AIROYAL
MANUFACTURING CO.

19 Gloria Lane, Fairfield, N.J. 07006

TEL. 227-4280 AREA CODE 201

Airoyal Continuous Energy

Airoyal Manufacturing Company's "ACE" concept is the logical answer to Computer Error Problems due to fluctuations by the utility power system.

The "ACE" is a custom Uninterruptible Power System for your computer power needs.

Airoyal's capabilities and the unique Airoyal "ACE" concept encompass a single contract and unit responsibility for the complete package consisting of:

1) Preliminary study of power requirements.

2) Monitoring evaluation of the power supply with an Airoyal System Monitor.

3) Custom design and engineering and/or coordinating the design with your engineers.

4) Supply the total equipment package on a lease or a sale basis.

5) Installation by our organization insures a completely coordinated, turn-key operation.

6) Supervision of start-up.

7) Instruction of personnel is conducted at time of acceptance.

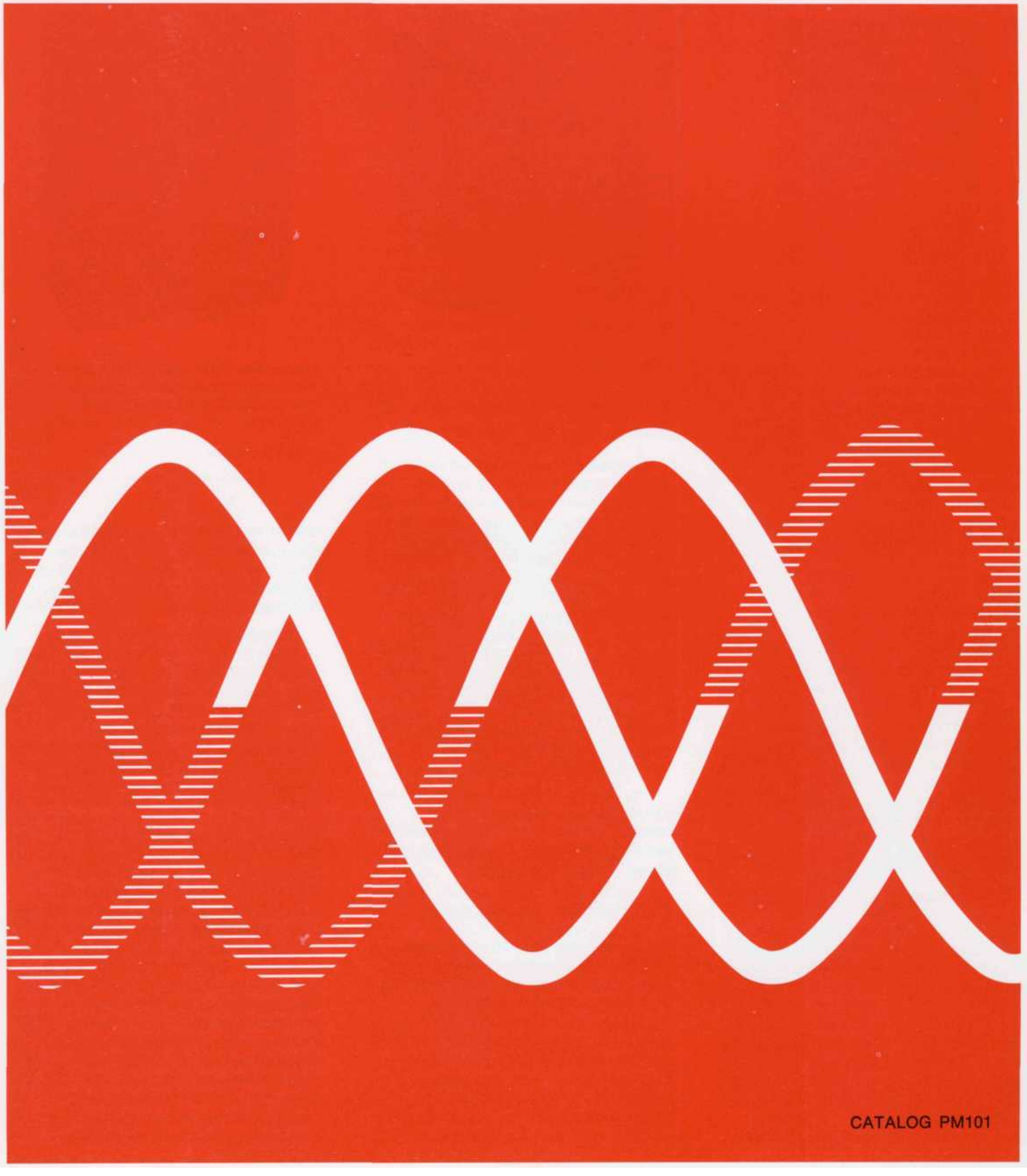
8) A preventative maintenance contract and manufacturer's one year warranty are a standard part of the "ACE" concept.

LEASING- By leasing the total package the complete cost of the installed uninterruptible power system is attributed to operating cost- no capital outlay is required. The standard lease term is 60 months with options, at the end of the lease period, to buy or continue to lease.

The standard Airoyal lease includes the cost of design, engineering, equipment, installation and preventative maintenance of the total system package.

AIROYAL

SYSTEM MONITOR



CATALOG PM101

AIROYAL

SYSTEM MONITOR * detects power line fluctuations and temperature or humidity deviations that cause equipment errors or failures

Much of today's sensitive and sophisticated electrical and electronic equipment is susceptible to malfunctions caused by transient variations in frequency and voltage of power lines, and to environmental temperature and humidity changes. Computers, electronic data processing equipment, industrial process systems, hospital instrumentation and automated machine tools are examples of equipment which may generate errors or function improperly unless line voltage and frequency variations are held within close limits.

The Airoyal Monitor is an integrated system for continuously monitoring power line input, and in some models temperature and humidity of equipment environment. It provides a visual and audible warning, and permanent strip chart record of under/over voltage, and under/over frequency together with a digital clock display of exact time at which power line, or other fault condition occured. Airoyal Monitors provide high reliability, instantaneous response, and through an arrangement of "fail-safe" output relays can control or shut down any type of electrical equipment.

The Airoyal System Monitor can be applied in frequency and voltage critical applications with confidence that the product has been designed and built to strict industrial control standards. Quality silicon semiconductors are used throughout to achieve the highest reliability, and individual monitors are factory pre-set to conform precisely to the desired voltage, frequency and environmental requirements.

Normal Service Variations

Normal commercial service is usually supplied by utilities within a tolerance of ±5% of rated voltage. This represents nominal continuous service values, and does *not* include transient variations.

A leading utility reports that once or twice a month their system experiences fluctuations of 25% from nominal voltage lasting for a duration of 100 milliseconds. Since sensitive electronic equipment, such as computers, will frequently malfunction or generate errors when there is a change of as little as 8% for a period of a few milliseconds, such power faults, if undetected, can create major problems.

Sources of Transients and Power Supply Variations

Sources of transients and variation in voltage and frequency on commercial power lines are numerous and varied. Lightning surges, temporary feeder faults that must be isolated, electrical and mechanical failures, switching procedures, human errors, etc., all cause deviations from normal voltage and frequency. In addition, as load conditions change during the day, line voltage changes. Voltage drops in transmission, and switching of inductive or high amperage loads cause similar variations. The most frequent single cause of transients is probably switching surges due to faults on the power system.

The Airoyal Monitor is designed to detect and give warning of line voltage variations and/or frequency variations generated by any type of power system disturbance.

Criteria for Computers

The required frequency and voltage stability for proper operation of computers is even more demanding than in many other applications. Typical computer specifications call for a power input range of -8 to +10 percent of rated voltage, whether steady state or transient, and frequency stability of 60 Hz $\pm^1/_2$ Hz. Errors in readout may occur any time input power deviates from these tolerances, whether due to frequency change, or to over/under voltage. If such power line induced errors go undetected they may cause dropouts, necessitating costly program reruns.

Model No. 11701 (Basic model) includes over/under voltage and frequency monitors, horn, red alarm light, clock, reset button, and event recorder.

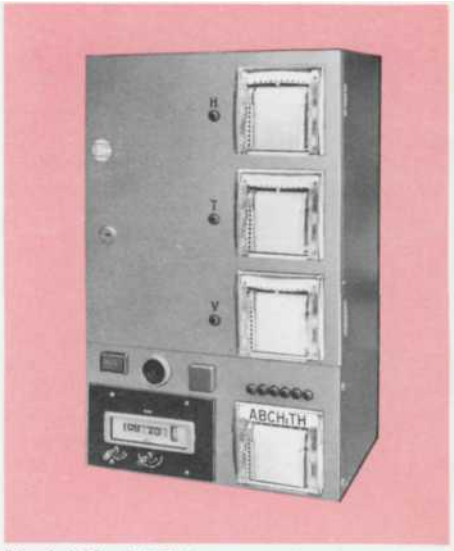
*Patent applied for.

The Airoyal Monitor, by instantly warning of power system fluctuations, and fixing their time of occurrence, puts an end to expensive reruns. Monitor models are also available with humidity and temperature monitoring of selected zones in the computer facility to detect out of tolerance conditions before trouble develops.

If a voltage dip is great enough (20% or greater, and lasting for a full cycle) computer sensing devices may interrupt the power supply to equipment and cause a "power-down" condition, which in turn necessitates equipment checks and expensive downtime. By isolating utility faults to the power line input, the Airoyal Monitor can save machine time and maintenance, eliminating the computer check-out that would otherwise be required before restarting the program. This is only one example of the many ways in which the Airoyal Monitor can maximize productive time of expensive electronic equipment.

Model No. 11702 same as basic model 11701, plus one voltage recorder with three position phase selector switch.

Model No. 11703 same as basic model 11701, plus one temperature recorder and one humidity recorder with fixed high-low alarms.



Model No. 11704 same as basic model 11701, plus one voltage recorder with three position phase selector switch, one temperature recorder and one humidity recorder with fixed high-low alarms.

How the Airoyal Monitor Operates to Detects Faults

The basic Airoyal System Monitor includes, in a single integrated unit, sensitive under/over frequency and voltage monitors capable of detecting deviations from the preset tolerance levels, visual and audible warning signals consisting of a red alarm light and horn, plus a clock and four channel event recorder. An output relay circuit, reset button and fused disconnect are also incorporated in the unit, which is housed in a standard NEMA 1 enclosure.

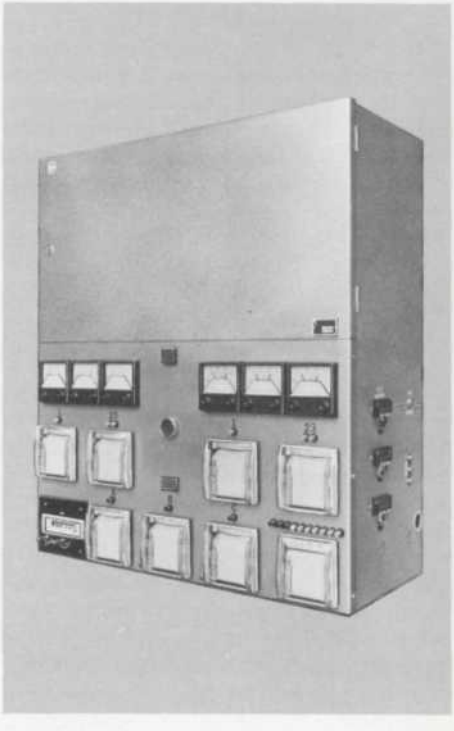
The monitors will denergize the output relay circuit whenever either voltage on any phase, or frequency, falls below or above the preset levels.

As the alarm horn and indicator light are activated, the digital electric clock stops to show exact time of malfunction. The alarm horn continues to sound until the manual reset button is pushed. At that time the clock is reenergized and must be manually reset to correct time. The red alarm light will remain on until the frequency and/or voltage conditions have been corrected, at which time the monitors automatically reset and the indicating light is extinguished.

In addition to the basic monitor model, three standard models are available with added features, as illustrated. They all include the basic monitoring, alarm, strip chart event recorder, and output relay features, but offer in addition the options of a voltage recorder, temperature and humidity monitors and recorders.

Custom Monitors

Custom Airoyal Monitors are available for all conceivable combinations of requirements. The monitor illustrated at right was designed and built for a leading computer manufacturer. The unit includes, in addition to the standard audible and visual fault indicators, clock and reset button, individual monitoring of frequency and voltage on all three phases of the power line, as well as three separate zones of temperature and humidity, adjustable for limits. A standby battery system was provided for continuous recording, even in the event of a total power outage. Equipment of this type delivers the ultimate in system performance, and provides visual and written records of the exact nature and duration of all faults.



Airoyal Custom Monitor

Monitor Accessories

Strip chart recorders are available as optional equipment, or as separate accessories for extending the performance capabilities of the standard systems. In addition to the basic event recorder for frequency and voltage deviations, recorders are available for charting voltage, temperature and humidity.

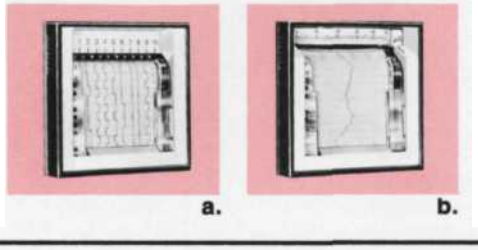
A battery source for the recorders can be included to provide complete freedom from power interruption in the event of total failure of line voltage. Adjustable high/low alarm for both humidity and temperature is also available. Virtually any combination of critical parameters may be monitored and recorded with the use of the optional accessories. In this way the Airoyal Monitor can be tailored to the exact requirements of a particular customer application.

Event Recorder

The Airoyal Multi-Channel Event Recorder is the most reliable and versatile instrument available today for simultaneously recording the on/off status (rather than magnitude) of up to ten separate sources. Inkless, pressure sensitive chart paper on 32 day rolls records the actual time at which an event occurred and its duration. Running 15 minute time markings are printed along the left edge of the chart for precise time reference. Chart paper is wound on a built-in take up reel. Direct feedout is also available through the use of the feedout slot at the bottom of the window. Provision is made for the use of a wire seal to prevent tampering with the recorder. Chart paper is loaded easily through the front panel. The window is simply lifted off, and the power switch turned to "off" position. The mechanism may then be pulled forward and tilted downward to the servicing position.

Voltage, Temperature and Humidity Recorders

Airoyal's strip chart recorders incorporating rugged taut-band meter movements are available for voltage, temperature and humidity recording with ±1.5% full scale accuracy. These recorders furnish clear visual readouts of magnitude on an edgewise chart scale. The basic design capabilities are similar to the event recorder. They can be used with appropriate sensors over standard ranges. Dual channel units are also available. High/low alarms for temperature and humidity zones are available to work in conjunction with the recorders, or separately with the basic monitor alarm circuit and readouts of individual event channels.



a. b.

Airoyal System Monitor Specifications

Nominal input voltage	120, 208, 240, 440 or 480 volts (as specified)
Nominal input frequency	50 or 60 Hz (as specified)
Under/Over voltage range of adjustment	85% to 115% of nominal
Under/Over frequency range of adjustment	50 to 70 Hz
Environmental temperature range	0° C to 45° C
Fixed differential for reset	1% of out setting
Response time of monitor on over/under frequency	4 cycles "Std." ½ cycles optional
Response time on monitor on under voltage	8.4 ms max.
Response time of monitor on over voltage	2.0 ms max.
Standard size: 16 x 12 x 10"	

Airoyal Monitors are performance certified and fully guaranteed.

Please supply the following information when ordering system monitors:

1. Catalog number and accessories if desired-
2. Input voltage and frequency.
3. Preset drop-out setting for frequency and voltage monitors.
4. Preset high/low alarm settings of temperature and humidity monitors.
5. Range of voltage, temperature and humidity recorders if desired.

a. Airoyal Ten-Channel Event Recorder
b. Airoyal Voltage Temperature, and Humidity Recorders

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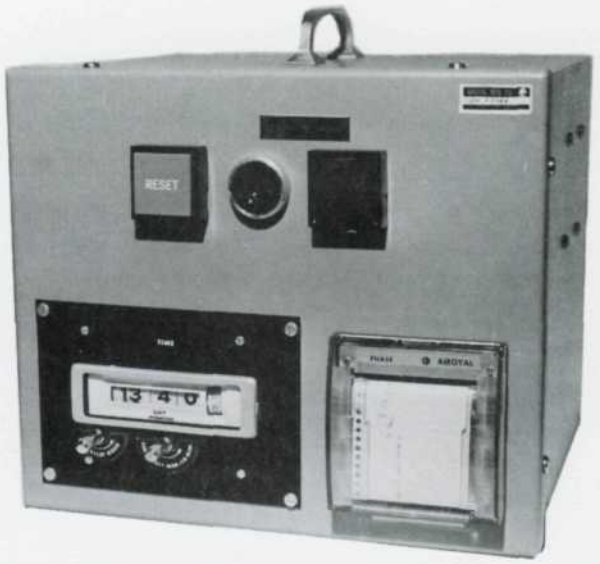
AIROYAL

VOLTAGE MONITOR

for Single Phase Computer Power Supply



Airoyal Voltage Monitor Catalog No. 11721

THE AIROYAL BASIC SYSTEM:

Monitors under and over voltage. Automatically activates the alarm circuits whenever there is a deviation from predetermined power supply requirements. The strip chart recorder continuously indicates the quality of voltage and logs the time and date of any fluctuation for a permanent record. These transients cause computer parity errors, memory and word structure alterations and non-programmed jumps.

BENEFITS

- Detects High Speed Transients
- Warns of Out of Tolerance Conditions
- Eliminates Expensive Reruns
- Saves Valuable Down time
- Pinpoints Problem Areas
- Saves Personnel time
- Eliminates Equipment Checks
- Maximizes Production Time

FEATURES

- Dual Voltage: Standard 120/208 volt
- Limits are field Adjustable
- Solid State Construction
- 2 MS Spike Response
- No Installation Charges
- 32 Day Chart Recorder
- Unconditional 1 Year Guarantee
- Compact Design - 10" x 12" x 10"

ALSO AVAILABLE: Single and Three Phase Digital, Single and Three Phase Analog, Frequency, Temperature and Humidity Monitors, Airoyal Continuous Energy Systems.

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Code: PM 101-A

AIROYAL VOLTAGE MONITOR

Airoyal Voltage Monitor Catalog 12101TA1

Analog Monitor for 3 Phase Computer Power Supply

THE AIROYAL SYSTEM:

Continuously monitors and records the magnitude of the three phases of voltage and frequency on 32 day chart rolls, by direct writing with an inkless recording stylus for each channel. Detects high speed transients. Available in surface, flush or relay rack mounting.

BENEFITS:

- Records High Speed Transients
- Records Declining 'Brownout' Voltage
- Permanent Record of Voltage
- Pinpoints Time, Date and Extent of Voltage and Frequency Excursions

FEATURES:

- 2ms. Spike/Dip Voltage Response
- $^1/_2$ Cycle Frequency Response
- Field Adjustable Limits
- Expanded Scale: 95 to 145 Volts; 57.5 to 62.5 Hertz

CHARACTERISTICS:

Heated Stylus
True Rectilinear coordinates
1 Volt/1 Div. - Sensitivity
0.1 Hertz/1 Div. - Sensitivity
50mm Chart Width/Channel
Better Than 1% Linearity
No Discernible Noise on Trace
Virtually Zero Drift
Dimensions: 21" x 22" x 18"
Front Loading Chart

ALSO AVAILABLE: Single and Three Phase Digital, Single and Three Phase Analog, Frequency, Temperature and Humidity Monitors, Airoyal Continuous Energy Systems.

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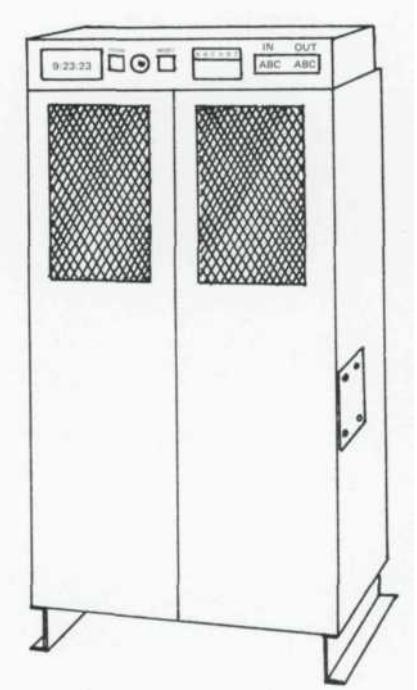
Code 5671

AIROYAL

for Computer Power Supply

VOLTAGE REGULATOR



- REGULATES
  Maintains Consistent Voltage Output
- MONITORS
  Warns of 2MS out of Tolerance Spikes

THE AIROYAL BASIC SYSTEM.

Regulates and Monitors your computer power supply. The regulator section provides constant input voltage to the computers during "BrownOuts"; clips and attenuates transient spikes. The monitor section records the quality of the input and output voltages and will activate the alarm circuits whenever deviations occur.

BENEFITS

- **Clips Voltage Spikes**
- **Filters Line "Noise"**
- **Compensates for "BrownOuts"**
- **Maximizes Computer Time**
- **Monthly Record of Voltage Quality**
- **Adjustable Output +7%**
- **No Maintenance**
- **Compact Design**

FEATURES

- **Output Voltage Regulation: +0.5%**
- **Input Voltage Range: +12%, -20%**
- **Wye or Delta 3 Phase Connected**
- **Efficiency: 95%**
- **Response: Starts-1/6 Hz**
  : Completed-4 1/2 Hz
- **Solid-State Construction**
- **Accepts 33% Unbalanced Loads**

ALSO AVAILABLE: Single and Three Phase Digital, Single and Three Phase Analog, Frequency, Temperature and Humidity Monitors, Airoyal Continuous Energy Systems.

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