loads, connected on each hot leg they intend to balance the current on each of these legs and lower the current on the neutral. Also by increasing power factor and lowering amperage, they are able to increase the capacity of the service equipment and help to reduce the wattage when connected on a inductive load. The unit also helps to reduce harmonic current and wattage contents of the line. They are intended to be installed on the load side of the main disconnect.

ELECTRICAL RATINGS:

30 A continuous, 480 V ac, 3 phase maximum.
30 A continuous, 277 V ac, 1 phase maximum.

Environmental rating, Type 1.

M.S.
M.S.

Breakdown of Underwriters Laboratory's Characterization of USES® Technology

1. Helps reduce wattage
2. Reduces current on line
3. Corrects power factor
4. Suppresses voltage surges and spikes
5. Improves voltage regulation
6. Helps to balance loads on all phases
7. Reduces current on the neutral
8. Reduces line-transmitted and motor/appliance - generated noise
9. Reduces total harmonic current contents
10. Reduces magnetic fields

STATE OF CONNECTICUT
DEPARTMENT OF ADMINISTRATIVE SERVICES
BUREAU OF PURCHASES

DATE July 7, 1993

SPECIAL STANDARD NO. 0025-056-162

AGENCY REQUEST FOR APPROVAL OF SPECIAL STANDARD

NAME OF AGENCY: ALL USING STATE AGENCIES

NATURE OF REQUEST: To establish a Special Standard for the Uses, Incorporated's Shunt Efficiency Systems (Power Conditioners) for use in State agencies with large demands for electricity due to motors, compressors, air conditioning, pumps, etc. or prone to erratic surges and/or spike. Uses, Inc. systems are U.L. Listed (Industrial Control Equipment Section 5B-81, File No. E 132743) C.S.A. Listed (Canadian Standards Association File No. LR99910). Uses holds a United States Patent (Pat No. 5,105,327, dated April 14, 1992).

JUSTIFICATION:

The Uses, Inc. Shunt Efficiency System, a power conditioner for AC Power lines, has a choke and capacitor coupled in series across the power lines. The choke comprises a coil terminating in a line, with the line looped back through the coil. The power lines are thereby balanced to provide greater operating efficiency. Capacitors and transient suppressors (e.g, varistors) are used for transient suppression and power factor correction. Uses technology principally consists of parallel, wrap-around magnetic chokes oriented to couple magnetic forces generated across each electrical phase by the current. On the basis of the magnetic fields sensed, a signal is generated that enhances the AC wave form and matches it to the requirements of the inductive load. The peak portion of the current wave on the line side is decreased and the electrical system inefficiencies that originate in the supplying transformer are reduced. Superior surge and spike suppression is a derivative of the process.

The Uses, Inc. systems are designated for those agencies experiencing loss of power, poor voltage regulation, surges and/or spikes and high electrical rates. The system once installed on the load side of the main disconnect, improves voltage regulation, reduces line transmitted interference and noise generated by motors or appliances, increases power factor, lowers amperage and reduces wattage contents on the line which reduces KwH per hour of operation. This will save the agency money.

State agencies requesting Uses, Inc. System (s) shall receive prior approval from the Standards Section of the State Bureau of Purchases. The agency shall supply a Uses, Inc. analysis detailing type of unit proposed, unit location within the facility, projected savings, R.O.I. figures, written justification and any additional detailed information as requested. This shall allow the Standards Section to establish a history file on number of units purchased, location of units and the ability to monitor progress and savings per agency over a specified period of time. This information will be jointly shared with the Advisory Committee on Standards for Electrical Hardware and Supplies. The members were responsible for approving Uses, Inc. systems for State agency use.

JUSTIFICATION: (cont'd.)

The Advisory Committee, in justifying their recommendation, have taken the following into consideration, the owner/inventor is a native Connecticut resident, has refused numerous large monetary offers to sell and/or relocate to other U.S. cities, North and South America and Europe, chose to remain located in the economically depressed area of New London County. The Advisory Committee believes the Uses, Inc. product will save our State agencies funds from continually shrinking budgets.

RECOMMENDATION OF ADVISORY COMMITTEE: RECOMMEND APPROVAL:

ADVISORY COMMITTEE ON STANDARDS FOR ELECTRICAL HARDWARE AND SUPPLIES

RECOMMENDATION OF THE BUREAU OF PURCHASES:

PROCESSED BY T.A. Faraci, CPPO, CPPO

T.A. Faraci, CPPO
Chief of Standards & Tests

APPROVED BY Peter W. Connolly DCS

Peter W. Connolly
Administrative Manager

Jay Churchill
Purchasing Services Officer II,

The City of New York

DEPARTMENT OF BUILDINGS

BUREAU OF ELECTRICAL CONTROL
MUNICIPAL BUILDING, NEW YORK, N.Y. 10007

RUDOLPH J. RINALDI, Commissioner

Telephone No. (212) 669-8673

November 12, 1992

Mr. Bill Morton
Uses, Inc.
1520 Old Coldchester Rd.
Quaker Hill, Ct. 06375-156

Reference: Advisory Board Submission # 92A0390
Calendar # 36038

Dear Mr. Morton,

On September 14, 1992, you requested approval for use in New York City of your Surge Suppressors, Model Nos. Reds-1, CMES-1, CMES-3Y, CMES-3Y480, CMES-3D, CMES-3D480, BL-208/240, BL-300, BLM-3Y, BLM-3D480, CABO-120, CABO-240, EBB-3D and EBB-3Y.

Your request was submitted to the Advisory Board at its meeting of November 12, 1992 together with supporting laboratory reports, brochures and a sample.*

It was the Board's recommendation that the above be approved.

I concur in this recommendation.

Very truly yours,

Edward Solomon, P.E.
Chairman, Advisory Board
Bureau of Electrical Control

* We no longer have need for your sample. Please make arrangements to have it picked-up.

LIMITED THREE YEAR WARRANTY FOR USES® SHUNT EFFICIENCY SYSTEM

The USES® Shunt Efficiency System has a limited three year warranty to the original end user by USES MFG INC. against defects in materials and workmanship when purchased from an authorized dealer. The limited warranty will cover the internal operating parts of a new unit against operational failure. During the limited warranty period, USES MFG INC. will repair or, at their option, replace a defective product at no charge. Any repairs, alterations, additions, or adjustments by others, unless authorized by USES MFG INC., will terminate all obligations of USES MFG INC. under this limited warranty. Removal of any Product from the Destination Country specified below shall void this limited warranty with respect to the Product so removed. This limited warranty does not cover the cost of labor, materials, repairs or replacement resulting from acts of God, fire, water damage or any other cause beyond USES MFG INC.'s control. The limited warranty is null and void if the unit has not been installed by a licensed electrician to USES MFG INC.'s installation specifications. Any tampering with circuits or seals of the unit shall void the warranty. When returning the unit to the authorized dealer for USES MFG INC., the unit must be properly packaged to avoid any damage in transit. The package must be shipped with the delivery charges prepaid. The shipper is responsible for insuring the package for full replacement value. The shipper shall also prepay all costs to cover the return shipping and handling charges.

THIS WARRANTY WILL BE VOID UNLESS THE ATTACHED PRODUCT REGISTRATION CARD IS COMPLETED AND RETURNED TO USES MFG INC. WITHIN FOURTEEN (14) DAYS OF PURCHASER'S RECEIPT OF THE USES SHUNT EFFICIENCY SYSTEM.

EXCEPT FOR THE EXPRESS WARRANTY SET FORTH ABOVE, USES MFG INC. GRANTS NO OTHER WARRANTY, EXPRESS OR IMPLIED, BY STATUTE OR OTHERWISE, REGARDING THE PRODUCTS, THEIR FITNESS FOR ANY PURPOSE, THEIR QUALITY, THEIR MERCHANTABILITY, OR OTHERWISE. USES MFG INC.'S LIABILITY UNDER ANY LEGAL THEORY SHALL BE LIMITED TO A REFUND OF THE PURCHASE PRICE. IN NO EVENT SHALL USES MFG INC. BE LIABLE FOR THE COST OF PROCUREMENT OF SUBSTITUTE GOODS OR ANY INCIDENTAL SPECIAL, CONSEQUENTIAL DAMAGES ON ANY THEORY OF LIABILITY.

Dealer Name:_____ Date of Purchase:_____

USES® Model: _____ Serial Number: _____

Destination Country: _____

USES MFG INC.
P.O. BOX 156, 152 OLD COLCHESTER ROAD
QUAKER HILL, CT 06375 U.S.A.
PHONE 860-443-USES (8737)

Keep for future reference
Nontransferable and Non-Prorated

Dealer Name: _____ Date of Purchase: _____

USES® Model: _____ Serial Number: _____

Destination Country: _____

Customer Name: _____

Address: _____ Telephone: _____

_____ Mail to USES MFG INC.

USES® Technical Specifications

MODEL	BL-120	BL-240	BL-300	BLM-3Y	BLM-3D	BLM-3Y 480	BLM-3D 480
Line Voltage	120 Vac	208/240 Vac	277 Vac	120/208 Vac	208 Vac	277/480 Vac	480 Vac
Nominal Frequency	50 HZ /60 HZ						
Power Dissipation per 8x20 µsec.	> 50 joules	> 100 joules	> 125 joules	> 180 joules	> 375 joules	> 420 joules	> 600 joules
Peak Pulse Current	> 12,000 A	> 12,000 A	> 5,000 A	> 20,000 A	> 18,000 A	> 22,000 A	> 20,000 A
Max Surge Current per 8x20 µsec.	15,000 A	15,000 A	15,000 A	18,000 A	18,000 A	18,000 A	18,000 A
Maximum AllowableVoltage	130 Vrms	250 Vrms	300 Vrms	130/250 Vrms	250 Vrms	300/550 Vrms	550 Vrms
Maximum Clamping Voltage	340 V	650 V	775 V	340/650 V	650 V	775/1500 V	1500 V
Response Time	< 15 nanoseconds						
Surge Rebound	inherent "self healing" property						
Standby Power	> 3 Watts	> 3 Watts	> 3 Watts	> 10 Watts	> 10 Watts	> 15 Watts	> 15 Watts
Total Capacitance	50 µF	50 µF	50 µF	350 µF	150 µF	300 µF	105 µF
Operating Temperature	-40° C to 70° C						
Unit Temperature Rise	< 3° C after 24 hours under full load conditions.						
Audible Noise at 3'	< 2 dBA						
Operating Life	> 60,000 hrs with over 95% survival						
Line Connections (THHN Single Cond.)	#10	#10	#10	#10	#10	#10	#10
Circuit Breaker Required	20 A, 1 pole	20 A, 2 pole	20 A, 1 pole	20 A, 3 pole	20 A, 3 pole	20 A, 3 pole	20 A, 3 pole
Dimensions (H x W x D)	6" x 6" x 4"	6" x 6" x 4"	6" x 6" x 4"	10" x 8" x 6"	6" x 6" x 4"	10" x 8" x 6"	10" x 8" x 6"
Estimated Weight	6 lbs.	6 lbs.	6 lbs.	17 lbs.	9 lbs.	23 lbs.	16 lbs.
Estimated Savings-*Note	0.1 kW 0.1 kWh/hr	0.2 kW 0.2 kWh/hr	0.2 kW 0.2 kWh/hr	0.5 kW 0.5 kWh/hr	0.8 kW 0.8 kWh/hr	0.8 kW 0.8 kWh/hr	1.3 kW 1.3 kWh/hr
Warranty	3 Years						

*NOTE: kW and kWh savings are provided for inductive loads only. Actual savings depend upon load characteristics.

REV 04/97

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THE ELECTRICAL WATCH DOG
USES®

USES® Technical Specifications

MODEL	RDES-1	RDES-1 380	CABO-120	CABO-240			
Line Voltage	120/240 Vac	220/380 Vac	120 Vac	120/240 Vac			
Nominal Frequency	50 HZ /60 HZ						
Power Dissipation per 8x20 µsec.	> 900 joules	> 1000 joules	> 325 joules	> 1000 joules			
Peak Pulse Current	> 30,000 A	> 30,000 A	> 20,000 A	> 30,000 A			
Max Surge Current per 8x20 µsec.	10,000 A 4 shots	10,000 A 4 shots	10,000 A 4 shots	10,000 A 4 shots			
Nominal Clamping Voltage	340/650 Vrms	250/420 Vrms	130 Vrms	340/650 Vrms			
Maximum Clamping Voltage	340 V	340/650 V	340 V	340 V			
Response Time	< 15 nanoseconds						
Surge Rebound	inherent "self healing" property						
Standby Power	> 8 Watts	> 8 Watts	> 6 Watts	> 8 Watts			
Total Capacitance	150 µF	120 µF	100 µF	150 µF			
Operating Temperature	-40° C to 70° C						
Unit Temperature Rise	< 3° C after 24 hours under full load conditions.						
Audible Noise at 3'	< 2 dBA						
Operating Life	> 60,000 hrs with over 95% survival						
Line Connections (THHN Single Cond.)	#10	#10	#10	#10			
Circuit Breaker Required	20 A, 2 pole	20 A, 2 pole	20 A, 1 pole	20 A, 2 pole			
Dimensions (H x W x D)	6" x 6" x 4"	6" x 6" x 4"	6" x 6" x 4"	6" x 6" x 14"			
Estimated Weight	7 lbs.	7 lbs.	7 lbs.	7 lbs.			
Estimated Savings-*Note	0.5 kW 0.5 kWh/hr	0.5 kW 0.5 kWh/hr	0.3 kW 0.3 kWh/hr	0.5 kW 0.5 kWh/hr			
Warranty	3 Years						

*NOTE: kW and kWh savings are provided for inductive loads only. Actual savings depend upon load characteristics.

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THE ELECTRICAL WATCH DOG

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USES® Technical Specifications

MODEL	CMES-1 380	CMES-3Y/380	CMES-3D/380	BL-380	BLM-3Y 380	BLM-3D 380	
Line Voltage	220/380 Vac	220/380 Vac	380 Vac	380 Vac	220/380 Vac	380 Vac	
Nominal Frequency	50 HZ /60 HZ						
Power Dissipation per 8x20 µsec.	>1000 joules	> 2700 joules	> 1250 joules	> 125 joules	> 420 joules	> 600 joules	
Peak Pulse Current	> 20,000 A	> 35,000 A	>35,000 A	> 5,000 A	> 22,000 A	> 20,000 A	
Max Surge Current per 8x20 µsec.	10,000 A 4 shots	20,000 A	20,000 A	10,000 A 4 shots	18,000 A	18,000 A	
Maximum AllowableVoltage	250/420 Vrms	250/420 Vrms	420 Vrms	420 Vrms	250/420 Vrms	250/420 Vrms	
Maximum Clamping Voltage	650 V	650/1240 V	1240 V	1240 V	650/1240 V	1240 V	
Response Time	< 15 nanoseconds						
Surge Rebound	inherent "self healing" property						
Standby Power	> 10 Watts	> 25 Watts	> 25 Watts	> 3 Watts	> 15 Watts	> 15 Watts	
Total Capacitance	150 µF	315 µF	255 µF	25 µF	300 µF	105 µF	
Operating Temperature	-40° C to 70° C						
Unit Temperature Rise	< 3° C after 24 hours under full load conditions.						
Audible Noise at 3'	< 2 dBA						
Operating Life	> 60,000 hrs with over 95% survival						
Line Connections (THHN Single Cond.)	#10	#8	#8	#10	#10	#10	
Circuit Breaker Required	20 A, 2 pole	30 A, 3 pole	30 A, 3 pole	20 A, 1 pole	20 A, 3 pole	20 A, 3 pole	
Dimensions (H x W x D)	10" x 8" x 6"	14" x 12" x 6"	14" x 12" x 6'	6" X 6" X 4"	10" X 8" X 6"	10" x 8" x 6"	
Estimated Weight	8 lbs.	20 lbs.	18 lbs.	6 lbs.	23 lbs.	16 lbs.	
Estimated Savings-*Note	1.0 kW 1.0 kWh/hr	2.0 kW 2.0 kWh/hr	3.0 kW 3.0 kWh/hr	0.2 kW 0.2 kWh/hr	0.8 kW 0.8 kWh/hr	1.3 kW 1.3 kWh/hr	
Warranty	3 Years						

*NOTE: kW and kWh savings are provided for inductive loads only. Actual savings depend upon load characteristics.

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USES® Technical Specifications

MODEL	CMES-1	CMES-3Y	CMES-3D	CMES-3Y/480	CMES-3D/480	CMES-3Y/600	CMES-3D/600
Line Voltage	120/240 Vac	120/208 Vac	208 Vac	277/480 Vac	480 Vac	347/600 Vac	600 Vac
Nominal Frequency	50 HZ /60 HZ						
Power Dissipation per 8x20 µsec.	> 1000 joules	> 2000 joules	> 1250 joules	> 4000 joules	> 3000 joules	> 4500 joules	> 3300 joules
Peak Pulse Current	> 30,000 A	> 45,000 A	> 45,000 A	> 45,000 A	> 45,000 A	> 50,000 A	> 75,000 A
Max Surge Current per 8x20 µsec.	10,000 A 4 shots	10,000 A 4 shots	10,000 A 4 shots	20,000 A	20,000 A	30,000 A	30,000 A
Nominal Clamping Voltage	130/250 Vrms	130/250 Vrms	250 Vrms	300/550 Vrms	550 Vrms	385/680 Vrms	680 Vrms
Maximum Steady State Voltage	340 V	340/650 V	650 V	775/1500 V	1500 V	1025/1815 V	1815 V
Response Time	< 15 nanoseconds						
Surge Rebound	inherent "self healing" property						
Standby Power	> 10 Watts	> 15 Watts	> 15 Watts	> 25 Watts	> 25 Watts	> 35 Watts	> 35 Watts
Total Capacitance	200 µF	450 µF	450 µF	315 µF	255 µF	315 µF	255 µF
Operating Temperature	-40° C to 70° C						
Unit Temperature Rise	< 3° C after 24 hours under full load conditions.						
Audible Noise at 3'	< 2 dBA						
Operating Life	> 60,000 hrs with over 95% survival						
Line Connections (THHN Single Cond.)	#10	#8	#8	#8	#8	#6	#6
Circuit Breaker Required	20 A, 2 pole	30 A, 3 pole	30 A, 3 pole	30 A, 3 pole	30 A, 3 pole	40 A, 3 pole	40 A, 3 pole
Dimensions (H x W x D)	10" x 8" x 6"	14" x 12" x 6"	14" x 12" x 6"	14" x 12" x 6"	14" x 12" x 6"	14" x 12" x 6"	14" x 12" x 6"
Estimated Weight	8 lbs.	17 lbs.	15 lbs.	20 lbs.	18 lbs.	26 lbs.	24 lbs.
Estimated Savings-*Note	1.0 kW 1.0 kWh/hr	1.25 kW 1.25 kWh/hr	1.5 kW 1.5 kWh/hr	2.0 kW 2.0 kWh/hr	3.0 kW 3.0 kWh/hr	3.0 kW 3.0 kWh/hr	4.0 kW 4.0 kWh/hr
Warranty	3 Years						

*NOTE: kW and kWh savings are provided for inductive loads only. Actual savings depend upon load characteristics.

REV 04/97

USES MFG INC. PO Box 156, 152 Old Colchester Road, Quaker Hill, Connecticut, USA 06375 •Telephone(860)443-8737 Fax(860)439-151

THE ELECTRICAL WATCH DOG
USES®

POWER FACTOR COMPENSATION WITH 3 PHASE USES UNITS

TECHNICAL SPECIFICATIONS

MODEL USES	VOLTAGE	L1 AMP REACT.	KVAR
CMES-3Y	208	11	4
CMES-3D	208	20	7
CMES-3Y	240	13	5
CMES-3D	240	23	8
CMES-3Y	480	18	15
CMES-3D	480	26	23
CMES-3Y	600	24	25
CMES-3D	600	32	34

L1 AMP REACTIVE IS MEASURED AMPERAGE ON THE L1 USES LEAD

KVAR (3-PHASE) = KILOVOLT (PHASE-TO-PHASE) x L1 AMP REACT. x 1.73

Install USES UNITS as close to inductive loads as possible. Match the KVAR of the individual units with these loads and have the units switched on and off with the loads. The total additional KVAR should be calculated from the Power Factor Improvement Table to bring the existing system power factor to the desired level.

Note: KVAR values can change depending on load characteristics.

THE HARTFORD COURANT: Monday, May 27, 1991

A surprisingly potent means of controlling power

Device guards against surges of electricity, cuts utility bills

By SAM LIBBY
Courant Correspondent

WATERFORD — During a 2½-year period, the area around Sanford "Bud" Solomon's house — which sits high on a hill on Old Colchester Road in Montville — was hit by lightning four times.

The lightning caused electrical power surges that destroyed his microwave oven, his televisions and other household appliances.

So, in 1989, he turned to an acquaintance, E. Brian Wohlford, an electrical and computer inventor and local entrepreneur. Wohlford, 41, installed a small gray box that he had designed as a surge protector.

But it soon became apparent that the small gray box was doing much more. Not only were Solomon's appliances being protected from electrical surges from lightning, but he also began seeing savings in his electricity bill.

Since then, a host of engineering studies by customers and Underwriters Laboratories have been done on the small gray boxes, which are called USES Savings Units. Wohlford has connected the units to local homes, and to electrical systems in hospitals, military installations, factories, office buildings, apartments, schools and government buildings.

This year the USES Savings Unit has been listed by Underwriters Laboratories as an electrical surge suppressor, a voltage regulator, a device that reduces magnetic fields and a power factor correction unit, which means it makes sure that the kind of power that goes into appliances is the correct kind.

And the engineering studies conducted on the small gray boxes conclude that the units reduced electricity demand and reduced power costs.

Russell and Larraine Rice, Montville homeowners who paid $675 for the smallest (6 inches by 6 inches by 4 inches) USES Savings Unit, which is for homes, say the unit decreased their monthly power bill by 30 percent and paid for itself immediately because it was able to correct power problems in their refrigerator. Before they got the unit, their heavy-duty refrigerator was not getting enough electricity to make ice cubes.

Other local homeowners say the device reduced their power costs by 10 percent to 25 percent and paid for itself in about a year and a half.

Owners or supervisors of commercial, industrial, military and municipal buildings say they've seen comparable savings when the units are connected to their power panels.

Engineering tests also show that the boxes reduce electromagnetic fields (thought by some scientists to be a cause of cancer), which are generated by electric appliances and power lines.

"It does everything they say it's supposed to do," said William Couillard, director of buildings and grounds for Waterford's public schools. Couillard said he tested a $3,000 USES Savings Unit on an electrical panel that controlled the pumps and heaters for Waterford High School's Olympic-sized swimming pool, and also controlled the lights for the school's tennis courts.

"It does work. It reduces electrical demand. I calculate that we're talking an 11.6 percent savings in power costs, and the unit will pay for itself in about a year and a quarter to a year and a half," Couillard said.

The unit also has been tested on the school system's electrical panels, which control the power to a wide range of computer equipment.

"Although the power companies don't want to talk about it, the power that comes off the streets has real high peaks or surges, which can really damage computers," Couillard said.

The units clean up electric power. They increase the life expectancy of computers, electric motors and other sensitive electrical or electronic appliances, he said.

But many of the electrical engineers who have tested the unit said they do not know how the gray boxes work.

Engineers in Northeast Utilities' energy conservation department saw a demonstration of the unit, said Jeffrey R. Kotkin, a spokesman for the utility company.

"But we need more information about how this thing works so we can do the controlled testing we would require before we could vouch that the unit works," he said.

"I'll be [darned] if I can explain it," said Stephen F. Pucino an energy conservation engineer at the U.S. Naval Base in Groton.

Pucino said he tested a unit that he attached to the electrical panel that controlled the heaters and pumps on a swimming pool at the submarine base.

"There's no doubt about it, it reduces electrical demand. . . . If this thing is for real, and I can't find any reason why it isn't, this is something big, this is the kind of thing that could make somebody very rich. I told Wohlford I hope he has all the patents on this. . . . I talked to him about how it works, and I'm not sure that he even knows. It really bothers me that I can't figure it out. If I could figure it out, I'd tell the Navy to buy a whole bunch of them. But since I'm not completely sure how it works, I'm telling the Navy to do more tests on it, maybe even have some physicists look at it and try to figure it out."

"I'm not sure of the concept," said Brian Johnson, electrical supervisor at Lawrence and Memorial Hospital in New London, where the gray box was attached to an electrical panel for a hospital elevator. "But it did reduce electrical demand."

Johnson said he is also advising further testing of the unit before he recommends that the hospital purchase them.

"At a certain level it's not that hard to figure out," Wohlford said.

Wohlford said the secret of his device is what he calls "parallel rap around magnetic chokes" in a "magnetic core memory."

He said he is filing for patents for the device in 43 countries, including the United States, Mexico, France, England, Japan, Germany and Canada.

Wohlford said the USES units are able to monitor the voltage, current, magnetism and the electricity load of an electrical circuit. This monitoring of an electrical circuit takes place every nanosecond, or about one-billionth of a second.

The device's magnetic core memory then eliminates the highs and lows of the circuits' energy use, or as Wohlford describes it, it evens out the circuits' electrical load, making the electrical system much more efficient in its use of electricity, and also protecting appliances from electrical surges.

By reducing the use of electrical current, the device also directly reduces electromagnetic fields, which could pose health hazards, he said.

The design of the unit also makes it easy to install, Wohlford said.

But Wohlford also admits that at a certain level he is not certain how or why USES units work, just as at a certain level nobody is sure how electricity works. But he said he is sure his device works.

The gray boxes are being manufactured by Wohlford and a five-person staff in the basement of his home and offices on Old Colchester Road in the Quaker Hill section of Waterford.

But Wohlford said he believes the manufacture of his invention could soon involve many other people seeking manufacturing jobs in southeastern Connecticut's depressed economy.

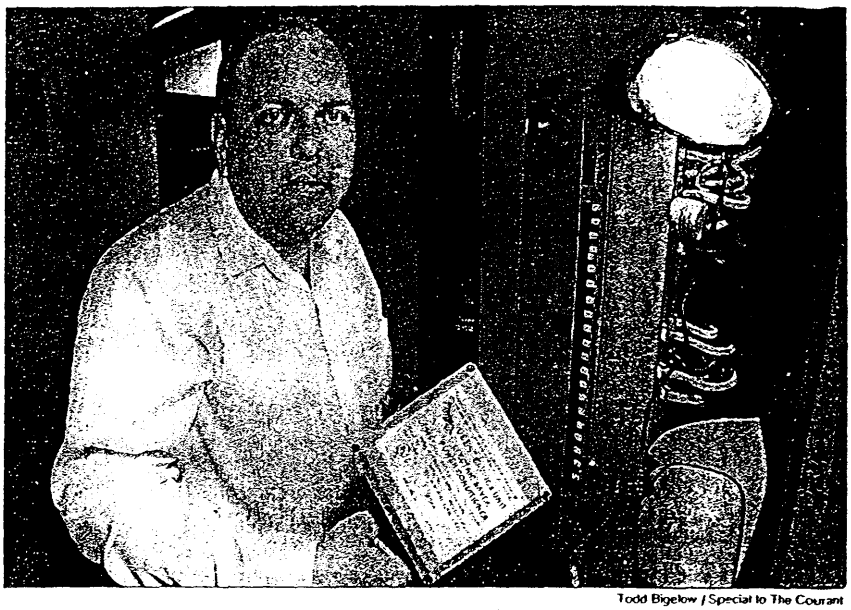
"A lot of people tell me I should sell this to a big company and make a lot of money right away," Wohlford said.

There are USES dealers in Connecticut, New York, Massachusetts, Virginia, Georgia, Arizona and Pennsylvania.

In the past two years, 80 of the units have been sold and installed. Wohlford said he is selling about six units a week, primarily in the Northeast.

Wohlford said he is negotiating with two local firms that would be able to make large numbers of the units in southeastern Connecticut.

"People are always asking me what the initials USES stand for. They aren't the initials for anything. I call it that because it has a lot of uses. It can protect appliances from power surges of as much as 20,000 to 30,000 volts. It reduces electrical demand and saves people money. It saves energy. It lengthens the lifespan of electric motors and appliances. It can create a lot of manufacturing jobs. It saves in reinstallation costs for electrical services. It just has a lot of uses," he said.



Todd Bigelow / Special to The Courant

■ E. Brian Wohlford has invented a device, the USES Savings Unit, that protects appliances from power surges and reduces electrical demand, among its other properties.

USES® SHUNT EFFICIENCY SYSTEM
APPLICATION GUIDE

The **USES® Shunt Efficiency System** is a solid-state power conditioning device which lowers costs by reducing the electrical energy that must be supplied by the utility company to operate inductive loads. It also offers protection from voltage transient surges and spikes and from lightning strikes.

1. RESIDENTIAL -- USES® residential units provide surge and spike protection for such items as personal computers and consumer electronics and energy savings on all motorized electrical appliances and loads such as refrigerators, freezers, air conditioners, heat pumps, heating system blowers and pumps, swimming-pool and well pumps, washers, and similar appliances. Most installations require a single unit which is installed at the service entrance circuit-breaker panel.

MODEL	APPLICATION
RDES-1	For 120/240 volt residential installations.
CMES-1	For 120/240 volt installations in larger homes or homes with 240 volt motor loads that operate for considerable periods of time, such as central air conditioning, heat pumps, and swimming pool pumps.

2. COMMERCIAL/INDUSTRIAL -- USES® commercial and industrial products provide power-factor correction, total harmonic current-content and RF-noise reduction, load balancing, surge and spike protection, and improved voltage regulation. Energy savings are provided for inductive loads including magnetic ballasted lighting and all motorized equipment such as air conditioning, air compressors, pumps, refrigeration, and other industrial-processing equipment. Units are installed at service panels or distribution panels or can be connected locally to equipment on the line side of any controllers, depending on the facility's electrical equipment and electrical distribution system

MODEL	APPLICATION
CMES-1	For 120/240 volt, small commercial installations.
CMES-3Y	For 208/120 volt, 3-phase, 5-wire commercial/industrial installations.
CMES-3Y (480v)	For 480/277 volt, 3-phase, 5-wire commercial/industrial installations.
CMES-3Y (600v)	For 600/347 volt, 3-phase, 5-wire commercial/industrial installations.
CMES-3D	For 208 volt, 3-phase, 4-wire commercial/industrial installations.
CMES-3D (480v)	For 480 volt, 3-phase, 4-wire commercial/industrial installations.
CMES-3D (600v)	For 600 volt, 3-phase, 4-wire commercial/industrial installations.

3. RECREATIONAL -- USES® recreational products are for use in recreational vehicles and boats to provide surge and spike protection and energy savings on all inductive loads such as refrigerators, freezers, air conditioners, and pumps. Units are installed at distribution panels.

MODEL	APPLICATION
CABO-120	For 120 volt recreational and marine installations.
CABO-240	For 120/240 volt recreational and marine installations.

4. AUXILIARY -- USES® auxiliary products are designed for use on heavy or remotely located loads, such as motors, pumps, and ballasted lighting. They only can be used in conjunction with an RDES, CMES, or CABO primary unit and are installed in electrical panels or are connected locally to equipment on the line side of any controllers

MODEL	APPLICATION
BL-120	For 120 volt installations.
BL-208/240	For 208 to 240-volt installations.
BL-300	For 277 volt, phase-to-neutral load installations.
BLM-3Y	For 208/120 volt, 3-phase, 5-wire commercial/industrial installations.
BLM-3Y (480v)	For 480/277 volt, 3-phase, 5-wire commercial/industrial installations.
BLM-3D	For 208 volt, 3-phase, 4-wire commercial/industrial installations.
BLM-3D (480v)	For 480 volt, 3-phase, 4-wire commercial/industrial installations.

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We use the pie chart to graphically display the features for the USES® Savings Unit because it visually shows the make-up of where the savings will be realized but also tries to emphasize that there is more to the unit than just helping lower your electric bills.

An important point which cannot be stressed enough is our product incorporates all of these features in one. To date, an individual would have to separately purchase:

1) Capacitors or soft starts for motors
2) Power factor correction device
3) Spike or surge protection outlet strips
4) Lightning arrestor equipment
5) Timers, special lighting
6) Load balance equipment
7) Magnetism reduction equipment

To incorporate these into your presentation, let us look at all the product features and the benefits to your customer.

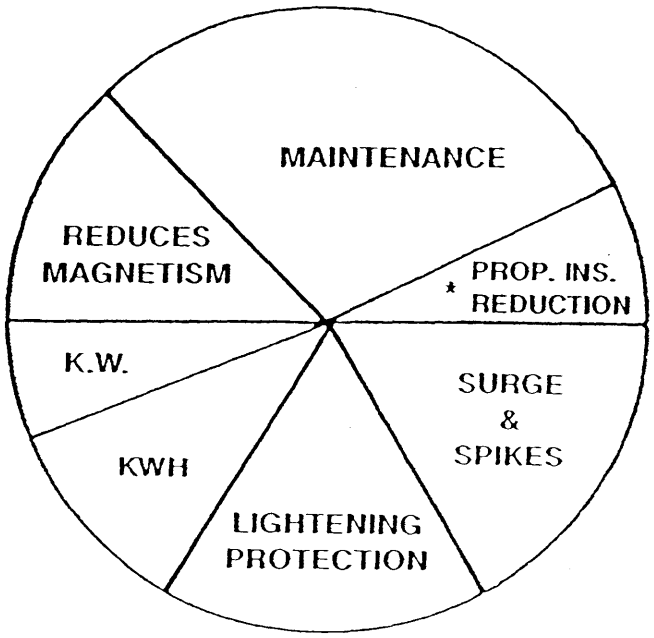
USES® FEATURE/BENEFIT

FEATURE	BENEFIT
• Reduces maintenance of motors • Surge and spike protection • Lightning protection • Helps lower demand (KW) • Helps lower kilowatt hours (KWh) • Reduces magnetism • U.L. listed • 3 year limited warranty • Requires no maintenance • Easy installation • Helps to balance loads	• Prolonged motor life • Suppresses contact arcing • Increases motor compressor reliability • Reduces electrical noise • Improves voltage regulation • Protects computers • Protects sensitive electrical equipment ie., microwaves, VCRs, stereos • Increases lamp life • Provides whole house protection by installation to service panel • Requires no maintenance • Reduces our exposure to magnetic fields at our electrical service • Independent testing by U.L. for public safety • Reduces loads on panels • Reduced rate on property insurance for qualified policy holders.

SAVINGS PROFILE

USES® A. C. POWER CONDITIONER

SAVINGS PAYBACK



MAINTENANCE

- VOLTAGE REGULATION
- MOTOR LIFE AND LAMP LIFE
- CONTACT ARCING
- I^2R LOSSES
- FILTER ELECTRIC NOISE AND R.F. NOISE
- LOWER AMP FOR TRIPPING CB
- BALANCING AND LOAD REDUCTION ON PANEL AND SERVICES
- MAGNETISM IS REDUCED FROM POINT OF CONNECTION.

*Lower Property Insurance costs for qualified policy holders.

Let "USES®" Be Your Electrical Watch Dog.

USES MFG INC.

P.O. Box 156
152 Old Colchester Road
Quaker Hill, CT 06375

USES®

TECHNOLOGY FOR EFFECTIVE CONSERVATION OF ELECTRICAL ENERGY

The escalating cost of the primary fuels used in the production of electric power (coal, oil, and natural gas) has made conservation of electricity a matter of universal concern. The extensive allocation of these basic fuels to the production of electric power has made saving electricity synonymous with saving important non-renewable resources.

Most efforts at conserving electric energy today emphasize more efficient utilization and/or effective management of available electrical energy; i.e., improved insulation of living and working spaces, efficient lighting systems, staggered loading to minimize peak demand, elimination of unnecessary use of electrical energy, etc. Programs in this area are in large part dependent on public cooperation or may not be sufficiently cost effective to merit implementation. We at USES® have a solution to the programs above which is highly cost-effective, and helps savings of electrical energy that is wasted.

The USES® approach to saving electrical energy focuses on providing more efficient and effective use of generated electrical power. Toward this end it must be recognized that, first, not all of the power generated by any plant reaches the user; energy is expended in delivering this power due mostly to the inherent resistance in the circuit conductors. This effect varies with the distance from the generating station to the load. Second, each generating station supplies current to a multitude of differing equipments. Some of these devices, primarily motors, interact with the power supplied in such a way as to force the utility to deliver more power to the motor than is actually needed. The technical designation for this phenomenon is "poor power factor". A detailed explanation of poor power factor is not necessary here. What is important is that this condition is unavoidable and exists wherever a motor is used. The expense of the power wasted as a result of poor power factor is borne by the utility. The utility may charge the customer for this wasted energy, but the energy is wasted nonetheless.

The new technology we employ uses parallel rap round magnetic chokes oriented to create crossing lines of magnetic force across the voltage and current of each electrical phase. Based on the magnetic fields sensed, it helps correct the quality of the power wave at the point of connection without disrupting the operation of the motor or equipment being served. USES® monitors the load approximately every 1×10^{12} seconds. The idea of the USES® AC power conditioner is to make sure your inductive equipment does not waste energy and the power being used by the customer for his equipment is more efficient and not wasted.

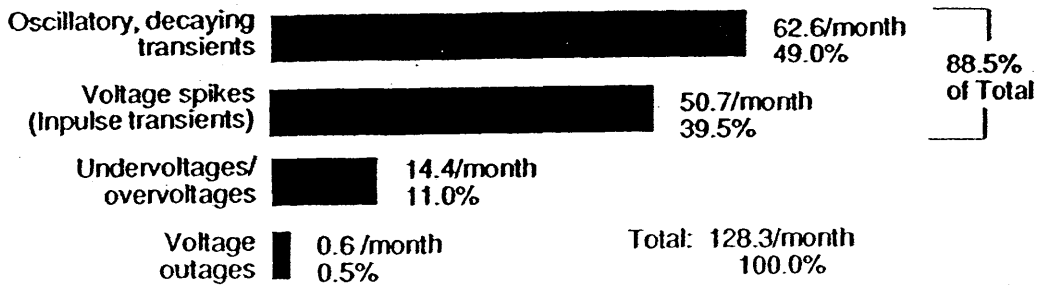
A USES® unit is easily installed across an existing 30 AMP circuit breaker in your distribution panel. Units are sized for 120/240 volt single phase residential systems to 3 phase 4 wire 480 volt industrial systems. Virtually all types of end users can be accommodated. They include, but are not limited to, private dwellings, apartment buildings, commercial buildings, industrial sites, stores, supermarkets, hospitals, marine installations, etc. The only distinction among them is that their savings increase with level of usage.

USES® Savings Unit Power Conditioner technology has a patent pending and it is presently filed in 43 countries. In December 1990, the unit completed engineering investigation and testing by Underwriters Laboratories and received approval for listing under category 5B81 "Industrial Control Equipment". Their report, under file number E132743, describes our unit as:

> "These devices are closed type power factor correction units with surge suppression. They use a polymeric enclosure. They function as a solid state surge and spike suppressors for voltage. They are intended to limit the max amplitude of voltage spikes and surges on power lines to specified values. The devices intend to reduce line transmitted interference or noise generated by motors or appliances. They imporve voltage regulation. They reduce magnetic fields through wire and equipment from the point of connection of the Unit back to the source by reducing current. When these devices are connected to inductive loads, connected on each hot leg they intend to balance the current on each of these legs and lower the current on the neutral. They are intended to be installed on the load side of the main disconnect."

One might ask about the frequency of power surges or spikes which can best be understood by reviewing a study prepared by George Allen and Donald Segall of IBM's System Development Division:

INCIDENCE RATE OF HARMFUL POWER LINE DISTURBANCES



Within your home or business, when an appliance or piece of equipment is turned on, the rush of current to energize it sets up a magnetic field; turning off the same appliance or equipment and the sudden decay of current within, sets up another magnetic field. These sudden surges and collapses of electrical energy, referred to technically as transients, can cause damage to sensitive electronic equipment and computers.

When studied by General Electric Research and Development Center in Schenectedy, NY they reported in General Electric Transient Voltage Suppression Manual, "Electricity being turned off or on in a home causes voltage 'spikes' up to 2,500 volts. Voltage surges from outside sources including lighting reach up to 5,600 volts on a 120 volt line."

A sudden change in supply voltage brought on by a cycling oil burner, air conditioner, refrigerator, etc., can cause a computer to lose memory, garble valuable data, or go blank and have to be restarted, with all accumulated data lost. Our USES® devices are designed to absorb and attenuate major transients before any damage can be done. They are especially effective against severe surges in electrical power at the point of entry. For this reason many are in use in commercial and business environments primarily for their protective capability; their energy-saving is considered an additional bonus.

The USES® devices have been tested for their ability to eliminate or significantly reduce the surges discussed above. They respond to spikes and surges in less than 5 nanoseconds ($<5 \times 10^{9}$). They are extremely effective in reducing surges resulting from activating large motors and other heavy duty equipment. This feature serves to extend the life of the equipment as well as reducing the power required.

The electrical energy associated with magnetic fields is not localized, or confined to the point of origin. It radiates over local circuits back to the service entry cables, over the transmission lines and eventually back to the power plant or origin. These fields also radiate outward from the circuits of origin which act as antennas, into the immediate surroundings. The USES® unit reduces magnetic fields through wire and equipment from point of connection of the unit back to the source by reducing current. Another factor to be considered regarding these magnetic fields is the frequency with which they occur. Bear in mind that thousands of appliances and other electrical devices are being turned on or off all the time. Current is increasing and decreasing constantly with the USES® unit current on their lines from point of connection will be reduced.

This means the widespread use of the USES® devices would contribute greatly to reducing of magnetic fields.

THE ELECTRICAL WATCH DOG
USES®

FACTS ON ELECTRICAL SPIKES & SURGES

- Electrical Spike~ A rapid burst of excessive electrical current.

- Electrical Surge~ A prolonged burst of excessive electrical current.

- Spikes & Surges Happen frequently~ National; average is 3.5 times every day at every home. { Source: IBM Research Study }

- Causes:
  A} Power Company~ Grid load switching.
  B} Thunder Storms~ Lightning and static electricity build up.
  C} Demand Changes~ Sudden power shut downs within your service area.
  D} Accidents~ The transformer falling in Burlington. { Free Press, 4/3/90 }

- The Problem is Real~ Industry is spending $504 million each year for protection against electrical surges.

- Common Appliances at risk in your home:

  - **Microwave Ovens**
  - **V.C.R.**
  - **C.D. Players**
  - **All Clocks & Radios**
  - **Telephones**
  - **Garage Door Openers**
  - **Computer**
  - **Any Electrical Device with a Printed Circuit Board and\or Micro Chips**

Three common ways Surges can enter your home:

1} Power Line Service
2} Telephone Line Service
3} Cable T.V. Line Service

- How Surge Protection Works~ A MOV { Metal Oxide Varistor } literally absorbs the excess electrical energy, converts it to heat energy and dispenses it into the air.

- Surges are more Hazardous and Costly today~ Because the average home has more appliances equipped with micro chips, pre-printed circuit boards, and liquid crystal displays than any home did, even four years ago.

•Your home needs Electrical Surge Protection because:

1} Spikes & Surges happen
2} Your home does get them daily
3} They reduce the useful life of your appliances...even your light bulbs
4} Surge Protection is cost effective. You can completely protect your home for less money than the costs of two service calls by appliance or T.V. repair.

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THE ELECTRICAL WATCH DOG

USES®

Most Frequently Asked Questions about the USES® Shunt Efficiency System

- IS IT LEGAL; WILL THE UTILITY COMPANY COME AND TAKE IT AWAY?

  Yes, it is legal. The USES® System is not connected to the utility meter. It is connected in parallel to your service panel by a licensed electrician.

- WHERE DO THE AMPS GO?

  The USES® System improves the power the utility company provides enabling you to operate more efficiently.

- WHAT IS THE LENGTH OF WARRANTY?

  Three { 3 } years, limited.

- HOW LONG WILL THE **USES®** SYSTEM LAST?

  We estimate 8 to 10 years prior to needing service.

- DOES IT WORK ON VARIABLE FREQUENCY DRIVES?

  Yes, it works on the A.C. line side.

- HOW MUCH CAN I SAVE ON MY ELECTRIC HEAT?

  Very little. The USES® System provides minimal savings to purely resistive loads such as electric heat, clothes dryers, electric stoves, etc...

- CAN'T I JUST BUY A LESS EXPENSIVE BL OR BLM **USES®** UNIT FOR MY LARGE ELECTRIC LOAD?

  No, the USES® System is designed to work in conjunction with a main unit on the service panel to further reduce I^2R losses from the point of the load back.

- IF EACH UNIT IS DESIGNED FOR 200 AMPS, WHAT HAPPENS IF IT SEES MORE OR IF THE PANEL IS RATED 400 OR 600 AMPS?

  The USES® System reaches the maximum saturation. Then, no additional savings will be provided.

- AT WHAT SIZE MOTOR DOES IT JUSTIFY A FULL UNIT { CMES-3D }?

  Most applications, 10 HP and above. If the motor is energy efficient and sized properly for the load, 20 HP or above.

- WHAT HAPPENS WHEN THE MOTOR OR PANEL ISN'T DRAWING A LOAD? DOES THE **USES®** SYSTEM STILL DRAW CURRENT? WILL IT STILL PROVIDE ENERGY SAVINGS?

  Yes, but the amount drawn is proportional to the load at the panel. The USES® System will provide savings because it will chase other inductive loads in the building and reduce their consumption.

- HOW DO I KNOW WHEN THE **USES®** SYSTEM NEEDS SERVICING?

  There are indicator lights on the side of the USES® Unit. If any of them are out, the unit should be serviced.

- DO I NEED A PANEL FOR EVERY PANEL IN MY FACILITY?

  No. The USES® System should be placed as close to the inductive loads as possible. It is not necessary to place it on panels with all resistive loads or receptacles unless you have something you want to protect.

- MY HOUSE HAS TWO PANELS. DO THEY EACH NEED ONE?

  Not necessarily. Some houses have two panels because one is electric heat.

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THE ELECTRICAL WATCH DOG
USES®

USES MFG INC.

QUESTIONS AND ANSWERS FOR RESIDENTIAL BUYERS

Q: What are power disturbances and where do they come from ?

A: Power disturbances are sudden voltage changes which are caused in many ways: Animals in contact with the power lines, the next door handy man using power equipment, road accidents involving utility poles, and stormy weather. More frequently, however, the disturbance occurs within the house when the A/C compressor cycles or because faulty wiring exists. A voltage surge quickly travels through the wires damaging unprotected sensitive electronic equipment. A surge may also enter the house via the telephone line or TV coaxial cable.

Q: Doesn't the circuit breaker protect home equipment ?

A: Common A/C circuit breakers do not react fast enough to stop surge damage. When the source of the surge is inside the home or business, it doesn't pass through the circuit breakers. This is why surge protection is important.

Q: Isn't surge protection only for computers ?

A: No. Televisions, stereo systems, VCR's, microwave ovens, home security systems - all have silicone chips which are sensitive to sudden voltage changes. Even water heaters , air conditioners and major appliances such as refrigerators can be damaged by larger surges.

Q: Why would I need surge protection now when I never needed it before?

A: Electronics are changing rapidly, becoming increasingly sophisticated and intricate. Much of todays technology was not commonly used just five years ago. Modern TV's, microwaves, computers, VCR's and other electronic equipment are sometimes very sensitive to even small variations in voltage.

Q: Can a surge damage my equipment even if I am not using it ?

A: Yes, as long as the equipment is plugged in, surges can erode the tiny microprocessor chips inside. The equipment can be damaged even if it is turned off.

Q: What about lightning protection ?

A: Millions of dollars in equipment and appliances are destroyed annually by the devastating power of lightning strikes. The magnitude of the problem is illustrated by recently revised business electronic equipment policies of some major insurance companies who now offer premium discounts to customers who use surge protection devices.

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THE ELECTRICAL WATCH DOG

USES

DESCRIPTION

Our Savings Unit was designed to cut demand and save money on your electric bills. As you realize, demand is what determines a commercial customers rate on his bill. Our Unit also acts as a surge suppressor, as we had to incorporate a suppressor into our unit to protect our own product.

Our unit balances the load in the panel box, takes out the spikes and surges, reduces the I^2R loss and reduces the noise pollution in the lines. A good electrical current is like a wave, versus the irregular waves you now receive. Our unit corrects the irregular waves to create as perfect a wave as possible to supply cleaner power.

The unit is also a positive envelope, which means that only 130 volts will be expelled to the electrical system at any one time, therefore protecting the system from surges. The unit reduces wear and tear on motors and lights. By reducing the wear and tear, your motors run cooler. The ballasts and fluorescent bulbs last longer as the unit takes the spikes out of the lines.

In our demonstration we can show by using an amp meter how we can reduce the initial start and running wattage on eight energy saving lamps by more than one amp and in some cases by much more. We cut the initial start up on motors by much more. We can also demonstrate how our unit has no effect on the light output or running of a light or motor.

Not all electrical equipment is pure resistance. Any piece of equipment which requires a magnetic field to operate, for example a motor, a transformer, a fluorescent ballast, or a solenoid will cause the voltage and current to get out of phase unless some corrective action is taken. Even if it is only a fraction of a second, it takes time to create and collapse a magnetic field which is what happens in an AC current circuit. This is similar in effect to physical inertia and is called inductance.

Many utilities do not show a penalty on their bills but they do have a KVAR or a KVA demand charge. Both of these are another way of penalizing an end user for poor power factor. If a plant is being charged for KVA demand and all that demand is not being converted to KW or useful work then the end user is paying the higher KVA demand and the related charges on the utility bill. Less current flowing in the end users conductors which means lower I^2R losses in the lines. This will result in lower basic KWH energy charges, lower sales taxes and lower fuel adjustment charges. It also means higher voltages at motors, which will run cooler, thereby, increasing their life.

As said previously, our unit is also a very heavy duty surge suppressor. This is a very important factor, whether it is used in a home or in a commercial building. Although, most homes do not have high power bills, many people wonder why they should purchase a unit. The unit will reduce the power bill, but most important it will protect their refrigerator motors and other motors from harmful spikes. The unit will also protect their televisions and microwaves, which are very easily damaged by spikes and brown outs. Saving an appliance such as these would make the purchase of a unit worthwhile. The unit is also very important if one lives in a trailer park where power supply is usually below standard.

In a commercial application, not only would the unit save on the bill, but it would protect the air conditioning, heat pump and any other large motors from surges. The motors would run cooler, more efficiently and would require less maintenance. We have not even tried to calculate the savings achieved by reducing the maintenance on motors, replacement of fluorescent bulbs and ballasts. In most applications the savings could be very substantial.

USES, Inc. has designs to correct above problems and actual models for the following units which are wired in a receptacle no more than 10' from a panel. Our model numbers are as follows; RDES-1, CMES-1, CMES-3Y, CMES-3D, CMES-3Y 480, CMES-3D 480, CABO-120 and CABO-240 for different voltages.

USES MFG INC. PO Box 156, 152 Old Colchester Road, Quaker Hill, Connecticut, USA 06375 • Telephone(860)443-8737 Fax(860)439-1515

THE ELECTRICAL WATCH DOG

USES®

SAVES MONEY AND CONSERVES ENERGY USES® Shunt Efficiency System

These devices are closed type power factor correction units with surge suppression. They use a polymeric enclosure. They function as a solid state surge and spike suppressors for voltage. They are intended to limit the maximum amplitude of voltage spikes and surges on power lines to specified values. The devices intend to reduce line transmitted interference or noise generated by motors or appliances. They improve voltage regulation. They reduce magnetic fields through wire and equipment from the point of connection of the Unit back to the source by reducing current. When these devices are connected to inductive loads, connected on each hot leg they intend to balance the current on each of these legs and lower the current on the neutral. They are intended to be installed on the load side of the main disconnect.

In order to provide you with an overview, the following is a brief synopsis of the benefits of the **USES® Shunt Efficiency System:**

- HELPS LOWER DEMAND AND KILOWATT HOURS
- HELPS LOWER ELECTRIC BILLS
- IMPROVES MOTOR PERFORMANCE AND HELPS EXTENDS LAMP AND BALLAST LIFE.
- LOWERS I²R LOSSES.
- INCREASES EFFECTIVENESS OF ELECTRICAL SYSTEMS
- REDUCES MAGNETISM.
- PROTECTS AGAINST POWER SURGES AND SPIKES.

Briefly our device is a UL and CSA approved product. These devices are closed type power factor correction units with surge suppression. They use a polymeric enclosure. They function as a solid state surge and spike suppressors for voltage. They are intended to limit the max amplitude of voltage spikes and surges on power lines to specified values. The devices intend to reduce line transmitted interference or noise generated by motors or appliances. They improve voltage regulation. They reduce magnetic fields through wire and equipment from the point of connection of the Unit back to the source by reducing current. When these devices are connected to inductive loads, connected on each hot leg they intend to balance the current on each of these legs and lower the current on the neutral. They are intended to be installed on the load side of the main disconnect.

The **USES® Shunt Efficiency System** technology can significantly reduce both KW demand and KWH usage for residential, commercial and industrial electrical systems. The device corrects power factor, balances loads, reduces spikes, surges, harmonics and noise. For all types of inductive equipment the device reduces eddy currents, hysteresis losses and counter EMF. Purely resistive loads receive minimal benefit.

Additional savings are obtained from lower maintenance requirements for motors, longer times between replacement of fluorescent bulbs and higher reliability of solid state circuitry in computers and communications systems.

The new technology uses magnetic chokes oriented to create crossing lines of magnetic force across the voltage and current of each electrical phase. Based on the magnetic fields sensed, an appropriate capacitance, inductance or resistance is introduced to the system. **USES®** monitors the load approximately every 1 X 10 seconds and responds to spikes and surges in less than 5 nanoseconds (<5 X 10). This degree of response permits dynamic power factor correction regardless of load variations.

A **USES®** Unit is easily installed across an existing 20 or 30 amp circuit breaker in your distribution panel. For optimum savings one unit is installed for every 200 amps of load. Units are sized for 120/240 volt single phase residential systems to 3 phase 4 wire 480 volt industrial systems.

USES® Shunt Efficiency System has been patented. In December 1990, the devices completed tests and approval for listing by the Underwriters Laboratories under category 5B81 "Industrial Control Equipment".

Without changing voltage or current to an eight energy saving lamp load or a High Pressure Sodium light, a good reduction in initial start and running wattage can be demonstrated. Depending on your electrical loads and energy consumption, you can expect a substantial savings on your electric bill.

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Technical Description

Power factors are generally lagging because of the exciting currents required by induction motors, transformers, fluorescent lighting, induction heating furnaces, etc.. Power factor improvement can be obtained through the use of synchronous motors or capacitors at the proper locations.

Low power factor has an adverse effect upon system operation. This fact applies to both industrial and utility power systems. For this reason, the rate structures of many utilities contain power factor clauses which penalize consumers with low power factor loads. The savings from improvement in power factor can be calculated from daily load chart of the plant and the particular rate structure involved. It is not uncommon for the capacitors to pay for themselves in a period of a few years.

Low power factor should be avoided for three reasons. First, since circuits and circuit elements tend to be more reactive than resistive, reactive components of current produce larger voltage drops than an equal resistive component of current. System voltage regulation suffers and additional voltage regulating equipment may be required for satisfactory operation.

The second disadvantage of low power factor is the inefficient utilization of system equipment due to the increased current flow per unit of real power transmitted. This larger current magnitude produces additional heating in system equipment and in effect, derates these components. Power factor correction will release this system capacity and permit increased loading without installation of additional distribution equipment.

A third disadvantage is the cost of the increased losses throughout the system. These losses vary as the square of the current and also inversely as the power factor squared. The reduction in system losses can result in an annual gross return of as much as 10 percent of the investment in power factor improvement equipment.

Motors and other utilization equipment are designed for operation at rated voltage. A loss in performance or life is experienced if other than rated voltage is applied to the equipment terminals. The ultimate effect of voltage variation is a function of the design of the equipment and the magnitude of the variation. Recognizing the fact that constant rated terminal voltage may not be maintained, various standardized bodies have allowed certain voltage tolerances within which the equipment will operate satisfactorily but not necessarily within guaranteed performance values.

A maximum voltage variation of $\pm$ 10 percent of rated is allowed for satisfactory operation of electric motors. Synchronous motor performance is generally affected the same manner, with the exception of the pull out torque, which is a direct function of voltage.

The major effects of motor operation at reduced voltages are increased losses, increased temperature rises, and reduction in starting and maximum running torques. Operation at voltages higher than rated produces greater starting and running torques, higher starting current and decreased power factor. In general there is less adverse effect on motor performance at terminal voltages slightly in excess of rated values than for voltages less than rated.

Power factor is the ratio of the true power or watts to the apparent power or volt amperes. The power factor is expressed as a decimal or in percentage. Thus power factors of 0.8 and of 80 percent are the same. In giving the power factor of a circuit, state whether it is leading or lagging. The current is always taken with respect to the voltage. A power factor of 0.75 lagging means that the current lags the voltage. The power factor may have a value anywhere between 0 and 1.0 but never greater than 1.0.

The power factor in a noninductive circuit is one containing resistance only, is always

1, or 100 percent; i.e, the product of volts and amperes in such a circuit gives true power. The power factor in a circuit containing inductance or capacitance may be anything between 0 and 1 (0 and 100 percent), depending on the amount of inductance or capacitance in the circuit.

The term kilowatt (kW) indicates the measure of power which is all available for work. Kilovolt amperes (KVA) indicate the measure of apparent electric power made up of two components, an energy component and a watt less or induction component. Kilowatts indicate real power and kilovolts-amperes apparent power. They are identical only when current and voltage are in phase, i.e., when the power factor is 1. Ammeters and voltmeters indicate total effective current and voltage regardless of the power factor, while a watt meter indicates the effective product of the instantaneous values of EMF and current. A watt meter, then indicates real power.

Standard guarantees on AC generators are made on the basis of loads at 80 percent power factor. However, it must not be inferred that a given generator will deliver its rated power output at all power factors. The generator rating in kilowatts will be reduced in proportion to the power factor and probably in a greater ratio if the power factor is very low. The method of rating AC generators by kilovolt amperes instead of by kilowatts is now in general use.

In industrial plants, excessively low power factor is usually due to under loaded induction motors because the power factor of motors is much less at partial loads than at full load. If motors are under loaded, new motors of smaller capacity should be substituted.

A single phase alternating EMF will be induced in an armature coil which has its sides set in a generator frame, the same distance apart as are a north and a south magnet that are forced to sweep continuously past the coil sides at a uniform speed. The distance between a north and south pole is always called 180 electrical degrees. The distance between a north pole and the next north pole is called 360 electrical degrees. In a given generator, the circumferential distance is the same between any two adjacent north and south poles.

Power capacitors are capacitors with relatively large values of capacity which are used on power distribution systems or in plants for improving the power factor. Since many power companies include low power factor penalties, kilovolt ampere demand rates, or power factor bonuses in their rate schedules, it is often economical for industrial consumers to install capacitors for power factor improvement. These capacitors are connected across the line and neutralize the effect of lagging power factor loads, thus reducing the current for a given kilowatt load.

The best point to connect capacitors to the circuit depends upon cost considerations. Relatively small capacitor units can be connected at the individual loads, or the total capacitor kilovolt amperes can be grouped at one point and connected to the main bus. Greater power factor corrective effect for a given total capacitor kilovolt amperes will result with the capacitors located directly at each individual load, since the current is thereby reduced all the way from the load to the source. The first cost of an installation of individual capacitors will be greater, however, than that for one unit of the same total kilovolt amperes located at a central point. The greater saving in operating expense due to individual capacitors must be weighed against their increased first cost.

The life of a fluorescent lamp is affected not only by the voltage and current supplied to it but also by the number of times it is started. Electron emission material is sputtered off from the electrodes continuously during the operation of the lamp and larger quantities each time the lamp starts. Since life normally ends when the emission material is completely consumed from one of the electrodes, the greater the number of burning hours per start, the longer the life of the lamp. When the emission material is exhausted, lamps on a preheat type of circuit will blink on and off as the electrodes heat but the arc fails to strike. Lamps designed for instant or rapid start will simply fail to operate. Blinking lamps should be removed from the circuit promptly to protect both the starter and the ballast from overheating.

The rated average life of a fluorescent lamp in burning hours is based upon the average life of large representative groups of lamps measured in the laboratory under specified test conditions. Many fluorescent lamps have a rated average life of 12,000 to 20,000 hours at 3 burning hours per start.

With the proper ballast operating voltage within the line voltage limits shown on the ballast label, rated lamp life should be obtained.

All semiconductor devices are intolerant of voltage transients in excess of their voltage ratings. Even such a short lived transient as a few microseconds can cause the semiconductor to fail catastrophically or may degrade it so as to shorten its useful life.

Frequently, damage occurs when a high reverse voltage is applied to a non-conducting PN junction. The junction may avalanche at a small point due to the non uniformity of the electric field. Also, excess leakage current can occur across the passivated junction between the terminations on the pellet surface. The current can create a low resistance channel that degrades the junction blocking voltage capability below the applied steady state voltage. In the avalanche case thermal runaway can occur because of localized heating building up to cause a melt through which destroys the junction.

If the base-emitter junction of a transistor is avalanched or zenered by a reverse pulse, the forward current will be degraded. The triggering sensitivity of a thruster will be reduced in the same manner by zenering the gate cathode junction. Thrusters can also be damaged if turned on by high voltage spike (forward break over) under bias conditions that allow a rate of current increase (di/dt) beyond device capability. This will occur in virtually all practical circuits because the discharge of the RC dv/dt protection circuits will exceed device capability for di/dt and destroy the thruster.

The high voltage generated by breaking current to an inductor with a mechanical switch will ultimately cause pitting, welding, material transfer, or erosion of the contacts. The nature of ultimate failure of the contacts depends upon upon such factors as the type of metal used, rate of opening, contact bounce, atmosphere, temperature, steady state and in rush currents, and AC or DC operation. Perhaps most important is the amount of energy dissipated in each operation of the contacts.

The actual breaking of current by a set of contacts is a complex operation. The ultimate break occurs at a microscopic bridge of metal which due to the inductive load, is forced to carry nearly all the original steady state current. Ohmic heating of this bridge causes it to form a plasma, which will conduct current between the contacts when supplied with a current and voltage above a certain threshold. The inductor, of course is more than happy to supply adequate voltage. (V=Ldi/dt). As the contacts separate and the current decreases, a threshold is reached, and the current stops abruptly ("chopping"). Inductor current then charges stray capacitances up to the breakdown voltage of the atmosphere between the contacts. (For air, this occurs at about 300V.) The capacitance discharges and recharges repeatedly until all the energy is dissipated.
This arc causes sufficient contact heating to melt, oxidize ,or "burn" the metal, and when the contacts close again, the contacts may form a poorer connection. If they "bounce", or are closed soon after arcing, the contacts may be sufficiently molten to weld closed. Welding can also occur as a result of high in rush currents passing through the initially formed bridges upon closing.

On AC power lines, surges are generated by utility switching, correction of a brownout, or lightning. But there are dozens of surge sources right inside your office, factory or home. The simple act of starting an office machine can cause a surge.

And every solid state circuit is a target, whether it's a mainframe computer or a microwave oven. As little as 450 volts can be destructive, and routine surge activity ranges from 250 to 3000 volts.

Noise causes more aggravation. Picked up from fluorescent lighting, broadcast transmissions, power tools, even static electricity, it upsets the operation of computers, office machines and telecommunications equipment. And it can garble or completely destroy valuable stored data.

Most suppressors ignore noise, but high performance units reduce destructive interference by 40 to 60 dB. Noise reduction performance, like clamping level and response time, is also a part of the units specifications.

Lightning is the biggest cause of surges from outside a building. We're excluding, "direct hit" lightning damage from this discussion. Lightning surges are the result of induced voltage on the power lines caused by lightning strikes in the vicinity of the lines. The surges ride the lines into the buildings through the service entrance conductors.

Good suppression techniques can significantly reduce the amount of energy dissipated at the contacts, with a proportional increase in operating life. Suppression can also reduce the noise generated by this arcing. Voltage limiting devices are particularly suited to preventing the noisy high voltage "showering" arc described above.

Transient over voltages can cause breakdown of insulation, resulting in either a temporary disturbance of device operation or instantaneous failure. The insulating level in the former case will be weakened leading to premature failure.

The severity of the breakdown varies with the type of insulation, air, liquid, or solid. The first two tend to be self healing, while breakdown of solid insulation (generally organic materials) is generally a permanent condition.

Air clearances between metal and electrical devices and power wiring constitute air gaps,which behave according to the usual physics of gap breakdown (pressure, humidity, shape of electrodes, spacing). The International Electrotechnical Commission Working Group on Low Voltage Insulation Coordination has developed a table listing the minimum clearances in air for optimum and worst case electric field conditions existing between electrodes. Breakdown of the clearance between metal parts can be viewed as a form of protection, limiting the overvoltage on the rest of the circuit. However, this protection is dependent upon the likelihood of AC line current that may follow during the arc breakdown. Normally, follow on current should cause the system fuse or breaker to function. If the follow on current is limited by circuit impedance then the system fusing may not operate. In that case sufficient heat could be generated to cause a fire. Experience with power wiring has shown that metal clearances flash over regularly and harmlessly under transient voltage conditions, and power follow on problems are rare but can occur.

In liquid dielectrics, an impulse breakdown not followed by a power current can be quite innocuous. However, this type of breakdown is of limited interest in low voltage systems, where liquid insulation systems are seldom used, except in combination with some degree of solid insulation.

Breakdown of solid insulation generally results in local carbonization of an organic material. Inorganic insulation materials are generally mechanically or permanently damaged. When no power follow on current takes place, the system can recover and continue operating. However, the degrading insulating characteristics of the material leads to breakdown at progressively lower levels until a mild overvoltage, even within AC line overvoltage tolerances, brings about the ultimate permanent short circuit. Since the final failure can occur when no transients are present, the real cause of the problem may be concealed.

Breakdown along the surface of insulation is the concern of creepage specifications. The working group of IEC cited above is also generating recommendations on creepage distances. The behavior of the system where creepage is concerned is less predictable than is the breakdown of insulation in the bulk because the environment (dust, humidity) will determine the withstand capability of the creepage surface.

When considering the withstand capabilities of any insulation system, two fundamental facts must be remembered. The first is that breakdown of insulation is not instantaneous but is governed by the statistics of avalanche ionization. Hence there is a "volt time" characteristic, which challenges the designer to coordinate protection systems as a function of the impinging wave shape. The second is that the distribution of voltages across insulation is rarely linear. For example, a steep wave front produces a piling up of

voltage in the first few turns of a motor winding, often with reflections inside the winding. Also, the breakdown in the gap between the electrodes, initiating at the surface, is considerably dependent upon the overall field geometry, as well as on macroscopic surface condition.

In our parallel choke there are two air gaps. The purpose of the air gap in these magnetic chokes is to prevent the core from being saturated. The introduction of an air gap (or nonmagnetic gap) into the magnetic circuit introduces an action called fringing. Since the flux lines naturally tend to spread apart from each other and the permeability of the surrounding air is the same as the gap itself, the lines of force will tend to spread apart. Fringing causes the flux density in the air gap to be slightly less than the flux density of the iron sections of the magnetic circuit. This air gap, less current being used, and crossing parallel choke lines through the opposite choke results in a reduction of eddy currents, hysteresis losses, and counter EMF for all type of inductive equipment and also act as an improved filter.

Not only do the units help to correct and improve all the above conditions mentioned in the description. It also takes care of electrical transients induced internally in the building and externally of the building, which are prevalent to electrical supply systems. It also changes the angle of volts, current, amperage, etc., so everything is in line. It also balances loads between phases so it balances out the lines. The lines are fairly close to being within balance so the neutral is not being loaded to the full maximum. It also decreases RF noise pollution as stated above and takes care of spikes and surges. Each unit varies upon its own electrical characteristics, so it will improve on all these items if not eliminate a great deal of them. It uses capacitor run type capacitors, type AC below 400 hertz with frequencies below 60 hertz normal. These are the type that give us the best savings with our crossing choke configuration. This type of capacitor and choke configuration should net us approximately 10 percent savings. With this configuration the voltage and load stays the same. Also this choke configuration is a communitive add to the savings for each unit put in circuit or parallel to the same circuit or bus load circuit or to the circuit that is implied on the same panel provided it does not go through a transformer. A transformer will block the frequency and will cause us not to be able to communitively add boxes which don't add 1 to 1 but add on roughly a square root of 2 or a fraction of a square root of 2 every time. The most you can probably get is 1.4. As stated above it also takes care of I^2R losses and corrects power factor. It can either be installed way down the line or at the main panel. You have to weigh the decision as to where each box would be installed.

It will not help pure resistive loads or electric heat loads. The other things that it does with all the things that it is already doing is lower kW hours, usage, and lowers demand rate, acts as a surge suppressor, and eliminates transients, improves power factor, balances the load, reduces the I^2R losses, supplies minimum power during brownouts, and acts as a filter for noise. It will protect fluorescent lights, motors. Anything that is of inductive load last longer and it also cuts down on the maintenance of the building quite drastically.

The uses savings unit was designed to cut demand and save money on your electric bills. Demand is what determines a commercial customers rate on his bill. Our unit also acts as a surge suppressor, as we had to incorporate a suppressor into our unit to protect our product.

Our unit balances the load in the panel box, takes out the spikes and surges, reduces the I^2R loss and reduces the noise pollution in the lines. A good electrical current is like a wave, versus the irregular waves you now receive. Our unit corrects the irregular waves to create as perfect a wave as possible to supply cleaner power.

The unit is also a positive envelope, which means that only 130 volts will be expelled to the electrical system at any one time, therefore protecting the system from surges. The unit reduces wear and tear on motors and lights. By reducing the wear, your motors run cooler. The ballasts and fluorescent bulbs last longer as the unit takes the spikes out of the lines.

In our demonstration we can show by using an amp meter how we can reduce the initial start and running wattage on eight energy saving lamps by more than one amp and in some cases by much more. We can cut the initial start up on motors by much more. We can also demonstrate how our unit has no effect on the light output or running of a light or motor.

Not all electrical equipment is pure resistance. Any piece of equipment which requires a magnetic field to operate, for example a motor, a transformer, a fluorescent ballast, or a solenoid will cause the voltage and current to get out of phase unless some corrective action is taken. Even if it is only a fraction of a second, it takes time to create and collapse a magnetic field which is what happens in an AC current circuit. This is similar in effect to physical inertia and is called inductance.

Many utilities do not show a penalty on their bills but they do have a KVAR or a KVA demand charge. Both of these are another way of penalizing an end user for poor power factor. If a plant is being charged for KVA demand and all that demand is not being converted to KW or useful work, then the end user is paying the higher KVA demand and the related charges on the utility bill. Less current flowing in the end users conductors which means lower I^2R losses in the lines. This will result in lower basic KWH energy charges, lower sales taxes and lower fuel adjustment charges. It also means higher voltages at motors, which will run cooler, thereby, increasing their life.

As said previously, our unit is also a very heavy duty surge suppressor. This is a very important factor, whether it is used in a home or in a commercial building. Although, most homes do not have high power bills, many people wonder why they should purchase a unit. The unit will reduce the power bill, but most important, it will protect the refrigerator motors and other motors from harmful spikes.

The unit will also protect their televisions and microwaves, which are very easily damaged by spikes and brown outs. Saving an appliance such as these would make the purchase of a unit worthwhile. The unit is also very helpful if one lives in a trailer park or has a boat at a dock as their power supply is usually below standard.

More common and more frequent are transient surges caused by inductive load devices such as motors, transformers, relay coils, and fluorescent ballasts. These are known as internally generated surges.

Turn on the copier you've got a surge. On AC power lines, surges are generated by utility switching, correction of a brown out, or lightning. There are dozens of surge sources right inside your office, factory or home. The simple act of starting an office machine can cause a surge.

Every solid state circuit is a target, whether it's in a mainframe computer or a microwave oven. As little as 450volts can be destructive, and routine surge activity ranges from 250 to 3000 volts.

Noise generated by fluorescent lighting, broadcast transmissions, power tools, even static electricity upsets the operation of computers, office machines, telecommunications equipment and can garble or completely destroy valuable stored data.

In a commercial application, not only would the unit save on the bill, but it will protect the air conditioning, heat pump and any other large motors from surges. The motors will run cooler, more efficient and would require less maintenance. We have not even tried to calculate the savings achieved by reducing the maintenance on motors, replacement of fluorescent bulbs and ballasts. In most applications the savings could be very substantial.

USES, Inc. has sixteen models to conform to any size service. The units are wired to a receptacle no more than 10' (feet) from a panel. USES manufactures models for residential, Boats, RV's, commercial applications and remote motors or units.

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THE ELECTRICAL WATCH DOG
USES®

DESCRIPTION OF USES® SHUNT EFFICIENCY SYSTEMS

USES® is a solid state power correction device which offers protection from transient surges, spikes and lightning strikes and kilowatt savings by improving power factor, balancing loads, reducing the top peak portion of the current wave, etc.

The **USES®** approach to saving electrical energy focuses on providing more efficient electrical power to inductive equipment so it does not waste energy.

The escalating cost of primary fuels used in the production of electrical power (coal, oil, natural gas) effects us all. **USES®** can help conserve these important nonrenewable resources.

PROTECTION

A transient surge is a prolonged burst of excessive electrical current. A transient spike is a rapid burst of excessive electrical current. Surges and spikes may be caused externally by:

- Lightning;
- Irregularities at the power generating plant or along transmission lines;
- Inductive loads operated by other electrical customers on the same transmission line in proximity to a facility.

And internally by:

- Inductive loads (motors, pumps, computers, fluorescent lights) operated within a facility.

The **USES® Shunt Efficiency System** is designed to absorb and attenuate major surges and spikes before damage can occur to equipment. **USES®** dissipates excess transient voltage through conversion to and release of heat.

Benefits derived from **USES® protection** include:

- Extended life for inductive electrical equipment;
- Lower maintenance expense;
- Fewer losses of stored computer information;
- Less likelihood of fire caused by electric motor overheating, short circuits, etc.

Kilowatt SAVINGS

Motors, pumps, transformers, fluorescent light ballasts and other inductive equipment require a magnetic field to operate. Magnetism causes the phase relationship between voltage and current supplied by the utility to change. Such phase shifting reduces the efficiency of the equipment, resulting in increased power consumption.

The phase angle between voltage and current is called power factor. Through the application of magnetic chokes, **USES®** tends to make the angle between voltage and current approach zero, which allows for the most efficient utilization of the power distribution system.

Additionally, when connected to inductive loads, **USES®** improves the balance of current on each hot leg and lowers the current on the neutral. Along with balancing the current, **USES®** reduces the peak portion of the current wave.

Benefits from **USES® Kilowatt savings** include:

- Lower electric bills;
- Better performance of motors and computers which are adversely affected by magnetic fields;
- Less wear and tear (maintenance expense) and longer equipment life resulting from efficient and effective use of generated electrical power;
- Conservation of nonrenewable natural resources.

ADDITIONAL INFORMATION ABOUT USES® Shunt Efficiency System

- **USES®** is U.S. Patent Office protected for it's surge and spike protection and energy savings.
- **USES®** is approved by Underwriters Laboratories Inc. as a power factor correction unit with surge suppression. Further, UL retains the on-going right to supervise manufacturing of **USES®** products.
- **USES®** comes with a three year warranty against defects in materials and workmanship. Models are designed for application from single family homes to large commercial and industrial businesses.
- Several property/casualty insurers recognize the increased safety afforded when **USES®** products are in place and have lowered premiums to policyholders accordingly.

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THE ELECTRICAL WATCH DOG

USES®

What USES® Does...

Electrical Characteristics	Currently Available Equipment
✪ Power Factor Improvement	Capacitors
✪ Harmonics (non-linear wave forms)	Shunt Filters
✪ Voltage Surge / Droop Protection	Voltage Regulator
✪ Voltage Spike Protection	Lightning Arrestor
✪ Electromagnetism	**USES® ONLY**
✪ Reduce KW Demand	Timers, Energy Management Systems
✪ Reduce KW Usage	Timers, Energy Management Systems
✪ Reduce Line Noise	Filters or Line Strips
✪ Improve Unbalanced Loads Across Phases	**USES® ONLY**
✪ Reduce I^2R Losses	Capacitors

✪ USES® accomplishes ALL of the above!!!!!!

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USES® PRODUCT BACKGROUND

Certifications and Approvals:

1. Underwriters Laboratories (UL):
   File Number: E132743
   Category: 5B81 Industrial Control Equipment
2. Canadian Standards Association (CSA):
   Category: LR99910
3. U.S. Patent:
   Number: 5,105,327 - A.C. Power Conditioning Circuit
4. General Services Administration (GSA):
   Federal Supply Schedule
   Power Distribution Equipment, FSC Group 61, Part V, Section B
   Special Item 412-12, Line Conditioners
5. New York City Approval:
   Submission #: 92A0390
6. Funacion Institito de Ingenieria, Caracas, Venezuela:
   Electric and Electric System Engineering Center Test Report No. 24-000593

List of Customers:

1. U.S. Navy: Patuxent River Naval Air Station, Lexington Park, MD
   Naval Academy, Annapolis, MD
2. U.S. Marine Corps Headquarters, Henderson Hall, Washington, DC
3. Washington National Airport, Washington, DC
4. U.S. Social Security Administration, Pawtucket, RI
5. Town of Salem, Connecticut
6. Reebok International, Stoughton, MA
7. Brockton Housing Authority, Brockton, MA
8. National Tire Wholesale (NTW), Woodbridge, VA (national chain)
9. Nutrena Feed - Cargill, Swanton, VA

Exports:

1. Canada
2. Republic of South Korea
3. Commonwealth of the Bahamas
4. Republic of Venezuela

USES MFG INC. PO Box 156, 152 Old Colchester Road, Quaker Hill, Connecticut, USA 06375 • Telephone (860) 443-8737 Fax (860) 439-1515

THE ELECTRICAL WATCH DOG

USES®

A "SHORT LIST" OF OUR CUSTOMERS INCLUDE:

ABITIBI-PRICE

AMERICAN CYANAMID

AMTECH EAST, INC.

ASSOCIATED MARKETS

AVERY ABRASIVES INC.

BRISTOL MYERS

BURNDY CORPORATION

CHAPIN AND BANGS COMPANY

CHEMICAL BANK

ETHAN ALLEN

FOOD LION

FRIONOR USA INC.

GENERAL ELECTRIC

GORDON MFG.

HOYT CORPORATIN

H.P. HOOD

ICELANDIC

J.C. PENNY

LEVER BROTHERS

MARLIN FIREARMS

TOWN OF MONROE

NABISCO

NATIONAL TIRE & WHOLESALE

NEWPORT CREAMERY

NUTRENA FEEDS

OTTOWA UNIVERSITY

PEPSI

PLASPRO

PURINA MILLS

RAND McNALLY

REEBOK INTERNATIONAL

REFLECK

SAINT FRANCIS HOSPITAL

TOWN OF SALEM

THE STATE OF CONNECTICUT

THE WHITE HOUSE

U.S. ARMY CORPS OF ENGINEERS

U.S. MARINE CORPS

WASHINGTON NATIONAL AIRPORT

UNITED STATES POSTAL SERVICE

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E-mail bill@usesmfg.com • Visit our website at usesmfg.com

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USES®

The **USES®** Product has a new Patent Technology, which makes the product a sole source. The product also has the following listing; UL, CSA, and NYC. USES MFG INC. is a member of the Alliance To Save Energy, and is an EPA Green Lights Ally.

USES® is a power conditioning device, which reduces the electrical energy that is supplied by the Utility Company to operate inductive electrical loads.

The product offers protection from voltage transient surges and spikes, and protection from secondary lightning effects.

USES® consists of parallel wrap-around magnetic chokes oriented to couple magnetic forces generated across each electrical phase by current complimentary winding technique, used with chokes and compactors lowers KiloWatt-Hour (KWH) consumption, energy usage, and demand rate when connected to inductive loads.

Energy savings are achieved for all inductive loads including motorized equipment; air conditioning units, elevators, pumps, refrigerators, manufacturing machinery, etc.... **USES®** also ensures protection of the A.C. electrical system and surge-sensitive electronics, along with electrical appliances, personal computers, consumer electronics, and appliances from power line transients, surges, spikes, and secondary lightning.

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THE ELECTRICAL WATCH DOG

USES®

Typical Customer Experiences

Pump Manufacturing Company gets a call from their power company in less than one week after the installation of **USES® Shunt Efficiency System** inquiring what they have done to raise their Power Factor from 70% to 99.5%.

-Hayward Tyler, Colchester, VT

Ceramic Manufacturing Company saves over $9,000.00 a year in Power costs with **USES®** installed.

-Superior Technical Ceramics, St. Albans, VT

Major Central Jersey Supermarket Chain saves 11% in Energy with **USES®** installed and a Return on Investment in under 13 months. Timed Interval Sampling in November 1995 and February 1996 prove identical savings.

-FoodTown Supermarkets, East Brunswick, NJ

Northern Jersey Supermarket saves 17.7% of Energy while the **USES®** is on line.

-Bishop's Thriftway Supermarket, Whitehouse Station, NJ

Major Software provider to the medical community enjoys lower Power costs due to the **USES®** system. On line for over two years, nine months.

-IDX Corporation, South Burlington, VT

New Jersey Senior Housing benefits from lower Power costs with **USES®** installed. Savings of 16% verified.

-Eaton Senior Housing, Eatontown, NJ

Sheet Metal Fabricator has significant reductions on their electric bill with **USES®** installed. Power factor increases from the low seventies to high nineties.

-Fab Tech, Colchester, VT

Regional Dairy Producer increases profits with **USES®** installed. Savings documented in excess of $10,500.00 per year.

-HP Hood, Burlington, VT

Major Military College installs **USES® Shunt Efficiency System** for Energy savings.

-Norwich University, Northfield, VT

19 Story Apartment Building in New York City saves 11.79% of Energy with **USES®** installed. Over $17,000.00 per year saved with a $16,000.00 system.

-Solil Management, New York, NY

Central New Jersey Township installs **USES®** in 9 different Municipal Buildings, savings verified through TIS study average 20%.

-Township of Milburn, NJ

Food Warehouse saves 15% in Energy usage with **USES®** installed. TIS studies conducted in October 1995 and February 1996 with the same results.

-Vasinee Food Corporation, Brooklyn, NY

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THE ELECTRICAL WATCH DOG

USES®

What Are They Saying About USES®?

United States Postal Service Air Mail Facility reduces electrical energy consumption by 12% and increases power factor from 75% to 99%...

-Jacksonville, FL

Local shipyard increases their Power Factor to over 90% while their electrical Energy use is reduced by 18%...

-Jacksonville, FL

"USES® is the best Energy-Saving Device we've ever used!"

-Ted Lucore, Selfix, INC. / Shutters, INC.

"Should this rate of savings keep up, our unit will pay for itself in the first year."

-Hugh C. Teel, First Selectman, The Town of Salem, CT

"At this rate of energy reduction, I estimate we will save over $11,900.00 ANNUALLY. This will yield a payback of less than two years on the USES® units. In addition to those savings, our power factor has improved over 12% so far."

-Tom Penningroth, Plant Manager, Nutrena Feeds

"We confidentially recommend USES® to all our customers who need power conditioning and want to save money."

-Ray "Skip" Speck, 3 Phase Electric

"Our electrical charges were a good ten percent lower than the same time last year!"

-Kenneth Guilfoil, Associates Planning Services

"In order to provide energy savings a unique inductive arrangement is provided across the AC power lines. The inductor comprises one or more coils with conductors from the device looping back through the coil{s}. It has been found that the unique arrangement of chokes {28} & {30} provide substantial savings in power usage, particularly for inductive applications."

-{From}: Summary of the Invention, U.S. Patent Number: 5,105,327

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COMMERCIAL SALES TIPS

With commercial prospects, it is important to accurately identify type of service and profile of what makes up the energy consumption.

The following questions are more or less applicable to:

- Light Commercial
- Manufacturing
- Office Space

1) What type of heat do you utilize?

2) What is your average electric bill?

3) What was your highest bill? Did it occur in the winter or summer?

4) What was your lowest bill? How many months is it low?

5) How much of your bill is your demand charge?

6) What type of electric service do you have; single or three phase?

7) What voltage; 208/230, 480V?

8) How large a service do you have; 400, 600, 800, 1200 AMPS?

9) Do you use computers in your business?

10) Do you have frequent power outages?

11) Do you air condition your facility?

12) What are your normal business hours?

13) Do you work more than one shift? Is it seasonal?

14) What is the largest motor you operate?

15) How long and how frequently does it run?

RESIDENTIAL SALES TIPS

During the course of conversation, incorporate the following questions to qualify the customer and determine what his needs and concerns are.

1) How much is the monthly electric bill?

2) Do you have frequent power outages?

3) Do you trip circuit breakers often?

4) How large of service do you have?

5) Do you have a circuit breakers or fuses?

6) Do you have more than one service panel?

7) How do you heat your home: oil, heat pump, electric, etc.

8) Do you have central air conditioning?

9) Do you have a swimming pool?

10) Do you have a well?

11) Do your lights dim when other equipment or appliances are used?

12) Do you have any hobby that consumes a lot of electrical power ie., welding, woodworking, pottery, etc.

13) Do you own a generator?

THE ELECTRICAL WATCH DOG

USES®

USES PRODUCT RETURN FORM:

DEALER NAME_____ RGA #_____

ADDRESS_____

_____

PHONE #_____

SIGNATURE_____

DATE SHIPPED FOR REPAIR_____

DEALER LOCATION FOR RETURN SHIPPING_____

_____

MODEL #_____ SERIAL #_____

CHECK BOX:

DEMO UNIT_____ CUSTOMER UNIT_____

TYPE OF LOAD UNIT WAS SERVICING_____

_____

DESCRIPTION OF WHAT PROBLEM IS_____

_____

DESCRIPTION OF WHAT HAPPENED TO CAUSE PROBLEM:

_____

_____

REV 06/97

THE ELECTRICAL WATCH DOG
USES

A GOOD ONE LINE DIAGRAM IS CRUCIAL

1. Always go into a facility and start where the power comes in. You want to start with the Main Distribution Panel (MDP). The MDP is where the main circuit breaker is to shut off the entire building and a series of circuit breakers with the rated amperages for the panels that are fed by the MDP and main loads.

2. On the MDP list all circuit breakers and what their amperages are. Start tracing lines to the load it feeds. If you go to a panel that subs into 3 more panels you make a note of the amperage that feeds those three panels. The sub panel may say it is a 225 amp 3 phase panel doesn't necessarily mean that it really is. They may have only used that size panel for the circuit breaker spaces. If it is fed by a 100 amp circuit breaker than it is a 100 amp panel. It is very important that this is noted so you don't put more units in than are really necessary.

3. Look for in line transformers.
Where are they located? From which panel? Mark them on your drawing with a little box. Make sure you have noted the amperage in the panel that feeds the transformer. Get the KVA. What the voltage is and are they step up or step down transformers.

4. Panels.
When looking at a panel you want to notate what the amperage is to the circuit breakers for the given pieces of equipment; motors, loads, etc.. It is not important to get the horse power unless it's 10 HP or more and it could possibly be candidate for a BL Unit.
NOTE* Always check the number of circuit breakers, whether they are 2 or 3 pole, if there are any spares, etc. This will help you when its time to figure installation costs for your proposal.

5. In an Industrial Complex.
Always keep an eye towards the ceiling or rafters for Buss Bars or raceways. Check for disconnects along the ceiling or rafters. Unlike a panel it is imperative that you write down the motor it feeds, HP, and everything else that you can find out because you may not be able to read what is on the disconnect. Raceways, get as much information as possible for these also. It may be a 1600 amp raceway but the business has changed and now use only 1 or 2 pieces of equipment where they used to use 5 or 6. Or it was designed for a different type of business or different machines and is not used at all any more.

6. Keep your drawings as simple and straight forward as possible.
When you do the proposal you want to be able to figure out what was there. Your drawings are correct when anyone can look at them and know what was at that location without any questions.

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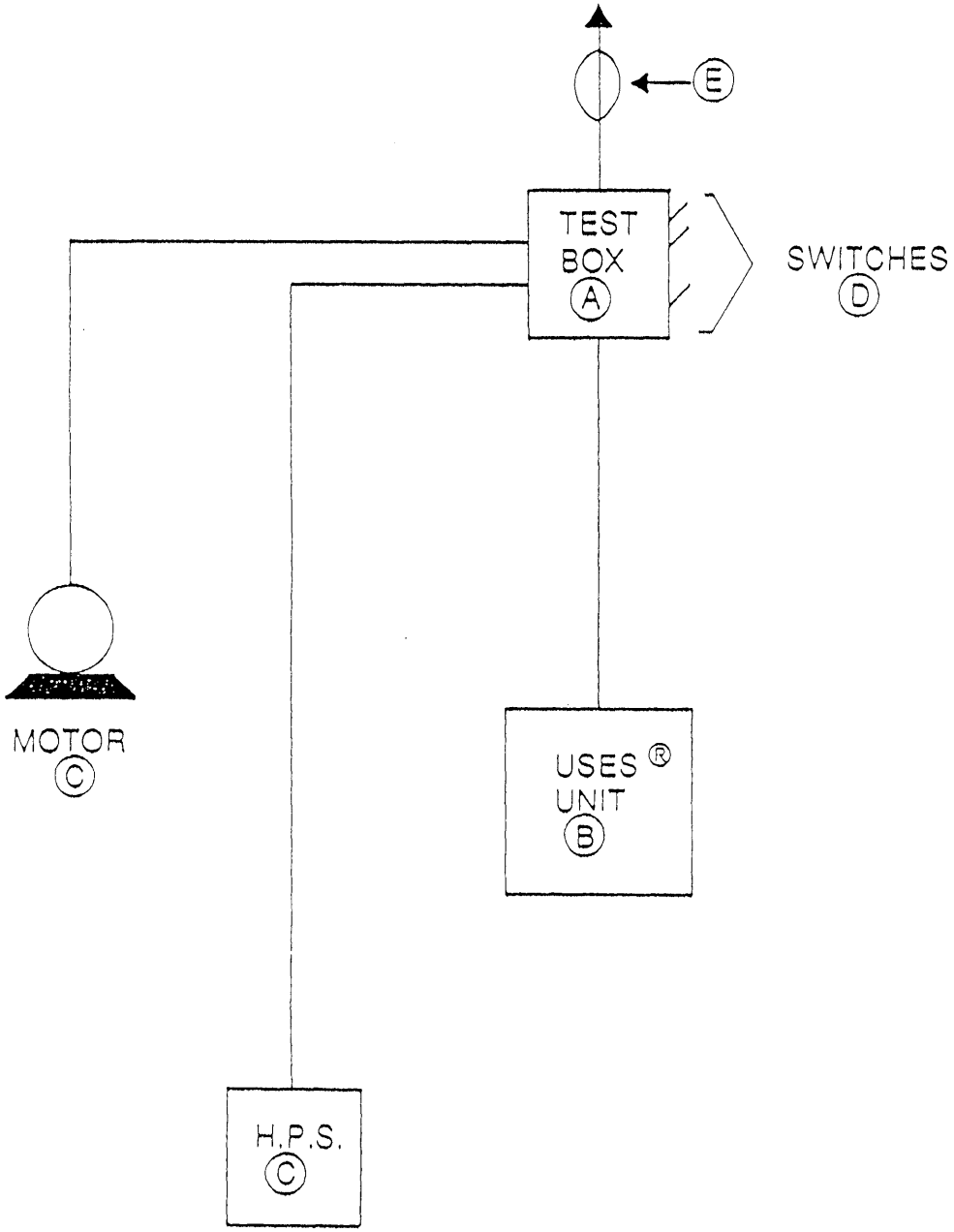


Ⓐ 120 volt test box.
Represents: Your panel.

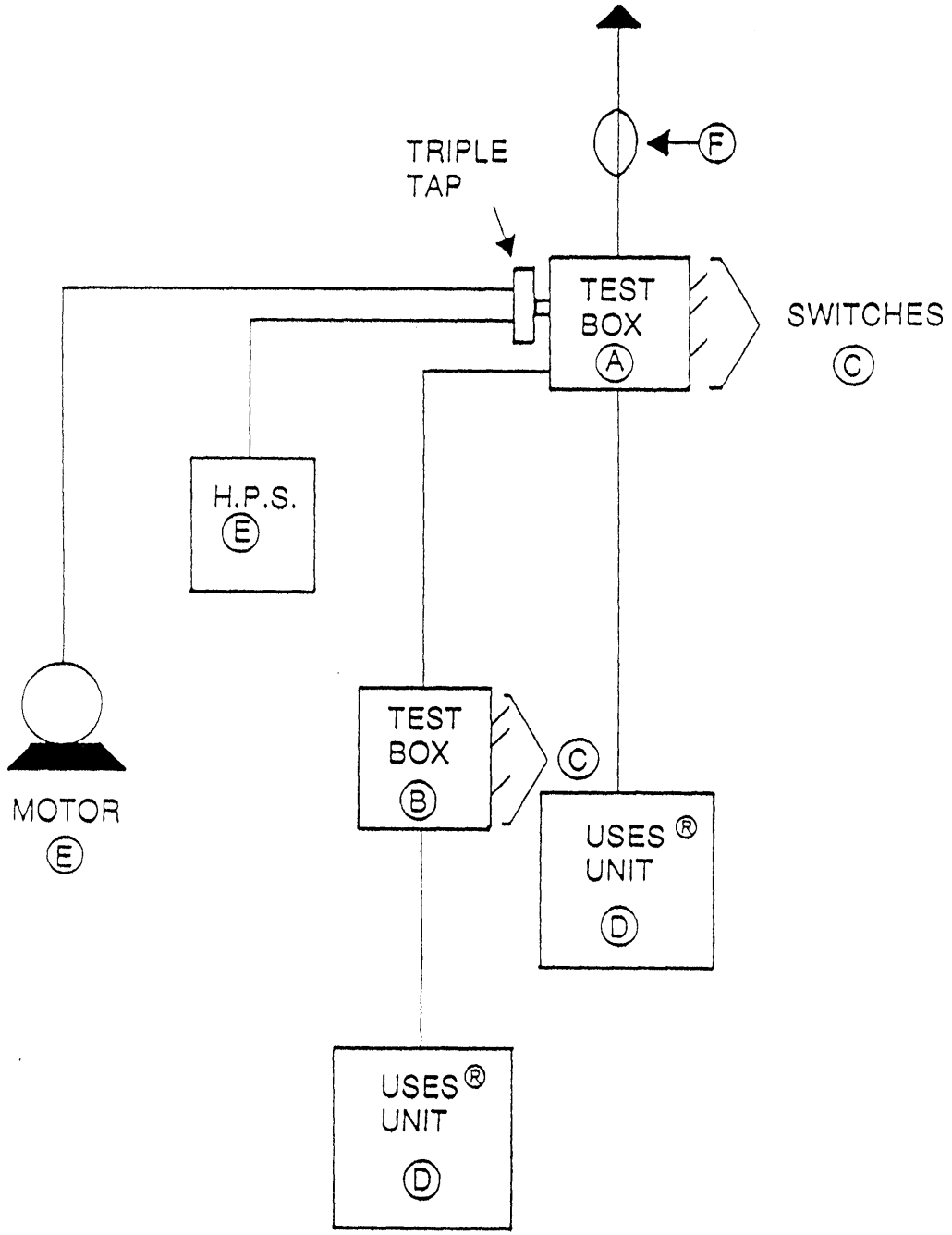
Ⓑ USES® Unit (RDES-1).

Ⓒ Motor and H.P.S. fixture.
Represents: Inductive loads on your panel.

Ⓓ Switches
Represents: Circuit breakers in your panel.

Ⓔ Take clamp on amp mter readings here.

120 VOLT USES® DEMO SET UP



Ⓐ 120 volt test box.
Represents: Your panel.

Ⓑ 2nd test box. (Needed for 2nd USES® unit hook-up).

Ⓒ Switches.
Represents: Circuit breakers in your panel.

Ⓓ USES® Units (RDES-1).

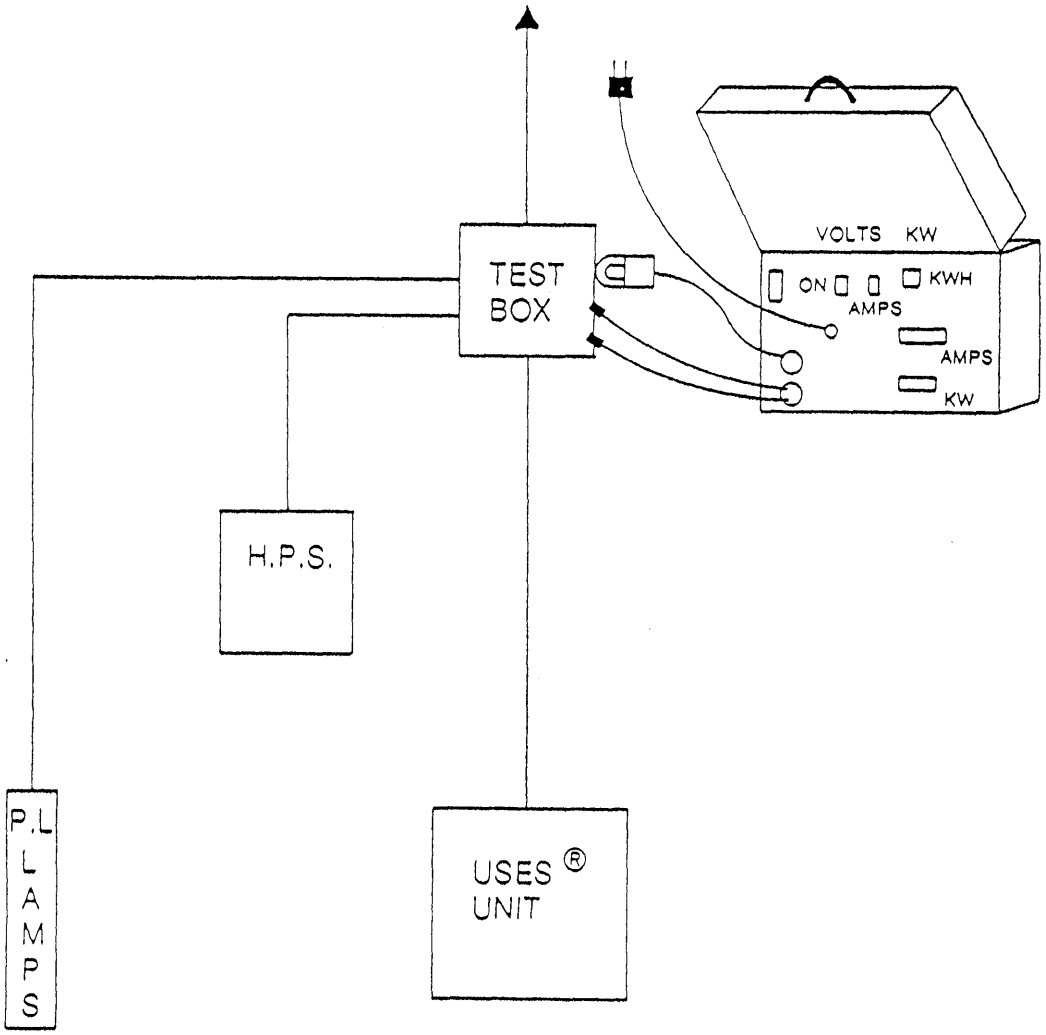
Ⓔ Motor and H.P.S fixture.
Represents: Inductive loads on your panel.

Ⓕ Take clamp on amp meter readings from here.

120 VOLT USES® DEMO COMMUNITIVE ADD
SET UP

TROUBLE SHOOTING FOR THE 120 VOLT DEMO

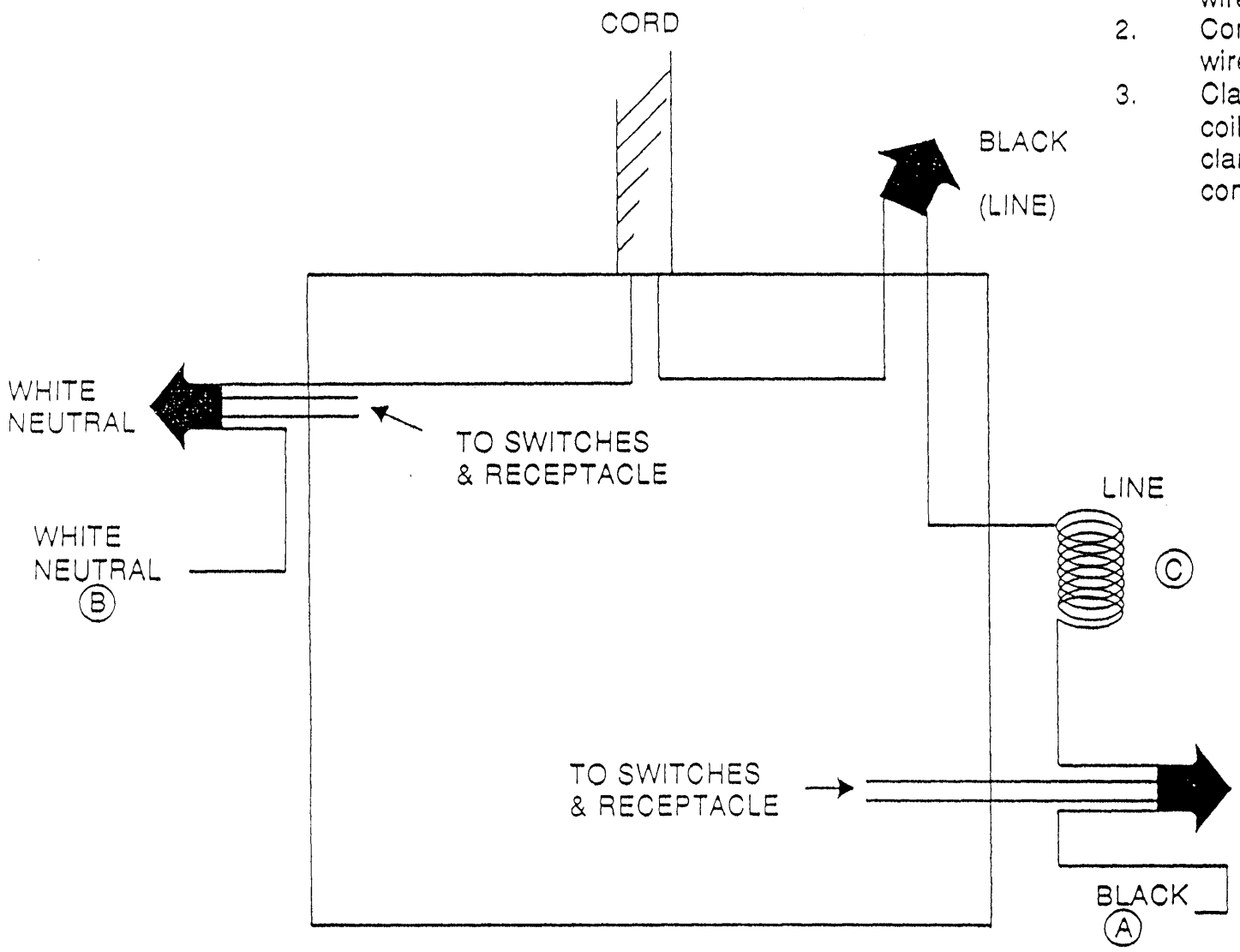
PROBLEM	CAUSE
USES® unit or loads will not turn on.	1. Test box is not plugged in. 2. Receptacle you are plugged into may not have power. Try different one. 3. Switch or switches may be broken. Send back for repairs.
The clamp on amp meter reads 0.00 with load running.	1. Check DATA HOLD. It must be off. 2. Check to see if the meter is set to read AC amps. 3. Make sure you have the black single conductor on the cord to the test box clamped and shut.
The clamp ON is stuck on one amp reading.	1. Check peak HOLD on clamp ON. It should be off. 2. Check to make sure clamp on meter is on AC amp setting.
The neon lights do not light up on the unit.	1. Is the switch on the test box for the unit in the on position. 2. Is the unit plugged into the receptacle.
The clamp on amp meter says low battery in upper left hand corner.	1. This means the 9 volt battery which powers the meter is getting low. Replace soon. (Remove panel on back).
The H.P.S. fixture will not light.	1. Check to make sure test box is plugged in. 2. Is switch for the H.P.S. in the ON position. 3. The bulb may be blown.
The motor will not turn on.	1. Is test box plugged in. 2. Is the motor plugged into the test box. 3. Is the switch for the receptacle in the ON position.
The amps go up when you turn it on with the P.L. lamp set.	1. The P.L. set is too little of a load for the USES® unit by itself.
The amps stay the same when I add the 2nd USES® unit for a communitive add.	1. Is the 2nd test box plugged into the 1st test box. 2. Is the switch on the 1st test box in the ON position for the receptacle. 3. Is the switch on the 2nd test box in the ON position for the USES® unit receptacle. 4. Is the USES® unit plugged into the 2nd test box. 5. Is the USES® unit on the 1st test box ON.



TIFF K.W. METER HOOK-UP

MAKE SURE CORD IS NOT PLUGGED IN!

1. Connect Phase 1 voltage clip on bare wire marked (A) (black wire).
2. Connect the black voltage clip on bare wire marked (B) (white or neutral).
3. Clamp Phase 1 amp clamp on the 10 rap coil marked (C); the sticker on the amp clamp must face towards the line or feed coming into the test box.



TIFF KW METER HOOK UP.

120 VOLT TEST BOX.

TROUBLE SHOOTING FOR THE TIFF K.W. METER

PROBLEM	CAUSE
There are no readings or the reading seems to be off. This implies an improper or low amp reading, voltage reading or power reading.	1. Make sure the Tiff meter is on and plugged in to a 120 volt receptacle. 2. Make sure all amp clamps are shut all the way. 3. Make sure the amp clamps phase 1, 2, and 3 are matched up correctly with the same number voltage clip. EXAMPLE: If the phase 1 voltage clip is hooked up to L or a black conductor, then the amp clamp phase 1 should be clamped around this wire. 4. The amp clamps must be clamped so the sticker on the clamp is facing to the source.
The KW display flashes a leading 1 followed by flashing 3 digits.	1. You have reached the 200 KW limit. The meter cannot read any higher. The 3 digits that are flashed on the display are not your power readings.
There is an LB symbol in the upper left hand corner of the KW/KWH display.	1. This indicates the 9 volt battery for KWH memory is low. Replace.
There is a low amp reading and no KW reading.	1. The load you're trying to measure is too small of a load to read. If feasible, you could splice a 10 wrap coil in line on your current conductor, then divide by 10 to get your correct reading. Make sure power is off before adding coil. Also, make sure wire is rated for the amps it will be carrying. 2. Make sure the KW/KWH switch is in the KW position.

USES® SHUNT EFFICIENCY SYSTEM

INSTALLATION INFORMATION

UNIT INSTALLATION:

As shunt devices, USES® units are installed in parallel. The units are wired to a circuit breaker (20A, 30A or 40A, depending on the USES® unit) in a distribution panel. Alternatively, if no room is available for a breaker in a panel, a circuit breaker disconnect may be used.

Because of the parallel installation, there is no limitation, from a current standpoint, on where the units can be installed. Also due to the parallel installation, power to the loads will not be interrupted in the unlikely event of unit failure.

NUMBER OF UNITS REQUIRED:

The number required is dependent upon the characteristics of the inductive loads and the electrical distribution system. In some instances, one USES® unit will be able to service multiple inductive loads. In other cases, a single unit may be required for an individual load either because of its size or the electrical system configuration.

The starting point for estimating the number of units required is that one USES® should be installed for each 200A of load current. Based on this, an initial estimate for a facility drawing 1000A would be that 5 USES® units are required. An evaluation of the facility's electrical distribution system, the types of loads that are installed there, and the operating profile of the loads is required in order to determine the actual number of units that are required and the locations at which the units should be installed.

USES® SHUNT EFFICIENCY SYSTEM

ESTIMATED ENERGY SAVINGS

(KWH SAVED PER HOUR OF EQUIPMENT OPERATION)

MODEL	SAVINGS
RDES-1	0.5 KWH
CMES-1	1.0 KWH
CMES-3Y	1.25 KWH
CMES-3D	1.5 KWH
CMES-3Y (480)	2.0 KWH
CMES-3D (480)	3.0 KWH
CMES-3Y (600)	3.0 KWH
CMES-3D (600)	4.0 KWH

THESE ESTIMATED VALUES ARE BASED UPON AVERAGE SAVINGS RECORDED DURING TESTS ON A RANGE OF LOADS. ACTUAL SAVINGS MAY VARY DUE TO ELECTRICAL SYSTEM CONFIGURATION AND LOADING.

THE ESTIMATED KWH SAVINGS ALSO INDICATE THE ESTIMATED REDUCTION IN DEMAND THAT A UNIT CAN PROVIDE. FOR INSTANCE, EACH CMES-3D (480) THAT IS INSTALLED CAN NOMINALLY REDUCE DEMAND BY 3 KW.

Rev: 3/94

USES® SHUNT EFFICIENCY SYSTEM

AMPERAGE MEASURED ON CONDUCTORS FROM USES® UNIT WITH UNIT ENERGIZED

USES® UNIT	L1	L2	L3	NEUTRAL
RDES-1	3.7	3.7	-----	-----
CMES-1	7.7	7.6	-----	0.1
CMES-3Y	8.1	8.1	8.1	0.1
CMES-3D	14.0	14.0	14.2	-----
CMES-3Y(480)	17.6	17.5	17.2	0.1
CMES-3D(480)	24.8	24.6	24.8	-----
CMES-3Y(600)	24.0	24.0	24.0	-----
CMES-3D(600)	32.1	32.1	32.3	-----
CMES-3Y-H	7.0	5.8	7.0	0.1
CMES-3D-H	9.1	12.2	9.0	-----
CABO-120	3.2	-----	-----	3.2
CABO-240	3.7	3.7	-----	-----
BL-120	0.6	-----	-----	0.6
BL-208/240	1.2	1.2	-----	-----
BL-300	1.6	1.6	-----	-----
BLM-3Y(208)	7.4	7.2	7.4	0.1
BLM-3D(208)	8.2	8.2	8.2	-----
BLM-3Y(480)	6.2	6.3	6.4	0.1
BLM-3D(480)	9.7	9.9	9.9	-----

NOTE: AMPERAGE READINGS ARE APPROXIMATE. THERE MAY BE A 20% VARIANCE FROM THESE FIGURES.

USES® INDICATOR LIGHTS
BULB REPLACEMENT INSTRUCTIONS

1. Deenergize the USES unit before replacing the bulb(s). Observe the precautions of the warning label on the USES unit. Specifically, wait 5 minutes after deenergizing before servicing.

2. Remove the light lens cap. The cap turns counter-clockwise to remove.

3. Carefully remove the old light bulb. DO NOT use pliers. Use fingers to move bulb back and forth until the prongs are freed allowing the old bulb to be extracted.

4. Insert replacement light bulb. Rotate the bulb until the prongs mate with receptacles and gently push in until it is seated. Reinstall the lens cap. Turn clockwise to tighten.

5. Energize the USES unit and observe the indicator lights.

6. Bulbs may be replaced once. If the replacement bulb fails to light or burns out again, the unit must be returned for servicing.

7. Return the burned out bulb, along with the USES unit serial number, date of bulb replacement, and cause or suspected cause of bulb failure (if known), to USES MFG INC. via the dealer/master dealer and USES rep.

THE ELECTRICAL WATCH DOG

USES

ANALYSIS OF TEST DATA

USES® MODEL #:_____ NOMINAL VOLTAGE:_____

CIRCUIT OR PANEL DESIGNATION:_____

CIRCUIT CONFIGURATION:_____

DESCRIBE LOAD:_____

ALL MEASUREMENTS MADE USING A TIF MODEL KW 220-3 WATT METER, TIFF MODEL 2300 POWER FACTOR METER AND AMPROBE MODEL 2000 RMS AMMETER

USES® OUT OF CIRCUIT	VOLTS	AVERAGE AMPS	RMS AMPS	HARMONIC AMPS	KW	POWER FACTOR IMPROVEMENT
PHASE					XXXXXXXXXX	
A					XXXXXXXXXX	
B					XXXXXXXXXX	
C					XXXXXXXXXX	
NEUTRAL (4 WIRE PANEL)	XXXXX				XXXXXXXXXX	XXXXXXXXXXXXX
TIF KW METER		XXXXXX		XXXXXX		XXXXXXXXXXXXX

USES® IN THE CIRCUIT	VOLTS	AVERAGE AMPS	RMS AMPS	HARMONIC AMPS	KW	POWER FACTOR IMPROVEMENT
PHASE					XXXXXXXXXX	
A					XXXXXXXXXX	
B					XXXXXXXXXX	
C					XXXXXXXXXX	
NEUTRAL (4 WIRE PANEL)	XXXXX				XXXXXXXXXX	XXXXXXXXXXXXX
TIF KW METER		XXXXXX		XXXXXX		XXXXXXXXXXXXX

SAVINGS CALCULATIONS	VOLTS	AVERAGE AMPS	RMS AMPS	HARMONIC AMPS	KW	POWER FACTOR IMPROVEMENT
PHASE					XXXXXXXXXX	
A					XXXXXXXXXX	
B					XXXXXXXXXX	
C					XXXXXXXXXX	
NEUTRAL (4 WIRE PANEL)	XXXXX				XXXXXXXXXX	XXXXXXXXXXXXX
TIF KW METER			XXXXXX	XXXXXX		XXXXXXXXXXXXX
TIF KW METER AS A %		XXXXXX		XXXXXX		XXXXXXXXXXXXX

Date of Analysis_____