Product Manual
KS-23832

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Lucent Technologies LINEAGE® 2000 DC-DC Converter and Converter Shelf Assembly +24V @ 25A to -48V @ 10A

Notice:
Every effort was made to ensure that the information in this document was complete and accurate at the time of printing. However, information is subject to change.

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1 Introduction

General

Thank you for making the Right Choice, a Lucent Technologies LINEAGE® 2000 Energy Systems product.The LINEAGE® 2000 family name of premier energy system products is globally recognized as the right choice for the ultimate in systems performance and reliability. Selecting this product brings the Lucent Technologies commitment to product and service excellence to your own telecommunication system. This long-standing Lucent Technologies commitment has been gained from over 80 years of worldwide telecommunication experience in the development, manufacturing, engineering, installation and service of leading edge energy systems, products and services.

Lucent Technologies Energy Systems power plant capacity is designed for modular growth by adding a connectorized rectifier shelf assembly. This allows growth and maintenance without interrupting power to the using systems.

The KS-23832 List 1A DC-DC Converter and its connectorized shelf assembly (KS-23832 List 2) complement these features. The LINEAGE® 2000 KS-23832 +24 volt to -48 volt DC-DC converter system utilizes 50kHz technology to provide a reliable and economical means to obtain closely regulated and filtered -48 volt DC power when only one primary source of +24 volt DC power is available. The converter shelf assembly (CSA) incorporates two 10-ampere 24-volt to -48 volt converters and the hardware to mount them. (See Figure 1-1.)

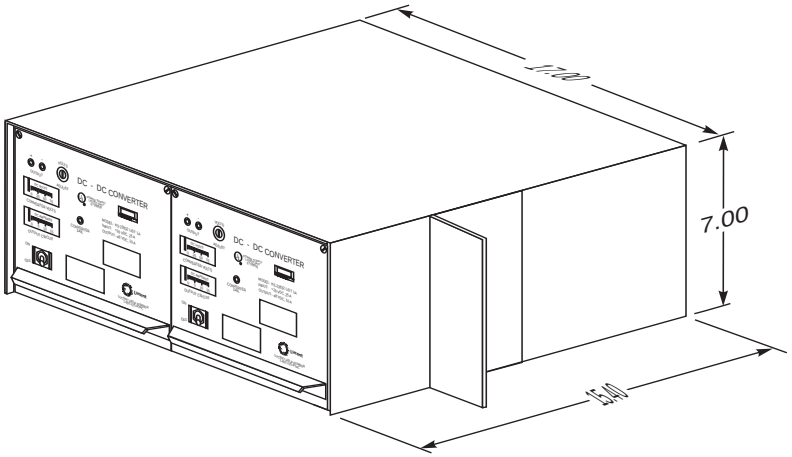


Figure 1-1: DC-DC Converter Shelf Assembly KS-23832 List 7

Technology Highlights

The DC-DC converter system consists of a KS-23832 L-2 converter shelf assembly equipped with two KS-23832 L-1A 10 ampere +24 volt to -48 volt Converters. Distribution to the -48 volt load is provided via an ED83120-30 G-2 fuse panel equipped with two fuse blocks each arranged to accommodate eight 1- to 30-ampere distribution fuses and associated alarm fuses.

The converter shelf assembly and distribution fuse panel have mounting brackets for standard 23-inch or 26-inch relay rack mounting. Each converter module contains a blocking diode and circuitry for load sharing, current limiting, high voltage shutdown and converter automatic restart. The converter shelf assembly is equipped with a major and minor alarm.

- Blocking Diode: the blocking diode on the converter output isolates a failed converter module from the output bus to protect other modules for parallel operation.

- Load Sharing: load sharing enables two or more modules to proportionally share the load.

- Current Limiting: the current limiting circuit protects the module from internal/external faults by limiting the output current to 110% of the output rating.

- High Voltage And Low Voltage Alarms: the high and low voltage detection circuits monitor the output voltage and provide an indication to the major and minor alarm circuits when the thresholds are exceeded.

- High Voltage Shutdown: the high voltage shutdown circuit protects the modules and the connected load from high voltage surges by automatically shutting down the converter when the voltage exceeds 58.0 + 0.5 volts.

- Restart Circuit: the restart circuit attempts to restart a failed converter after a high voltage shutdown. If the high voltage condition has ceased within the time limit (approximately 3-5 seconds), the converter will restart. If the high voltage condition is still present, the converter will lock out.

- Major and Minor Alarm: the converter shelf assembly has two Form "C" contacts, one for converter major and one for converter minor. When one converter fails, the converter minor relay will operate and when two converters fail, the converter major relay will operate.

Technical Support

Technical support for Lucent Technologies equipment is available to customers around the world.

USA, Canada, Puerto Rico, and the US Virgin Islands

On a post-sale basis, during the Product Warranty period, our Technical Support telephone number 1-800-CAL RTAC (1-800-225-7822) provides coverage during normal business hours. Product Specialists are available to answer your technical questions and assist in troubleshooting problems. For out-of-hours EMERGENCIES, the 800 number will put you in touch with a Regional Technical Assistance Center Engineer via our 24 hour a day, 7 day per week Help Desk.

When Technical Support is required in the Post-Warranty Period, the service may be billable unless you hold an extended warranty or contractual agreement.

Central and South America

If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs.

Europe, Middle East, and Africa

If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs

Asia Pacific Region

If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs.

Product Repair and Return

Repair and return service for Lucent Technologies equipment is available to customers around the world.

USA, Canada, Puerto Rico, and the US Virgin Islands

For information on returning of products for repair, customers may call 1-800-255-1402 for assistance.

Central and South America

If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.

Europe, Middle East, and Africa

If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.

Asia Pacific Region

If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.

Customer Service

For customer service, any other product or service information, or for additional copies of this manual or other Lucent Technologies documents, call 1-800-THE-1PWR (1-800-843-1797). Specify the select code number for manuals, or drawing number for drawings. These numbers are listed in the following reference table.

Contact your regional customer service organization or sales representative for information regarding spare parts.

2 Product Description

General

The KS-23832 Converters and Converter Shelf Assembly use a single output designed to provide a regulated -48 volts dc rated at 10 amperes dc full load from a +24 volts dc battery input source.

The converter has an overvoltage detection circuit that shuts the unit off if the output exceeds a predetermined level. It also has a high/low detector that generates an alarm if the output is below or above a predetermined level.

The converter assembly can hold up to two converters or 10 amperes dc redundant capacity. Input and output terminations are provided on the back of the unit accessed via a protective cover through knockouts on each side.

Mechanical and Electrical Specifications

The KS-23832 converter and shelf assembly are designed to be used in a variety of cellular applications within a 24-volt dc battery plant. Examples of such plants include the Lucent Technologies LINEAGE® 2000 J85500E-1 and H569-403 bays.

Table 2-A: Specific Characteristics and Ratings, Lists 1A - 9

Product	Characteristics
List 1A Converter	6.9" H x 8.4" W x 10.0" D Weight: 8 lbs UL Listed
List 2 Converter Shelf Assembly	7.0" H x 23" or 26" W x 16.0" D Weight: 12 lbs Allow at least 3.5" for air circulation above List 2 UL Listed
List 3 Mounting Bracket	Used to mount shelf assembly in 23" or 26" frames
List 4 Blank Panel	6.88" H x 8.35" W x 9.9" D x 0.125" T Weight: 8 oz
List 5 Cable Extended Assembly	18" L Weight: 8 oz
List 7 Converter Shelf Assembly	7.0" H x 23" or 26" W x 16.0" D Weight: 28 lbs
List 8 Sloped Heat Deflector Baffle	4.05" H (including 0.555" mounting flange) x 14.3" D x 17.15" W Weight: 2 lbs Replaces top grill work of List 2 Converter Shelf Assembly Allow at least 3.5" for air circulation above List 2
List 9 Converter Shelf Assembly	7.0" H x 23" or 26" W x 16.0" D Weight: 20 lbs

Table 2-3: Electrical Specifications

Product	Characteristics
Input Voltage	20 to 28 volts dc at 25 amperes
Output Voltage	-48 volts dc at 10 amperes dc, adjustable within a range of -47 to -54 volts dc for output currents of 0 to 10 amperes dc
Output Voltage Regulation	±2% for any combination of line, load or temperature. At 20 volts dc input, maximum output voltage at 10 amperes dc is 50 volts dc
Output Noise	Less than 26 dBrnc; wideband noise less than 30 mv rms or less than 100 mv peak to peak over the frequency range 10 Hz to 20 mHz
Initial Startup	Converter starts approximately 4 seconds after the input circuit is switched on
Low Input Shutdown Voltage	Activates at 19 volts dc
Restart Input Threshold	21 volts dc nominal
High Voltage Shutdown Detection Threshold	58.0±0.5 volts dc. After high voltage shutdown, converter will attempt to restart. If high voltage condition remains after restart, HVSD activates, causing converter to shut down and lock out; switch the input circuit breaker to the “Off” position. Wait approximately 35 seconds, then switch the circuit breaker to the “On” position
Manual Shutoff and Restart	If the converter is turned off manually for longer than 15 seconds, wait 35 seconds or longer before restarting the converter
Efficiency	80% or greater at nominal input voltage from 50% to 100% load
Panel Meter Accuracy	±5% of full scale. Pin jacks are provided to measure output voltages with greater accuracy; external shunts may be used to measure current with greater accuracy
EMI Requirements	Complies with FCC Docket 20780, Part 15, Subpart J, Class A
Heat Dissipation	450 BTU/hour

Alarms

The Converter Shelf Assembly alarms are arranged so that an isolated contact closure or minor alarm occurs between two terminals when one converter fails. A second isolated contact closure or major alarm occurs when both converters fail. The CSA has two Form "C" contacts, one for converter major and one for converter minor alarms.

The Converter Fail Alarm (CFA) will be issued for any or all of the following conditions:

1. A high voltage shutdown.

2. Operation of an internal fuse and/or overcurrent operation of the input circuit breaker if provided (Fuse Alarm).

3. A high voltage alarm activates at -56 ± 0.5 volts dc.

4. A low voltage alarm activates at -43 ± 0.5 volts dc. CFA results in an illuminated red front panel LED labeled CFA and causes operation of the CFA alarm relay.

Additional Features

Natural convection cooling is provided. The converter MTBF (mean time between failures), calculated in accordance with Bellcore TR-TSY-000332, is in excess of 67,000 hours at 40° C, sea level, nominal input line and full load. The converter has a calculated life of 10 years when operated at 40° C, sea level and full load.

Environmental Specifications

These units are capable of operating in air temperatures within a range of 0° C to 50° C for altitudes within the range of -200 to 5000 feet. Between 5000 and 13,000 feet, derate the ambient temperature by 2° C per 1000 feet as the altitude increases.

These units are capable of operating in a relative humidity between 10% and 95% (noncondensing). The List 1A is capable of being stored at any temperature between -40° C and 85° C without being damaged.

These units remain operational when mounted in a frame and subjected to earthquake zone 4 conditions.

3 Installation

Introduction

This section covers the input, output and alarm connections needed to install the KS-23832 converter and shelf assembly, and discusses installation checks, operational checks, load sharing, factory settings and initial turn-on of the unit.

Lucent Technologies recommends that only persons trained and experienced in the installation of telecommunications power equipment install the converter and its associated shelf assembly.

Input Connections

Typically the input connections are made at the terminal block at the rear of the converter shelf assembly through knockouts provided on the side of the units. Bushings are provided to prevent chafing the 8 AWG stranded wire with the appropriate terminals attached. Cable assemblies color coded red and black are provided for the J85500E-1 and H569-403 Bays. These are usually included in the kits for the appropriate List numbers for each bay along with the 45-ampere circuit breakers to mount on the 24-volt bus at the upper part of these bays.

Output Connections

Typically the output connections are run at the same time (through bushings placed in the knockout holes on the side of the converter shelf assembly) as the input connections using cable assemblies for connections to output distribution within the bays in question. If distribution or converter shelf assemblies are mounted in supplemental bays, then the voltage drop calculation shown on the engineering drawing for the bay in question should used to determine the wire size for the length of run in question. Gutter tapping may be required if the wire size and/or terminal selected is larger than the converter can accommodate.

Alarm Connections

The alarm connections are made on the rear terminal, usually at the same time as input and output connections, through bushings placed in the knockout holes. It may be feasible to use current limiting resistors (1K ohms, 2 watt) along with small gauge (20 AWG) wire to terminate the alarm connections (major and minor to the ECS or a similar controller if available in the same bay). Otherwise alarm connections will be made directly to the alarm office termination points.

Installation Checks

The mounting shelf is equipped with reversible brackets for flush fit mounting in 23-inch or 26-inch frames. For ease of mounting, the one or two List 1A modules should be removed from the mounting shelf. This is accomplished by loosening the two lock screws, grasping the front handle, and pulling the module out of the rack.

Interconnection

The input, output and alarm connections are made to the 14-point barrier terminal block on the rear panel beneath the cover and through the bushings inserted when the knockouts are removed. The details of these connections are shown on the appropriate T or SD drawing for the J85500E-1 or H569-403 bay. The output may be connected directly in parallel, since each converter module contains an output isolating diode.

Note

The List 2, List 7, or List 9 converter shelf assembly should be mounted away from heat sensitive equipment. The ventilation louvers in the top and bottom of the shelf assembly must not be obstructed.

Warning

The input to each List 1A converter module should be supplied from an individually protected circuit. Otherwise, a fault in one module may cause the entire converter system to fail.

Warning

The circuit breaker must be in the off position before installing the KS-23832 converter into the converter shelf assembly. If not, the current inrush to the converter may cause the connector to weld.

Installing Converter in Shelf

To install the KS-23832 converter in the List 2 mounting shelf, turn off the circuit breaker, insert the List 1A converter in the guides, slide in the module to engage the connector and secure the two lock screws.

Operational Checks

Verify that the converter system is properly installed and interconnected. Turn on the circuit breaker of each module one at a time and verify that the front panel dc voltmeter measures the output. If a load bank is available, the individual List 1A converters should be checked to verify that each one provides the rated output current.

Load Sharing

The converters are connected for load sharing. If the load currents are not balanced, adjust the output voltage of either List 1A converter until the load currents are equal.

Turn On

Connect the load and turn on the KS-23832 List 1A converter's circuit breaker. If the load requires more current than one module can deliver, the first module energized will automatically reduce its output voltage to keep the current within its capacity. When enough converters to supply the load current have been turned on, the first module's load voltage will rise to the correct regulated value.

Factory Settings

- The default set point for the output voltage is -52 volts dc at 5 amperes dc with 26 volts dc input.
- The low input voltage shutdown set point is 19 volts dc nominal. There is a 2 volts dc hysteresis such that the converter will restart at a nominal 21 volts dc.
- The low output voltage alarm is factory set to -43 ± 0.5 volts dc.
- The high voltage alarm is factory set at -56 ± 0.5 volts dc.
- The high voltage shutdown is factory set to -58 ± 0.5 volts dc.

4 Maintenance and Troubleshooting

Adjustments

The KS-23832 converters do not require routine maintenance. The output voltage of the converter may be adjusted by means of the R5 potentiometer located on the front panel (see Figure 4-1). To adjust the output voltage, either disconnect the output from the common output bus or de-energize all other paralleled converters. Connect a precision voltmeter to the test jacks on the front panel and adjust the R5 potentiometer to obtain the desired output voltage. All other adjustments are internal and set at the factory. Readjustment of these internal set points is normally not required in the field and should not be tampered with unless a trained technician familiar with the converter's operation has the correct equipment and procedure to make the required adjustments. Internal adjustments typically require the use of a special cable extended assembly (KS-23832 L5, CC#406475426, see Figure 4-2) to permit operation of the converter external to the KS-23832 L2 shelf assembly (see Figure 4-3). Failure to follow the correct procedures or an incorrect setting may create or introduce operational problems in the KS-23832 converter systems.

Notice

If it can be determined that the converter's internal settings were inadvertently misadjusted and caused some sort of failure, the warranty on the unit may be void.

Troubleshooting

Servicing this equipment requires specialized equipment and is not recommended. If you require assistance, please contact your regional technical assistance center on our toll free number: 1(800)-225-RTAC.

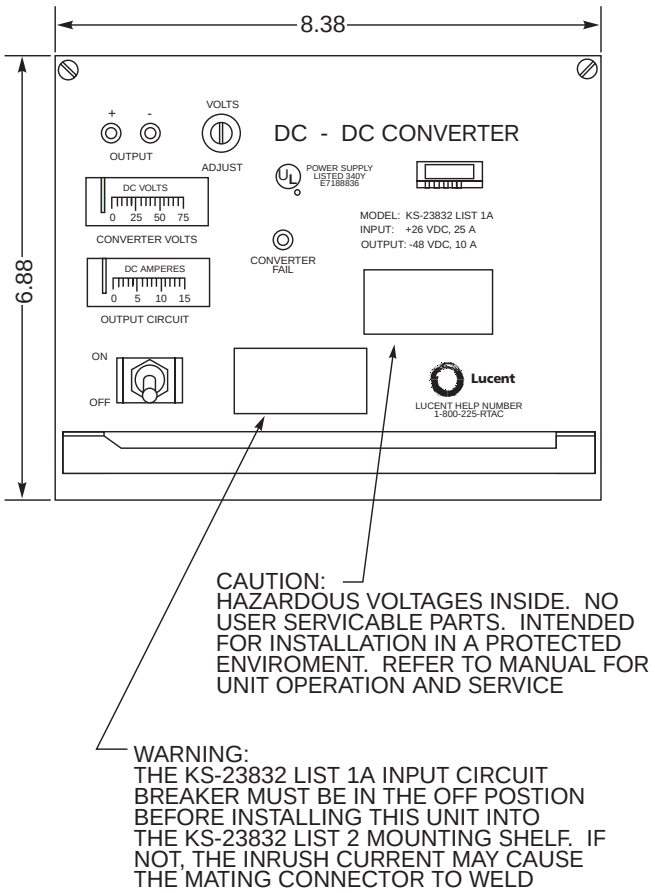


Figure 4-1: Front View, DC-DC Converter KS-23832 List 1A

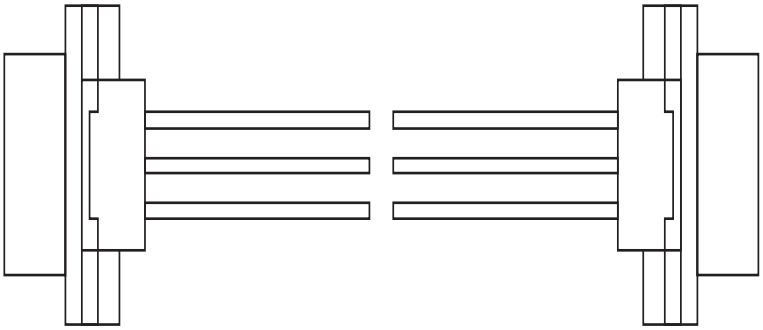
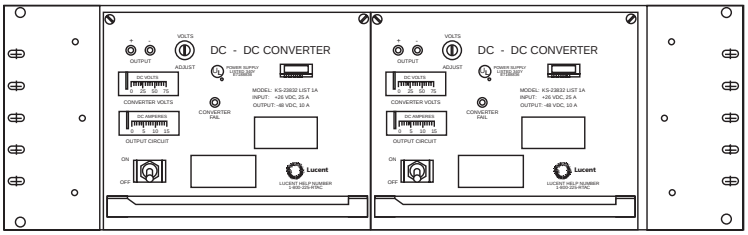


Figure 4-2: Extended Cable Assembly KS-23832 List 5



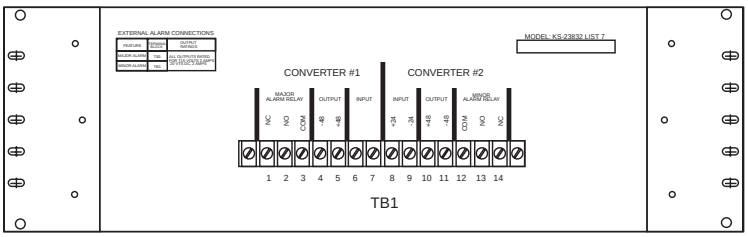


Figure 4-3: Front View (Top) and Rear View (Cover Removed), DC-DC Converter Shelf Assembly KS-23832 List 7

5 References

The following drawings are shipped with the Converter Shelf Assemblies (CSAs). These drawings provide the details, not provided in this manual, that are necessary for the proper installation of the converters and CSAs. Refer also to the documents for the associated power plants (e.g., J85500E-1 or H569-403).

Table 5-A: Drawing References

Converter and Shelf Assembly	Drawing	Drawing Title
KS-23832	SD-83120-01	Power Systems LINEAGE® 2000 Converter Shelf Assemblies Schematic Diagram
	CD-83120-01	Power Systems LINEAGE® 2000 Converter Shelf Assemblies Circuit Description

6 Product Warranty

A. Seller warrants to Customer only, that:

1. As of the date title to Products passes, Seller will have the right to sell, transfer, and assign such Products and the title conveyed by Seller shall be good;
2. Upon shipment, Seller's Manufactured Products will be free from defects in material and workmanship, and will conform to Seller's specifications or any other agreed-upon specification referenced in the order for such Product;
3. With respect to Vendor items, Seller, to the extent permitted, does hereby assign to Customer the warranties given to Seller by its vendor of such Vendor Items, such assignment to be effective upon Customer's acceptance of such Vendor Items. With respect to Vendor items recommended by Seller in its specifications for which the vendor's warranty cannot be assigned to Customer, or if assigned, less than Sixty (60) days remain of the vendor's warranty or warranty period when the Vendor's items are shipped to Customer or when Seller submits its notice of completion of installation if installed by Seller, Seller warrants that such Vendor's Items will be free from defects in material and workmanship on the date of shipment to Customer. In such an event, the applicable Warranty Period will be sixty (60) days.

B. The Warranty Period listed below is applicable to Seller's Manufactured Products furnished pursuant to this Agreement, unless otherwise stated:

WARRANTY PERIOD

Product Type	New Product	Repaired Product or Part
Central Office Power Equipment	24 Months	6 Months

*The Warranty Period for a repaired Product or part thereof is as listed or, in the case of Products under Warranty, is the period listed or the unexpired term of the new Product Warranty Period, whichever is longer.

**The Warranty Period for Products ordered for Use in Systems or equipment Manufactured by and furnished by Seller is that of the initial Systems or equipment.

C. If, under normal and proper use during the applicable Warranty Period, a defect or nonconformity is identified in a Product and Customer notifies Seller in writing of such defect or nonconformity promptly after Customer discovers such defect or nonconformity, and follows Seller's instructions regarding return of defective or nonconforming Products, Seller shall, at its option attempt first to repair or replace such Product without charge at its facility or, if not feasible, provide a refund or credit based on the original purchase price and installation charges if installed by Seller. Where Seller has elected to repair a Seller's Manufactured Product (other than Cable and Wire Products) which has been installed by Seller and Seller ascertains that the Product is not readily returnable for repair, Seller will repair the Product at Customer's site.

With respect to Cable and Wire Products manufactured by Seller which Seller elects to repair but which are not readily returnable for repair, whether or not installed by Seller, Seller at its option, may repair the cable and Wire Products at Customer's site.

D. If Seller has elected to repair or replace a defective Product, Customer shall have the option of removing and reinstalling or having Seller remove and reinstall the defective or nonconforming Product. The cost of the removal and the reinstallation shall be borne by Customer. With respect to Cable and Wire Products, Customer has the further responsibility, at its expense, to make the Cable and Wire

Products accessible for repair or replacement and to restore the site. Products returned for repair or replacement will be accepted by Seller only in accordance with its instructions and procedures for such returns. The transportation expense associated with returning such Product to Seller shall be borne by Customer. Seller shall pay the cost of transportation of the repair or replacing Product to the destination designated by Customer within the Territory.

E. The defective or nonconforming Products or parts which are replaced shall become Seller's property.

F. If Seller determines that a Product for which warranty service is claimed is not defective or nonconforming, Customer shall pay Seller all costs of handling, inspecting, testing, and transportation and, if applicable, traveling and related expenses.

G. Seller makes no warranty with respect to defective conditions or nonconformities resulting from actions of anyone other than Seller or its subcontractors, caused by any of the following: modifications, misuse, neglect, accident, or abuse; improper wiring, repairing, splicing, alteration, installation, storage, or maintenance; use in a manner not in accordance with Seller's or vendor's specifications or operating instructions, or failure of Customer to apply previously applicable Seller modifications and corrections. In addition, Seller makes no warranty with respect to Products which have had their serial numbers or month and year of manufacture removed, altered, or with respect to expendable items, including, without limitation, fuses, light bulbs, motor brushes, and the like.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. CUSTOMER'S SOLE AND EXCLUSIVE REMEDY SHALL BE SELLER'S OBLIGATION TO REPAIR, REPLACE, CREDIT, OR REFUND AS SET FORTH ABOVE IN THIS WARRANTY.