INSTALLATION
and
OPERATION MANUAL
for

INTERNATIONAL POWER MACHINES CORP.

Balanced Power II

30kVA

Harsh Environment
Uninterruptable Power Supply
(UPS)

SAVE THESE IMPORTANT
SAFETY INSTRUCTIONS

This manual contains important safety instructions that should be followed during installation and maintenance of the UPS and Environmental Cabinet.

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HE
0kVA

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HOW TO USE THIS MANUAL

Understanding and properly using this operating and maintenance manual will enhance UPS reliability. Therefore, the manual should be given equal status with the tools and equipment used to align and maintain the system. Conversely, misunderstanding or improper application of the principles set forth can result in impaired system operation, loss of power to critical equipment loads, injury to personnel or damage to the inverter.

1. Become familiar with the Table of Contents. It is here that the user can first determine where required information or guidance can be found in the manual.

2. Read through the entire manual so as to become familiar with its style and general contents.

3. Know the manual's limitations. This manual is not intended to give a detailed theory of operation of the UPS. Troubleshooting is limited to the isolation and correction of problems that are signaled by the Control/Monitoring/Alarm Panel.

4. Be thoroughly familiar with the safety precautions outlined in Sections II and IV of the manual.

5. Do not take short cuts when operating the UPS or performing maintenance on the system. A slower, more deliberate pace will give better results because it eliminates confusion and any false conclusions that may be reached by skipping steps. Careful adherence to step sequence presented here is often the fastest way to achieve desired results.

6. This manual is written based on the assumption that maintenance personnel are fully knowledgeable in electronics and aware of the hazards of working with high voltage equipment. *Always remember that voltages may be present even when the system has been fully shut down.* Use a voltmeter to check terminals to ground. There is **no substitute for common sense.**

7. Don't guess! If you don't know, ask someone who does.

8. Remember that International Power Machines Service Staff is always available to answer your questions or provide helpful advice about your UPS. Call them on our **Service Hot Line:**

Telephone: (800) 777–8922

SAFETY CONSIDERATIONS

The UPS and Environment cabinets are designed for industrial applications in harsh environments. However, the UPS system is a sophistication power system and should be handled with appropriate care, following these guidelines:

- **Keep surroundings clean and free from excess moisture.**
- **Do not operate the UPS system close to gas or electric heat sources.**
- **This system is not intended for outdoor use.**
- **The operating environment should be maintained within the parameters stated in this manual.**
- **Keep the cabinet doors closed to ensure proper cooling airflow and to protect personnel from the dangerous voltages inside the unit.**
- **The system contains its own power source. Lethal voltages are present even when the UPS is disconnected from utility power.**

If service or routine maintenance is required:

- **Ensure all power is disconnected before performing installation or service.**
- **Ensure the area around the UPS system is clean and uncluttered.**
- **Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.**

GETTING HELP

If you have questions about any of the information in this manual, or if you have a question this manual does not answer, please call International Power Machines Field Service:

UNITED STATES **(800) 777–8922**

SECTION I
THEORY OF OPERATION

1.1 GENERAL

The **BalancedPower *II*** Harsh Environment (BP II *HE*) Uninterruptible Power System (UPS) presented in this manual is a solid state, on–line system designed to provide high quality, continuously filtered and conditioned AC power to critical equipment loads. Most commonly, the UPS is configured as a single, stand–alone unit. Information contained herein is applicable to this power rating.

A single UPS is comprised of the following basic components:

Input Transformer
Rectifier/Charger
Inverter
Static Bypass Switch
Bypass Breaker
Output Transformer
System Control Logic and Circuitry
Digital Monitoring Panel
Battery
DC Disconnect

A one–line diagram at the end of Section II shows the relationship of these various components.

1.2 RECTIFIER/CHARGER

The UPS input voltage from the utility is fed into the rectifier/charger (usually referred to as the rectifier) which converts the AC to filtered, regulated DC voltage. The DC is used to power the inverter and to recharge the batteries as necessary. The assembly consists of an input circuit breaker, a transformer, and a solid–state three–phase rectifier designed to eliminate even–ordered harmonics.

1.3 INVERTER

The inverter changes DC voltage to precision AC voltage through pulse width modulation (PWM) inversion. Output isolation transformers and an output filter provide "clean", computer grade AC, which is then sent to the critical load. When utility power is available, the rectifier supplies power to the inverter. Should the utility power fail, the inverter is powered by the batteries for a predetermined length of time.

1.4 STATIC BYPASS SWITCH

The static bypass switch connects the UPS bypass input to the load in the event of inverter output loss or an overload condition. During normal conditions, the static bypass switch is in the open or disconnected mode, which isolates the bypass input from the load.

If the inverter output becomes unavailable or exceeds its specified tolerance, the static bypass switch will close and transfer the load directly at AC power without interruption. This transfer is automatically inhibited in the event the UPS bypass input is not within specified tolerance.

As soon as the inverter output becomes available within tolerance, or the overload clears, the static bypass switch will disconnect and retransfer the load to the inverter. Note, however, that so long as the inverter is out of specification, the static bypass will automatically inhibit retransfer of the load.

1.5 BATTERIES

The separate batteries are intended to supply 120 VDC nominal. This is the energy reservoir of the UPS and provides DC power to the inverter during UPS input power loss or rectifier malfunction. The Battery Disconnect Circuit Breaker electrically isolates the batteries from the UPS module for maintenance purposes and provides overcurrent protection of the battery output.

The rectifier/charger normally provides a maintaining or "float" charge to the batteries. Following periods of discharge when the batteries have supplied power to the inverter, the rectifier/charger increases power to the batteries in order to recharge them.

1.6 CONTROL LOGIC AND CONTROL CIRCUITRY

The control logic and circuitry of the UPS provide the operating logic and system control for all functions. These range from limiting the rectifier/charger inrush current by "walking" it in, to maintaining the inverter output voltage within rigid specifications, to determining whether or not the static bypass switch should be activated. The control logic is, for all practical purposes, the brain of the UPS.

1.7 DIGITAL MONITORING PANEL

The UPS is equipped with a standard Digital Monitoring Panel, which selectively monitors critical parameters of the UPS, using a bright, easy–to–read LCD display. Detailed instructions in Section III guide the operator through the UPS startup sequences.

In the event of an abnormal condition, an audible alarm will sound and the LCD display will show the alarm value to identify the condition so that corrective action can be taken. An alarm history can be displayed when desired. Alarm Silence and Emergency Power Off pushbuttons are provided.

The Digital Monitoring Panel is discussed in greater detail in Section III.

1.8 MULTI–LEVEL PASSWORDS

A password is required to access and use the **UPS Maintenance Menu,** described in Section 3.6.3. This menu, with five subsections, makes a variety of maintenance functions available including transfer to and retransfer from bypass, password changes and adjustment to time and date.

A person who already knows either the password in question or a higher level password may change the passwords.

Passwords consist of a minimum of 4 and a maximum of 9 characters. The numerals 0 through 9 and letters A through F may be employed.

The first character of the password indicates the privilege level of the password. The higher the privilege level, the more capabilities that password can access.

Privilege level 0:	No password. Used only for the front panel display of voltages, currents, etc. Does not permit any menu access.
Privilege level 1:	Reserved for future development.
Privilege level 2:	Remote operator password. Used to monitor the UPS, but not to affect transfers and retransfers.
Privilege level 3:	Reserved for future development.
Privilege level 4:	Operator password. Monitor the UPS as well as allow transfers, retransfers, transfer enables, retransfers enables, reset faults, etc.

1.9 PHONE HOME ALARM REPORTING

When phone home operation is activated and the UPS senses one of several pre–selected alarm conditions, the UPS automatically dials IPM's Field Service computer without human assistance and notifies IPM's Field Service personnel of a system problem requiring attention.

Important information down–loaded during each phone home event includes: 1) UPS name, ID and serial number, 2) customer ID and phone number and 3) a list of active alarms. You obtain the following benefits from this feature:

a. Immediate field service notification of site power or UPS problems, even when the UPS is unattended.

b. Increased UPS availability due to reduced mean–time–to–repair with automatic notification and complete remote diagnostic capabilities.

c. 24–hours per day, 7 days per week monitoring of unmanned facilities and locations where operators are unfamiliar with the UPS. Often, service personnel can take steps to solve a UPS problem remotely before the user is aware that there is a problem.

An internal modem and a dedicated telephone line are required. Phone Home Alarm Reporting can be activated only with a Field Service level password. Our Customer Service Engineer normally activates the system at startup.

1.10 DIAL–BACK SECURITY

This security feature is provided to ensure system integrity. **It prevents "hackers" or other unauthorized persons from intentionally or unintentionally accessing the UPS database.** Anyone calling the UPS must establish authority through the use of a dial–back password. The unit will validate the password by comparison to a maximum of four passwords stored in non–volatile memory. One of the passwords allows direct communications to commence with the UPS. The other three passwords have associated telephone numbers. If one of these passwords is used, the UPS logic will hang up and dial back the phone number associated with that password. When connection is made, the remote operator must enter the normal password for access to the corresponding level of monitoring diagnostics and controls.

1.10 DIAL–BACK SECURITY (continued)

High level security is provided since the remote operator must know the dial–back and access passwords and be calling from the proper **associated** phone number.

An internal modem and a dedicated telephone line are required. Dial–Back Security can be activated only with a Field Service level password. Our Customer Service Engineer normally activates the system at startup. Phone Home Alarm Reporting and Dial–Back Security can share the same modem and telephone line.

SECTION II
INSTALLATION

2.1 GENERAL

The location for the UPS is critical to the performance of the system and to the life expectancy of its components. Failure to select a site that meets all the requirements specified in this section can result in excessive maintenance problems.

2.2 UNPACKING AND POSITIONING THE UPS

Unloading the UPS from the van and moving it to its operational location is the responsibility of the consignee and should be accomplished by a forklift. Forks must be long enough to reach completely under the cabinet and extend on the other side to provide stability during movement. Depending upon the construction of the flooring over which the UPS will be moved, consideration might be given to laying a plywood "runway" to help spread the weight of the combined forklift/UPS load.

CAUTION
Do not tilt cabinet more than 10 degrees from vertical.

WARNING
UPS cabinets are extremely heavy.

It is recommended that the protective packaging materials be left in place while the UPS is being moved to the proximity of its final location.

To unpack, remove all exterior crating, padding and wrapping.

Locate the keys in an envelope taped to the outside of the UPS cabinet. Unlock and open the cabinet doors and carefully remove interior padding and packages.

2.3 INSPECTION

The UPS was carefully tested and inspected both mechanically and electrically prior to shipment from the factory. The system should be in proper operating condition upon receipt at the installation site. However, a careful visual/mechanical inspection of the system should be performed when it is received to determine if any physical damage was incurred during shipment. Any and all such damage should be reported to the carrier immediately, preparatory to filing claim against the carrier.

2.4 ENVIRONMENTAL CONSIDERATIONS

There are several environmental concerns that must be taken into consideration. These are covered individually in the following sub–paragraphs.

2.4.1 Temperature and Humidity

The UPS is capable of operation within a temperature range of 0° – 40°C (32°–104°F). This is the maximum operating temperature limit and should not be considered a design condition. For maximum reliability, maintain a temperature between 20°–30°C (68°–86°F) in the system operational area. Any operation at temperatures above 30°C should be limited to emergencies such as a failure in the air conditioning or ventilation system for as short as time as possible. Prolonged operation of the UPS at excessive temperatures will result in an over–temperature condition with the possible shutdown of the UPS. Humidity must be maintained within a range of 0–95% (non–condensing).

2.4.2 Floor Loading

A location must be selected which is able to support the equipment. The weight of the UPS is exerted upon a relatively small floor area because of cabinet design. In some instances it may be possible to distribute the weight over a larger floor area through the use of load–spreading timbers or other material. In case of doubt, consult the building architect or engineer.

The weight of the UPS may be found in the Standard Installation Information located at the end of Section II.

2.4.3 Acoustics

Acoustical noise generated by the UPS is as specified in the Standard Installation Information located at the end of Section II. The ambient noise level may be reduced through the use of acoustical tile and linoleum in the room housing the UPS.

2.4.4 Heat Rejection

The maximum heat rejection of each individual UPS at the rated full load is dependent on the UPS output as reflected in the Standard Installation Drawings at the end of Section II.

2.4.5 Accessibility

The room in which the UPS is installed should have passageways and doorways that are large enough to permit entry of the cabinet and moving equipment. If elevators are used, their size and lift capacity must be sufficient to allow the system to be loaded and carried safely.

2.4.6 Room Size and UPS Dimensions

To provide sufficient space for maintenance and to permit adequate ventilation, a minimum of two (2) feet (61 cm) of clearance between the top of the UPS and the ceiling, and a minimum clearance of 40 inches (102 cm) for door swing should be allowed. Based upon these specifications and the dimensions of the UPS, minimum room dimensions can be determined. UPS dimensions are shown on Page 2.8 of this manual.

WARNING
Installation should be performed by qualified personnel.

2.5 MECHANICAL PREPARATION OF THE UPS

The UPS can be fully accessed from the front for operation and maintenance. Side area access is required for air filter changes.

Follow these sequential steps for mechanical preparation.

1. Open the front doors of the UPS.
2. Ensure that all packing, both external and internal, has been removed from the UPS.
3. Remove the three top right front panels around and above the circuit breakers, exposing the breakers and terminal blocks.
4. Remove the cable entry panel located on top of the UPS cabinet at the right side. Punch conduit holes in this panel of suitable size for the cables to be inserted. Replace the panel on top of the cabinet.

CAUTION
Do not install a damaged cabinet. Report any damage to the carrier and contact your local sales and service office immediately.

2.6 SIGNAL WIRING

NOTE: Use Class 1 wiring methods for all field–wiring connections.

Run wires down from the access panel and through a hole in the partition (to the right of the power terminal strip) then forward to the PWB panel. Bring the wires through the hole in the PWB panel and over to the Board. Connections for the following functions are located on the Customer Interface Board.

2.6.1 Remote Control (A24–TB1):

Terminal wire sizing: #22–#12 AWG

a. Remote EPO Switch
   1. 24 VDC lamp supply, 0.25 amp max.
   2. Isolated contact closure causes EPO.

b. Remote On–Generator Condition–Isolated contact closure signals the UPS logic that a generator is supplying UPS input power.

c. Summary Alarm (NO/NC)
   1. 120 VAC– 0.5 amps AC max.
   2. 28 VDC– 1 amp AC max.

2.6.2 Site Interface Assembly (A26)

The optional site interface assembly mounts on top of the Remote Interface Board (A24). The following connections are available from this interface:

a. Computer Shutdown Interface (AS400) 9–pin D–sub plug.

b. System 38 BNC connector (jack)

c. 12 sets of NO and NC contacts are provided for monitoring UPS status and alarm conditions. Connector wire size #22–#12 AWG.

2.6.3 User–Specified Alarm (A37)

The optional user–specified alarm mounts on top of the Site Interface Board (A26). Three sets of NO contact inputs can be connected for UPS monitoring of external alarms. Connector wire size #22–#12 AWG.

2.7 ELECTRICAL POWER CONNECTIONS

Electrical connections to the system are made to terminal blocks inside the UPS left–hand door (see Outline drawing at the end of Section II).

International Power Machines does not specify wire size for customer connections because electrical code standards differ throughout the world. However, wire sizing is critical. Refer to the installation information/drawing for:

1. Voltage applied to each connection, if applicable.
2. Wire sizing current
3. Minimum/maximum conductor size which can be accommodated.

Cable length should be minimized to avoid unnecessary voltage drops. Be certain to observe local and national electrical codes as may pertain to cable installation, routing, connections, etc. Observe phase sequencing and battery Polarity. Failure to do so can result in damage to the UPS and/or injury to personnel.

WARNING
Confirm that all UPS circuit breakers are off (open) and that power cabling is de–energized before proceeding.

1. Use separate conduits for power and signal wiring.

2. Run cables from the batteries through the access panel to the **NEGATIVE** and **POSITIVE BATTERY** terminal block inside the UPS.

3. Run **UPS output** cables from the terminal block through the access panel to the equipment to be protected.

4. Run primary input cables (see One–Line Diagram at the end of this section) through the access panel to the **PRIMARY INPUT** terminal block inside the UPS.

5. Run reserve input power cables through the access panel to the **RESERVE INPUT** terminal block as shown on the Outline Drawing. Reserve input **MUST** be the same voltage, frequency, phase sequence and configuration as the UPS output.

6. The following table lists torque requirements for all terminal block power connections.

TIGHTENING TORQUE FOR PRESSURE WIRE CONNECTORS

Size of Wire Used		Torque Specification	
AWG/kcmil	(mm^2)	lb–in	(N–m)
6–4	(13.3–21.2)	110	(12.4)
3	(26.7)	150	(16.9)

2	(33.6)	150	(16.9)
1	(42.4)	150	(16.9)
1/0–2/0	(53.5–67.4)	180	(20.3)
3/0–4/0	(85.0–107.2)	250	(28.2)
250–350	(127–177)	325	(36.7)
400	(203)	325	(36.7)
500	(253)	375	(42.4)

2.8 INSTALLATION INFORMATION

Uninterruptible Power System (UPS)
Model BP II HE, 30 KVA/24 KW

General Installation Information:

UPS Output Rating:	30 KVA at 0.8 lagging 24 KW at 1.0 to 0.8 lagging P.F.
Battery Cells required:	60 cells
Dimensions:	48.00"W x 35.00"D x 73.75"H (1219.20 x 889.00 x 1873.25 cm) (Requires front access only)
UPS Weight:	2,000 lbs.
BTU Loading (Normal)	14,456 BTU/hr with UPS output at 100% load and battery charged.

Ref. Des.	Pol.	Input/Output Connections	Terminal Ac-cept. Copper Cable Sizes
		20kVA/16kW UPS	
I/O interface	OA	Primary Input – 480 VAC, 60 Hz	14 AWG–1/0 AWG (1)
I/O interface	OB	3 Phase, 3 wire	14 AWG–1/0 AWG (1)
I/O interface	OC	Sequences: A–B–C	14 AWG–1/0 AWG (1)
I/O interface	POS	Battery Input– 120 VDC	4/0 AWG–350 MCM (2)
I/O interface	NEG	60 cells	4/0 AWG–350 MCM (2)
I/O interface	OA	Reserve Input 277/480 VAC, 60HZ	14 AWG–1/0 AWG (1)
I/O interface	OB	3 Phase, 3 wire	14 AWG–1/0 AWG (1)
I/O interface	OC	Sequence: A–B–C	14 AWG–1/0 AWG (1)
I/O interface	NEUT		14 AWG–1/0 AWG (1)
I/O interface	OA	UPS Output– 277/480 VAC, 60HZ	14 AWG–1/0 AWG (1)
I/O interface	OB	3 Phase, 3 wire	14 AWG–1/0 AWG (1)
I/O interface	OC	Sequence: A–B–C	14 AWG–1/0 AWG (1)
I/O interface	NEUT		14 AWG–1/0 AWG (1)
I/O interface	Ground	UPS Frame	14 AWG–1/0 AWG (1)
A34 Board			
TB1–10	NC	Summary Alarm Contacts*	22 AWG–12 AWG
TB1–11	NO		22 AWG–10 AWG
TB1–12	COM		22 AWG–12 AWG
A26 Board			
TB1–19	NO	Rectifier Failure Contacts	22 AWG–12 AWG
TB1–20	NC		22 AWG–12 AWG
TB1–21	COM		22 AWG–12 AWG
TB2–16	NC	Inverter Failure Contacts	22 AWG–12 AWG
TB2–17	NO		22 AWG–12 AWG
TB2–18	COM		22 AWG–12 AWG
TB1–7	NC	Static Switch On Reserve	22 AWG–12 AWG
TB1–8	NO		22 AWG–12 AWG
TB1–9	COM		22 AWG–12 AWG
TB1–4	NO	Input Power Failure	22 AWG–12 AWG
TB1–5	NC		22 AWG–12 AWG
TB1–6	COM		22 AWG–12 AWG

* Summary Alarm Contacts activated by any or all major or minor alarms (user selectable).

SECTION III
OPERATION

3.1 GENERAL

This section contains safety considerations, UPS operational procedures, and an overview of the monitoring panel and operating controls for the system. Prior to operation, ensure that the UPS has been installed correctly as outlined in Section II of this manual. Ensure that correct input phase rotation and battery polarities have been observed. **Failure to do so can result in damage to the UPS and/or injury to personnel.** Operators should be thoroughly familiar with the contents of this manual and with the location and function of all system controls and indicators.

3.2 SAFETY CONSIDERATIONS

The UPS enclosures are designed for industrial or computer room applications, and contain safety shields behind the doors. However, the UPS is a sophisticated power system and should be handled with appropriate care, following these guidelines:

- Keep surroundings clean and free from excess moisture.
- Do not operate the UPS close to gas or electric heat sources.
- The system is not intended for outdoor use.
- The UPS operating environment should be maintained within parameters stated in this manual.
- Keep the UPS doors closed to ensure proper cooling airflow and to protect personnel from dangerous voltages inside the unit.
- The UPS contains its own power source. Lethal voltages are present even when the UPS is disconnected from utility power.

WARNING
Only AUTHORIZED SERVICE PERSONNEL should perform service or maintenance on the UPS or battery.

If service or routine UPS maintenance is required:

- Ensure all power is disconnected before performing installation or service.
- Ensure the area around the UPS system is clean and uncluttered.
- Battery cabinet maintenance or battery replacement should be performed only by authorized service personnel.
- Observe all DANGER, CAUTION, and WARNING notices affixed to the inside and outside of the equipment.

3.3 RADIO FREQUENCY ENERGY HAZARD

WARNING: This equipment generates, uses and can radiate radio frequency and, if not installed and used in accordance with instructions, may cause interference to radio communications. It has been designed to comply with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference. The user will be required to take and finance whatever measures may be necessary to correct such interference.

CAUTION

Always be aware that hazardous voltages may be present within the UPS even when the system is not operating.

3.4 DIGITAL MONITORING PANEL

The Digital Alarm Panel consists of one multicolor LED **STATUS** Indicator Light, one LCD message screen, two **MENU** Select pushbuttons, three **PARAMETER** Adjust push-buttons, an **ALARM SILENCE** pushbutton and an **EMERGENCY POWER OFF** (EPO) pushbutton. The Menu Select buttons provide access to the various data and messages which are displayed on the Message Screen. Section III includes detailed instructions for startup sequence, alarm parameters, available battery run time and alarm conditions.

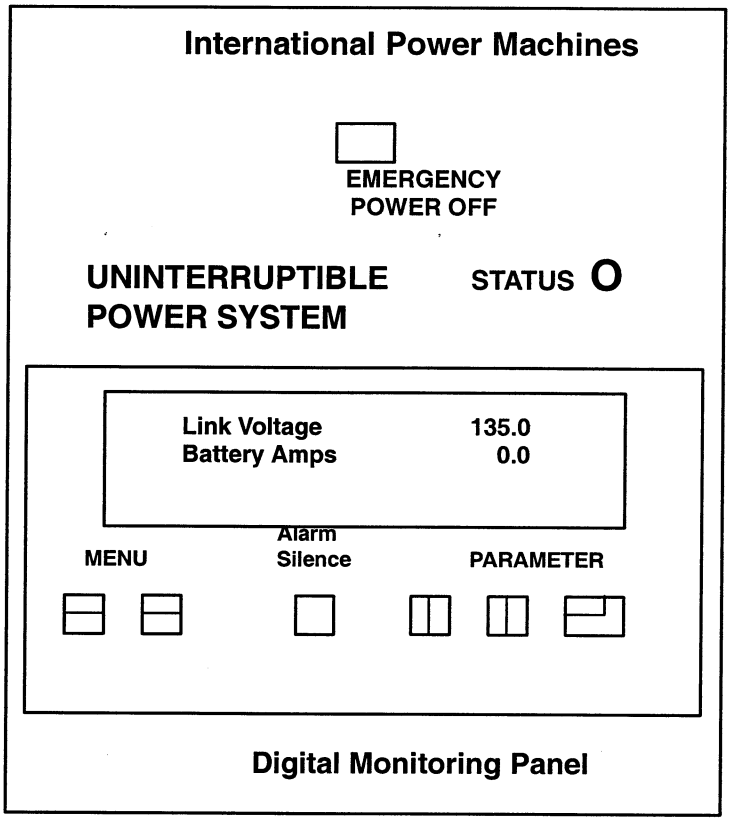


Figure 3.1

3.4.1 Indicator Light

If the multicolor indicator light (LED), located in the upper part of the panel, is:

? **Green: UPS Normal** – This indicates that the critical load is being powered from the inverter. It represents a fully normal condition. With any alarm the LED will change color to indicate a non–critical or actual alarm. When the alarm condition is corrected, the LED will turn green again.

? **Green/Red: Non–Critical Alarm** – This indicates that a non–critical alarm is present, and that message will appear on the message screen. Check Alarm History (Paragraph 3.4.2.2) to identify the alarm.

? **Red: Alarm Condition** – When the LED turns red, a problem exists with the UPS. Alarms such as AC input failure, low battery voltage, UPS overload, transferred to bypass, transfer not available, battery not available or retransfer inhibited may exist. Check active alarm conditions (Paragraph 3.4.2.1) or alarm history (Paragraph 3.4.2.2) to identify the alarm.

- **AC Input Failure** – The UPS input power has been disrupted or gone out of specification limits. The system goes to battery power and the alarm sounds, alerting the operator to a brownout or power failure. When the batteries run down, the critical load will shut off unless steps are taken to correct the situation or another source of input power is provided.
- **Low Battery Voltage** – When the system is operating on battery power, this condition indicates approximately five minutes remains before the UPS system shuts down. A message screen (Section 3.4.2) displays the amount of battery run time left. The rectifier link (battery) voltage may also be monitored (See Paragraph 3.4.2.8). Shutdown occurs when the link voltage drops to 148.5 VDC (selectable). If utility power can not be restored or an auxiliary power source can not be activated, the critical load should be shut down in an orderly procedure.
- **UPS Overload** – The load on the UPS output is in excess of 105% of rated load. If the condition exists for more than a few seconds, sufficient critical load should be powered down or removed to make the indicator go green. Otherwise, the UPS will shut down and/or transfer to bypass within 15 minutes.

  This condition may occur when the UPS is close to 100% load and a large disk drive or other motor load is started. These loads draw currents many times the normal level for a few seconds when first started. The UPS is designed to handle this short overload condition.
- **Transferred to Bypass** – An indication that the critical load is being powered directly from the UPS bypass power source. This situation is created when maintenance personnel want to bypass the UPS through the static bypass switch for routine maintenance or when an abnormal condition exists in the inverter, such as failure or extended overload. When in this operational mode, the critical load does not have UPS protection.
- **Transfer Not Available** – An indication that transfer to the static bypass switch is not possible. This may be caused by the UPS bypass input power source being out of specification or a power outage.

- **Battery Not Available** – The battery's DC Disconnect (circuit breaker) is open or a battery cabinet fuse is blown. The battery is not available to power the inverter if needed.
- **Retransfer Inhibited** – An indication that the inverter is out of specification or has lost phase lock with the bypass power source. When active in conjunction with the Transferred to Bypass indicator, power cannot be retransferred from the static bypass switch back to the inverter.

3.4.2 Message Screens

Message screens display the status of the UPS. To scroll through these screens, depress ⬅ or ➡ buttons.

Following are the legends that appear in this area while the UPS is running normally. To display these in this order, start with the screen at right and depress the ➡ button to show each screen in turn.

UPS Operating Normally

If the UPS is operating on battery power, this screen will appear instead. It can be monitored to determine the battery run time remaining during a power outage.

Time Left XXX Min XXX Sec

3.4.2.1 Active Alarm Condition

If any active UPS alarm conditions exist, the condition(s) will be shown on the screen. When NONE is indicated, no alarm conditions are active. With activation of alarm condition(s), one or more of the following abbreviations will be displayed:

ALM: NONE N/A

ALM – ALARM
INP – AC Input Failure
LBT – Low Battery Voltage
BYP – Transferred to Bypass
OVL – UPS Overload

N/A – Not Available
BATT – Battery Not Available
XFR – Transfer Not Available
RXFR – Retransfer Inhibited

ALM: INP LBT BYP OVL N/A: BATT XFR RXFR

Description for each alarm condition is provided in Paragraph 3.4.1.

3.4.2.2 Alarm History

Alarm history is a sequence of entries showing as many as 1500 alarm and status conditions that have occurred. To see them all, scroll through the list depressing the ⬆ or ⬇ button successively (see paragraph 3.6.2).

xx/yy uu:vv:ww ttt *Alarm identity**

On this screen the letters are read as follows:

xx = month yy = day of the month uu = hour (on the 24–hour clock)
vv = minutes ww = seconds
tttt = alarm sequence number. 0 is most recent. Press ⬇ to scroll from a higher number to 0 or press ⬆ to scroll from 0 to a higher number.

* The identity of the alarm is abbreviated on the screen. The full identification and corrective action for the alarms are given in **Table 3–2**.

3.4.2.3 Input Voltage

Input voltage between phases

Input Vab Vbc Vca

–and–

Input Van Vbn Vcn

Input voltage phase to neutral

3.4.2.4 Input Current:

Input Ia Ib Ic

Input current, measured in amps per phase

3.4.2.5 Bypass Voltage

Bypass voltage
V_{L-N} for 50Hz or V_{L-L} for 60Hz

Bypass Voltage

3.4.2.6 Input/Output Frequency

Input and Output frequency in Hz.

Freq. Input/Output

3.4.2.7 Inlet Temperature

Inlet temperature in °C

Inlet Temp.

3.4.2.8 Battery Amps

Battery Amps

A positive number indicates battery charging; a negative number indicates discharging (possibly because UPS is operating on battery power).

3.4.2.9 Maximum Output Crest Factor

Max Out CF

Maximum output crest factor of the load on the UPS

3.4.2.10 Output KW/KVA

Output kW/kVA

3.4.2.11 Output Power Factor

Output Power Factor

3.4.2.12 Output Voltage

Output voltage, for 50Hz or for 60 Hz. There is a maximum variance of 5% between phases.

Output Voltage

V_{L-N}

3.4.2.13 Output Current

Output current, measured in amperes per phase

Output Current

3.4.2.14 Date

Today's date

Date
Actual Date

3.4.2.15 Time

The current time

Time
HH:MM:SS

3.4.2.16 UPS Maintenance Menu

This screen allows entrance into the UPS Maintenance Menu described in Paragraph 3.6.3. A password is required to use this menu.

UPS Maintenance Menu

The next message is "UPS Operating Normally."

3.4.2.17 **Other Messages**

Under certain conditions other messages may appear on the message screens.

3.4.3 Display Select Pushbuttons

The ➡ and ⬅ pushbuttons are used to select the desired display on the Message Screen, as described in Paragraph 3.4.2.

3.4.4 Parameter Adjust Pushbuttons

These pushbuttons, labeled ⬆, ⬇, and ↵, are used with **Alarm Identity/History** procedures (Paragraph 3.6.2) and to set or alter the parameters of the UPS.

3.4.5 Alarm Silence Pushbutton

Whenever an alarm condition exists, an audible alarm sounds calling attention to the situation. Depressing the ALARM SILENCE pushbutton once silences the audible alarm. A red LED indicates an active alarm condition that may require immediate action.

3.5 System Controls

Controls for the UPS, with the exception of the pushbuttons located on the face of the UPS monitor panel, are situated inside the front door of the cabinet.

MAIN INPUT CIRCUIT BREAKER: *Available with optional input isolation transformer only.* When closed, the breaker allows input power to activate the input isolation transformer that supplies control power, rectifier, SBS and maintenance bypass inputs.

CAUTION
Incorrect use of the power controls can cause a loss of power to your circuit load.

UPS CONTROL SWITCH: This switch is rotated clockwise to energize the power supply to the Digital Signal Processor logic.

RECTIFIER INPUT CIRCUIT BREAKER: When closed, the breaker allows UPS input power to supply the rectifier and, on units having an optional input isolation transformer, the SBS input.

BYPASS CIRCUIT BREAKER: The breaker is used primarily for maintenance purposes. When closed, it enables the UPS electronics to be de–energized for maintenance procedures while continuing to supply power to the critical load.

STATIC BYPASS SWITCH CIRCUIT BREAKER: *Not available with input isolation transformer.* When closed, the breaker allows bypass input to supply power to the Static Bypass Switch.

OUTPUT BREAKER: When closed, the breaker connects the critical load to the inverter and static bypass switch.

3.6 UPS Operating Procedures

It is important for safety and the protection and performance of the UPS that the step–by–step instructions for each procedure be followed in the sequence given.

3.6.1 System Startup Procedure

Before initiating UPS startup, make sure that:

- ? All circuit breakers/switches are OFF (open).
- ? The DC (Battery) disconnect switch is OFF (open).

Then —

Each of the following steps must be completed before going to the next step. Failure to do so may result in interruption of power to the critical load.

1. (NOTE: If the UPS does not have an input isolation transformer, skip this step.) If the UPS has an optional input isolation transformer (see one–line diagram in Section II), close the **MAIN INPUT CIRCUIT BREAKER**. This will activate the input transformer, which supplies control power, rectifier, SBS and maintenance bypass.

2. Rotate UPS CONTROL SWITCH knob clockwise to ON to energize the system logic. If this screen appears, the UPS is not in operable condition. Phone Service Hotline at **(800) 777–8922** or **(214) 342–6100** for assistance.

Checksum Bad Service Required

Normally, turning on the UPS CONTROL switch should turn the LED red.

. . . and this screen which will be displayed for a short time,

Checksum Good

. . . . . then —

3. When this instruction appears on the Message Screen, close **BYPASS CIRCUIT BREAKER**. The LED should remain red. Power is now available on the UPS output.

Close BYPASS CKT. BREAKER

4. When this instruction appears on the Message Screen, close the **RECTIFIER INPUT CIRCUIT BREAKER.**

Close RCT INPUT CKT. BREAKER

5. This screen will appear for a short time, then —

Waiting DC Link = XXX.X VDC

When this instruction appears on the Message Screen, close the DC (Battery) Circuit Breaker. Depress the ALARM SILENCE pushbutton. The LED should remain red.

Close BATTERY CKT. BREAKER

6. When this instruction appears on the Message Screen, close **the Output Circuit Breaker**.

Close OUTPUT CKT. BREAKER

7. *This step does not apply to UPS with the optional input transformer.* When this instruction appears on the Message Screen, close **STATIC BYPASS SWITCH CIRCUIT BREAKER**. The LED should remain red.

Close SBS INPUT CKT. BREAKER

8. When this instruction appears on the Message Screen, open the **BYPASS CIRCUIT BREAKER**. Within approximately 2 minutes the audible alarm will sound. Depress the ALARM SILENCE pushbutton.

Open BYPASS CKT. BREAKER

9. This screen will show for a short time.

Wait Retransfer Pending

UPS Operating Normally

10. Then this screen will appear, indicating that the UPS is now in normal operation.

3.6.2 Alarm Identity/History

As described in Paragraph 3.4.2.2, this is the first Alarm History screen. It can be displayed by pressing the ➡ or ⬅ button, going through the sequence of screens described in Paragraph 3.4.2 until this screen appears.

Xx/yy uu:vv:ww ttt
*Alarm Identity**

xx = month yy = day of the month uu = hour (on the 24–hour clock)
vv = minutes ww = seconds
tttt = alarm sequence number. 0 is most recent. Press ⬇ to scroll from a higher number to 0 or press

⬆ to scroll from 0 to a higher number.

* The identity of the alarm is abbreviated on the screen. The full identification of each and corrective action are given in **Table 3–2**.

The principal use of the Alarm History screen is to identify the source of audible alarms so that corrective action can be taken. When the audible alarm sounds, press ➡ or ⬅ until this Alarm History screen appears. You may depress the ALARM SILENCE button once to silence the alarm.

You may find it advantageous to leave the message screen on Alarm History during normal operations. Then, if an alarm sounds, its identity will be seen immediately.

It may be helpful to view the Alarm History as a list of alarms, ordered by date and time. Whenever the Alarm History screen is first selected, the first entry shown on the screen is the latest entry on the list. Pressing ⬆ moves you toward the top of the list and pressing ⬇ moves you toward the bottom of the list. See an example in Table 3–1.

Table 3–1 is the beginning of a typical list of messages from the Alarm History screen as the startup procedure is begun. The date, time, and alarm identity are shown in the first Alarm History screen after system startup. By depressing ⬆, you can scroll the screen up one message at a time to the oldest (earliest) message. Thinking of the Alarm History screens as part of a list will help you visualize what is happening.

Table 3–1. Typical Alarm History Screens

Date	Time	Alarm	Screen Message
01/01	08:30:00	CPU Restarted	CPU Restart

01/01	08:35:09	Input Circuit Breaker Closed	inp bkr clsd
01/01	08:35:10	Input Voltage Normal	inp vol norm
01/01	08:36:00	DC Voltage Normal	dc volt norm

Table 3–2. Alarm History Messages and Descriptions with Corrective Actions

Screen Message	Description	Corrective Action
inp bkr open	Rectifier Input Circuit Breaker open	Follow System Startup procedure to close Rct. Input Circ. Brkr
inp bkr clsd*	Rectifier Input Circuit Breaker closed	Verifies that Rectifier Input Circuit Breaker is closed
bat bkr open	Battery (DC Disconnect) switch open	Follow System Startup procedure to close Battery (DC Disconnect) switch
bat bkr clsd*	Battery (DC Disconnect) switch closed	Verifies that Battery (DC Disconnect) switch is closed
inp vlt high	Input voltage too high	Verify correct UPS input voltage. Decrease if necessary.
inp vlt low	Input voltage too low	Verify correct UPS input voltage. Increase if necessary.
inp vlt norm*	Input voltage normal	No action required.
inp freq hi	Input frequency too high	Verify correct UPS frequency.
inp freq low	Input frequency too low	Verify correct UPS frequency.
inp freq norm*	Input frequency normal	No action required.
inp cur high	Input current too high	Reduce load on UPS output.
inp cur imbl	Input current out of balance	Verify correct UPS input voltage and current.
inp cur norm*	Input current normal	No action required.
dc volt high	DC (battery) voltage too high	Verify correct battery voltage. Decrease if necessary.
dc volt low	DC (battery) voltage too low	UPS is operating off the battery.
dc volt norm*	DC (battery) voltage normal	No action required.
rct fus norm*	Rectifier fuses normal	No action required.
rct bln fus	Rectifier fuse blown	Test/replace rectifier fuses
rct pwr fail	Rectifier power supply failure	Test/replace rectifier drive boards
rct pwr norm*	Rectifier power normal	No action required
rct lock*	Rectifier phase locked	No action required
rct not lock	Rectifier not phase locked	Verify UPS input voltage and frequency.
rct cur limt	Rectifier current limit	Reduce load on UPS output.
rct cur aval*	Rectifier current not available	No action required
rct on gen*	Rectifier on generator	No action required
rct in rechg*	Rectifier in recharge mode (battery being recharged)	No action required
rct in float*	Rectifier in float (battery is recharged)	No action required
bat volt low	Battery voltage low (LED warning also)	UPS will shut down in a few minutes. Initiate shutdown of critical loads
inv fus norm*	Inverter fuse normal	No action required
inv bln fus	Inverter fuse blown	Test/replace DC booster inverter fuses
inv ps fail	Power supply failure	Test/replace inverter drive/power assemblies.
inv ps norml*	Power supply normal	No action required

inv locked*	Inverter phase locked	No action required
inv not lock	Inverter not phase locked	Verify UPS input voltage and frequency.
boost fail	DC booster failure	Test/replace DC booster drive/power assembly
boost normal*	DC booster normal	No action required
inv ovr tmpA	Inverter over temperature.	Verify cooling fans are operating on power assembly.
inv norm tmp*	Inverter temperature normal	No action required
inv cur norm*	Inverter current normal	No action required
inv OC shtdn	Inverter shutdown – over current	Remove some of the load
inv OT shtdn	Inverter shutdown – over temperature	Room is too hot or fan failure
inv cur limt	Inverter current limit	Reduce load on UPS
xfer enabled*	Transfer enabled	No action required.
rexfr enable*	Retransfer enabled	No action required.
maint by flt	Maintenance bypass fault	Maintenance bypass breaker is closed with inverter operating. Follow Startup procedure to open bypass breaker.
bst hi shtdn	Inverter shutdown due to DC booster overvoltage	Verify rectifier DC voltage. Decrease if necessary.
bst low shtdn	Inverter shutdown due to DC booster undervoltage	Verify rectifier DC voltage.
bst vlt norm*	Inverter booster voltage normal	No action required.
dc hi shtdn	Rectifier shutdown due to DC output overvoltage.	Verify that rectifier automatically restarts
inv mnl strt*	Inverter manual start	No action required
inv mnl stop*	Inverter manual stop	No action required
inv mnl xfer*	Inverter manual transfer	No action required
inverter on*	Inverter on	No action required
inverter off	Inverter off	Follow Startup procedure to restart UPS.
inv fan fail	Inverter fan failure	Verify all cooling fans are operating.
inv fan norm*	Inverter fan normal	No action required
dc low shtdn	UPS shutdown – DC (battery) voltage low	Batteries are discharged.
inv phrt nml*	Inverter phase rotation normal	No action required
out volt hi	Output voltage high	Verify UPS output voltage. Decrease if necessary.
out volt low	Output voltage low	Verify UPS output voltage. Increase if necessary.
out volt nml*	Output voltage normal	No action required
out frq high	Output frequency high	Verify UPS output frequency.
out frq low	Output frequency low	Verify UPS output frequency.
out frq norm*	Output frequency normal	No action required
out cur high	Output current high	Reduce load on the UPS
out cur norm*	Output current normal	No action required
out bkr open	UPS Output Circuit Breaker (Switch) open	Follow Startup procedure to close
out bkr clsd*	UPS Output Circuit Breaker (Switch) closed	No action required
sbs pwr norm*	Static Bypass Switch power normal	No action required

sbs pwr falA	Static Bypass Switch power supply failure – Phase	Test/replace SBS drive board
bypass open*	Bypass Circuit Breaker Open	No action required
bypass close*	Bypass Circuit Breaker closed	Follow Startup procedure to open
sbs on	Static Bypass Switch on (closed)	Follow Startup procedure to return to normal.
sbs off*	Static Bypass Switch off (open)	No action required
sbs disabled	Static Bypass Switch disabled	Enter SBS Maintenance Menu and enable transfer
sbs enabled*	Static Bypass Switch enabled	No action required
ups amb high	UPS ambient temperature high	Room is too hot. Lower temperature
ups amb norm*	UPS ambient temperature normal	No action required
ups amb shdn	UPS ambient temperature shutdown	Room is too hot. Lower temperature.
byp volt hi	Static Bypass Switch bypass voltage high	Verify SBS input voltage. Decrease if necessary.
byp volt low	Static Bypass Switch bypass voltage low	Verify SBS input voltage. Increase if necessary.
byp volt nml*	Static Bypass Switch bypass voltage normal	No action required
byp freq hi	Static Bypass Switch bypass frequency high	Verify SBS input Frequency.
byp freq low	Static Bypass Switch bypass frequency low	Verify SBS input frequency.
byp freq nml*	Static Bypass Switch bypass frequency normal	No action required
rct summary	Rectifier summary alarm	Review other rectifier alarms for cause
rct inhibit	Rectifier inhibited	Review other rectifier alarms for cause
rct normal*	Rectifier normal	No action required.
dc low shtdn	UPS DC link low shutdown	Complete UPS restart procedure is required
dc link norm*	UPS DC link normal	No action required
inv summary	Inverter summary alarm	Review other inverter alarms for cause
inv inhibit	Inverter inhibited	Review other inverter alarms for cause
inv normal*	Inverter normal	No action required
sbs summary	Static Bypass Switch summary alarm	Review other SBS alarms for cause
sbs inhibit	Static Bypass Switch summary inhibited	Review other SBS alarms for cause
sbs normal*	Static Bypass Switch summary normal	No action required
ups summary	UPS summary alarm	Review all alarms for cause
ups inhibit	UPS inhibited	Review all alarms for cause
ups normal*	UPS in normal condition	No action required
CPU normal*	UPS processor normal	No action required
UPS Powerup*	UPS processor initialized	No action required
EPO btn pshd	EPO pushbutton pressed	Complete UPS restart procedure is required
EPO btn rlsd	EPO pushbutton released	Complete UPS restart procedure is required
ctl pwr on*	Control power on	No action required

ctl pwr off	Control power off	Turn on Control Power switch
rct wdog flt	Rectifier watchdog fault	Call Service Hotline
rct hi shtdn	Rectifier high shutdown	Call Service Hotline
clr rct wdog*	Rectifier watchdog fault cleared	No action required
pwrsply fail	Power supply failure	Call Service Hotline
pwrsply nrml*	Power supply normal	No action required
ps inp fail	Power supply input failure	Call Service Hotline
ps inp normal*	Power supply input normal	No action required
bat vlt nrml*	Battery voltage normal	No action required
sbs scr normal*	Static bypass switch normal	No action required
rct on util*	Rectifier served by utility power	No action required
sbs inp open	Static bypass switch breaker open	Follow Startup procedure to close circuit breaker
sbs inp closed*	Static bypass input switch or circuit breaker closed	No action required
sbs out open	Static bypass output switch is open	Follow Startup procedure to close switch
sbs out clsd*	Static bypass output switch is closed	No action required
xfer dsabld*	Retransfer disabled	No action required
rexfer inhibit*	Retransfer inhibit	No action required
inv no ovrld*	Inverter drive no overload	No action required
trnsnt overld	Inverter drive transient overload	Decrease load
Inv Overload	Inverter drive overload	Decrease load
ram normal*	RAM is normal	No action required
ph dial*	Phone home dialout	No action required
ph connect*	Phone home connection established	No action required
ph test*	Phone home test performed	No action required
ph fail*	Phone home connection attempt failed	No action required
out overload	The load on the UPS has exceeded 100%	Reduce the load
load normal*	The load on the UPS is < or = 100%	No action required
bln trap fuse	The input trap fuse has blown	Call Service Hotline
trap fuse ok*	The fuse on the input filter is normal	No action required
inp 5th high	The 5th harmonic content of the input current is too high	Perform bypass shutdown and call Service Hotline
inp 5th norm*	The 5th harmonic content of the input current is at an acceptable level	No action required
Unused*	Unused alarm appears when alarm is cleared	No action required.
* Not an alarm condition.		

NOTE: If a message requires action you cannot perform, call Service Hotline: (800) 777–8922 or (214) 342–6100.

11. Depress ⬆ to display the next most recent alarm. You can repeatedly depress ⬆ to review past alarms in receding order. Continue as long as desired. After you have started repeatedly depressing ⬆, depressing ⬇ will display more recent alarms back to the current alarm.

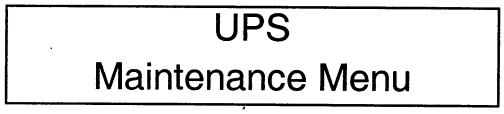
12. To exit Alarm History, depress, ⬅ or ➡.

3.6.3 UPS Maintenance Menu

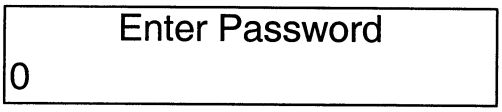
The UPS Maintenance Menu performs a variety of maintenance functions including password changes and adjustment of time and date. It is divided into the following secondary menus in the order stated. The detailed instructions for each are given in the following subparagraphs.

3.6.3.1 Rectifier Maintenance Menu
3.6.3.2 Inverter Maintenance Menu
3.6.3.3 SBS Maintenance Menu
3.6.3.4 System Maintenance Menu
3.6.3.5 Password Maintenance Menu

1. To bring the UPS Maintenance Menu to the screen, depress the ➡ pushbutton as many times as necessary until this screen appears.

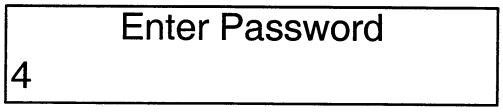


2. Press ↵. This will display –

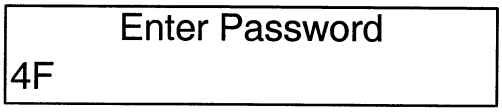


NOTE: There is a further discussion of multi–level passwords in Section 1.8.

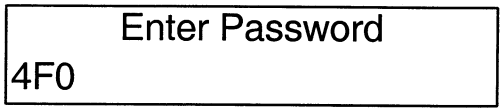
3. The UPS is shipped with the password 4F00. To enter this password, depress ⬆ or ⬇ to change the first digit to "4". ⬆ is the shortest way to get to the "4" the first time. The screen will now look like this.



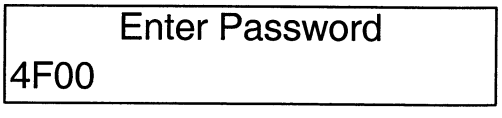
4. Now depress ➡ to activate the second digit. Press ⬆ or ⬇ until the "F" shows like this:



5. Depress ➡ to activate the third digit. The screen will show:



6. Depress ➡ again to activate the fourth digit to obtain:



7. Depress ↵ to bring up the first of the secondary menus. Depress → to bring up the other four Maintenance Menus in turn. Sometimes it will be faster to depress ← to obtain the desired menu.

3.6.3.1 Rectifier Maintenance Menu

Rectifier Maintenance Menu

To be used only when advised by qualified service personnel.

1. When in the Rectifier Maintenance Menu, depress ↵. When this screen is displayed, press ↑ to reset the faults.

Reset Rect. Faults UP = reset

2. This message will appear on the screen. To confirm the previous action, press ↑ again

Confirm Yes=UP No=DN

–returning the screen to–

Reset Rect. Faults UP = Reset

3. Press → to obtain this screen.

Return to Previous Menu

4. Press ↵ to return to the Rectifier Maintenance Menu.

Rectifier Maintenance Menu

3.6.3.2 Inverter Maintenance Menu

1. Press → to advance to the Inverter Maintenance Menu.

Inverter Maintenance Menu

2. Press ↵ to obtain this screen. The crest factors shown here are for information only. No adjustments can be made.

Output CF A B C X.XX X.XX X.XX

3. Press → to obtain this screen.

Reset Inv. Faults (UP) Rdy to Start

Steps 4, 5, and 6 should only be performed when advised by qualified service personnel.

4. Press ⬆ to reset the inverter faults.

5. This screen will ask you to confirm that you wish to reset inverter faults.

Confirm Yes=UP No=DN

6. Press ⬆ again to return to this screen.

Reset Inv. Faults (UP) Rdy to Start

7. Press ➡ to obtain–

Return to Previous Menu

8. Press ↵ to return to the Inverter Maintenance Menu.

3.6.3.3 SBS Maintenance Menu

1. Press ➡ to advance to the SBS Maintenance Menu.

SBS Maintenance Menu

Bypass/Shutdown Procedure

2. Press ↵ to obtain this screen. Press ⬆ to begin the Bypass/Shutdown Procedure. Retransfers are disabled by this procedure. To skip Bypass /Shutdown procedure and go directly to Manual Transfer to Bypass (Step 12), press ➡ instead of ⬆.

Bypass/Shutdown UPS UP = Bypass

3. Press ⬆ to continue the Bypass/Shutdown procedure.

Confirm Yes=UP No=DN

WARNING

Bypass/Shutdown procedure can not be exited without performing all steps in the order shown.

4. When this message appears, close the **BYPASS CIRCUIT BREAKER**.

Close Bypass Breaker

5. When this message appears, open the **OUTPUT CIRCUIT BREAKER**.

Open Output Breaker

6. When this message appears, open the **BATTERY CIRCUIT BREAKER**.

Open Battery Breaker

7. On a UPS *without* the input transformer option – when this message appears open the **SBS INPUT CIRCUIT BREAKER**.

Open SBS Input Breaker

8. When this message appears, open the **RECTIFIER INPUT CIRCUIT BREAKER.**

Open RCT Input Breaker

9. While this message is on the screen, the link voltage will be gradually decreasing. XXX.X represents the actual voltage as displayed. When the rectifier link voltage has decreased to the proper value, the following screen message will appear

Waiting ...
DC Link = XXX.X VDC

10. This message indicates that the Maintenance Bypass Shutdown procedure is complete.

Bypass Shutdown Complete

11. You may turn off the **UPS CONTROL** switch. This message appears only briefly.

You may turn off UPS Control

Manual Transfer to Bypass

12. Perform this step only if Bypass/ Shutdown was skipped at Step 2. Press ↵ and ➡ to obtain this screen.

Man Transfer/Retransfer Inv Running

13. Press ⬆ to obtain this screen.

Confirm Yes=UP No–DN

14. Press ⬆ to manually transfer input to bypass power source. This will inhibit retransfer and turn the LED red. It will also change the "Inv Running" on the screen to "Wait Rexfr."

Man Transfer/Retransfer Inv Running

15. If it desired to manually retransfer to primary UPS input, press

Man Transfer/Retransfer Inv Running

⬇ and wait 10 seconds for this screen to appear. This will turn the LED to green.

16. Normally, the system will be left so that transfer and retransfer are enabled. Following Step 11 of this subsection, press ➡ once or twice to obtain this screen with either "transfers" or "retransfers" on the top line. Pressing ⬆ or ⬇ will change between "enabled" and "disabled" on the bottom line.

Retransfers Enabled

17. Press ➡ to obtain–

Return to Previous Menu

18. Press ↵ to return to the SBS Maintenance Menu.

SBS Maintenance Menu

3.6.3.4 System Maintenance Menu

1. Press ➡ to advance to the System Maintenance Menu.

System Maintenance Menu

2. Press ↵ to obtain this screen. The X.XX represents the latest software release number.

Software Rev. Level X.XX 60 Hz

3. Pressing the ➡ key will obtain this screen. Press UP to execute the LED/lamp test.

LED/Lamp Test UP = Test

The LED will light and a test pattern will be displayed for 3 seconds in the display area.

NOTE: This test can be performed only from the front panel display.

4. Press ➡ to obtain this message. This is the beginning of a procedure to change the language on the monitor panel if desired. To leave it in English, press ➡, and skip to Step 7, below.

Language English

5. Pressing ⬆ in the step above will bring up this screen. If you wish to change the language it is necessary to confirm by pressing ⬆ again.

Confirm Yes=UP No=DN

⚠ CAUTION

If you don't understand German, don't perform this step. You may get lost trying to get back into English.

6. Pressing ⬆ the second time will change the language and obtain this message (example shown in German).

Sprache Deutch

7. Press ➡ to obtain this message (in the language displayed in Step 6). The message screens will now be in the selected language. Press

Confirm Yes=UP No=DN

⬆ to confirm that this is the desired language. Press ⬇ to change the language. Refer to the manual written in the appropriate language for screen messages and instructions.

8. Press ➡ to obtain this screen. This is the start of the procedure to change the date setting.

Date mm/dd/yy

9. Press ⬆ . The screen will ask you to confirm that you want to reset the date. IF you do not wish to reset the date, press ⬇.

Confirm Yes=UP No=DN

10. Press ⬆ to obtain this screen. IF desired, press ⬆ or ⬇ to change the year. Press ➡. Then, if desired, press ⬆ or ⬇ to change the month. Then press ➡. If desired, press ⬆ or ⬇ to change the day.

Enter Date mm/dd/yy *(actual date)*

11. Press ↵. This will display the new month/day/year you have set.

Date mm/dd/yy

12. Press ➡ to obtain this screen. This is the start of the procedure to change the time setting. (Time readings are based on a 24–hour clock.)

Time *(actual time)*

13. Press ⬆. The screen will ask you to confirm that you want to reset the time. IF you do not wish to reset the time, press ⬇.

Confirm Yes=UP No=DN

14. If you press ⬆ , you will obtain this screen. If desired, press ⬆ or ⬇ to change the second. Press ➡. Then, if desired, press ⬆ or ⬇ to change the hour. Then press ➡. If desired, press ⬆ or ⬇ to change the minute.

Enter Time hh:mm:ss *(actual time)*

15. Press ↵. This will display the new time you have set.

Time *(actual time)*

16. The LCD screen may be tilted up and down to give persons of different height a better view of the messages. Press ⬆ or ⬇ to increase or decrease the reference number. A higher number tilts the screen down; a lower number tilts it up. When finished, press ↵.

LCD display view XX

17. Press ➡ to obtain this screen. Pressing ⬆ will save all the changes made to the menu.

Save Personality? UP = Save

18. Pressing ⬆ in the step above will bring out this screen. It is necessary to confirm by pressing ⬆ again.

Confirm Yes=UP No=DN

19. Pressing ⬆ or ⬇ will return to this screen.

Save Personality? UP = Save

3.6.3.4.1 Alarm Configuration Menu

1. Press ➡ to obtain this screen, beginning the Alarm Configuration Menu.

Alarm Configuration Menu

2. Press ↵ to obtain this screen.

Clear Alarm History? UP = Clear

⚠ CAUTION

Pressing ⬆ will clear the Alarm History records.

3. Press ➡ and ↵ to proceed.

Return to Previous Menu

3.6.3.4.2 Communications Menu

1. Press ➡ to obtain this screen.

Communications Menu

2. Press ↵ to obtain this screen.

COM 1 Menu

3. Press ↵ to obtain this screen. Pressing ↑ at this point will reset the optional COM1 serial port. (See NOTE 1.)

COM1 Device UP to Power Up Init.

NOTE 1: The last display line shows the present state of the COM port. Following is list of valid messages:
Power Up Init
Wait on call
Get Password
Dev. Online
Dev. Offline
Log Out
Resetting,...

NOTE 2:COM1 and COM2 in some of the following displays apply only to an optional modem or RS232 customer interface described fully in Section VII. They can be skipped by pressing → until you get to Step 15.

4. 5. Press ➡ once to obtain one of the Com1 Display screens. Press ⬆ or ⬇ to obtain another of these three screens, as desired. Pressing

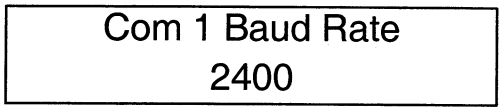
COM1 Display User Interface

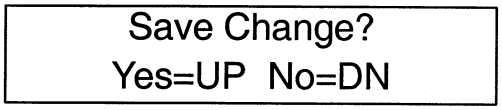
Save Changes? Yes=UP No=DN

↵ will display the "Save Change?" screen. User Interface enables the UPS to communicate in a standard ANSI terminal format (VT100 emulation or equivalent). P–rec Proto allows computer–to–compute communications with user developed software per the protocol provided in Section VII or optional Windows–based UPS Manager Plus™ software. BCM Proto® enables communications with optional online network power management software.

6. Pressing ⬆ will select the desired program and will bring back the previous COM1 screen.

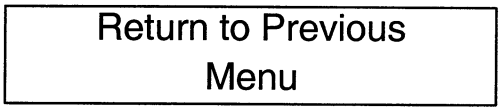
7. Press ➡ once to get this screen. If your wish to change the Com 1 baud rate, press ⬆ to increase baud rate from 2400 to 9600, or press ⬇ to decrease from 9600 to 2400. Pressing ↵ will display the "Save Change?" screen.



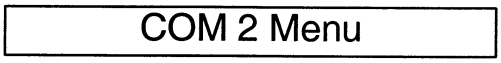


8. Pressing ⬆ will save the desired baud rate and will bring back the previous COM 1 screen.

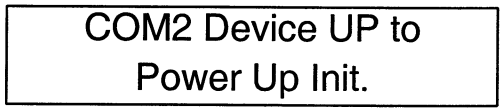
9. Press ↵ , ➡ and ↵ to proceed.



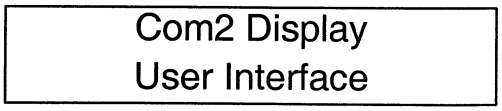
10. Press ↵ to obtain this screen.



11. Press ➡ to obtain this screen. Pressing ⬆ at this point will reset the optional COM2 serial port (see Note 1).



12. Press ➡ once to obtain one of the "Com 2 Display" screens. Press ⬆ or ⬇ to obtain



another of these three screens, as desired. Pressing

↵ will display the "Save Change?" screen. User Interface enables the UPS to communicate in a standard ANSI terminal format (VT100 emulation or equivalent). P–Rec Proto allows computer–to–computer communications with user developed software per the protocol provided in Section VII or optional Windows–based UPS Manger Plus[t] software. BCM Proto enables communication with optional online[R] network power management software.

13. Pressing ↑ will select the desired program and will bring back the previous COM 2 screen.

14. Press → once to get this screen. If you wish to change the COM 2 baud rate, press ↑ to increase baud rate from 2400 to 9600, or press ↓ to decrease 9600 to 2400. Pressing ↵ will display the "Save Change?" screen.

15. Pressing ↑ will save the desired baud rate and will bring back the previous COM 2 screen.

16. Press ↵, →, and ↵ to proceed.

Com Baud Rate 2400

Save Change? Yes=UP No=DN

Return to Previous Menu

3.6.3.4.3 UPS Identification Menu

1. Press → to obtain this screen.

2. Press → to obtain this screen.

UPS Identification Menu

UPS Name

Confirm Yes=UP No=DN

3. Press ⬆ and this confirmation screen will appear asking whether you want to enter a name.

4. Press ⬆ again if you do wish to enter a name. This screen will appear.

Enter name:
_

Notice the blinking cursor at the bottom line. Pressing ⬆ or ⬇ will change the character under the cursor (originally a space). You can move through the available characters faster by holding down the ALARM SILENCE button while pressing ⬆ or ⬇. To move the cursor to the right, press ➡; to move it to the left, press ⬅.

5. When all the characters have been entered the screen will look like this. Press ↵.

Enter name:
ABC COMPANY

6. Press ⬆ to save the change.

Save Change?
Yes=UP No=DN

7. Press ➡ to obtain this screen.

UPS Unit ID

8. Press ⬆ and this confirmation screen will appear, asking whether you want to enter a unit identification.

Confirm
Yes=UP No=DN

9. Press ⬆ again if you do wish to enter a unit identification. This screen will appear.

Enter unit ID:
_

Notice the blinking cursor at the bottom line. Pressing ⬆ or ⬇ will change the character under the cursor (originally a space). You can move through the available characters faster by holding down the ALARM SILENCE button while pressing ⬆ or ⬇. To move the cursor to the right, press ➡; to move it to the left, press ⬅.

10. Press ⬆ to save the change.

Save Change?
Yes=UP No=DN

11. If "Phone Home" feature is being used, the UPS modem phone number must be entered. Press ➡ once to obtain this screen. If you wish to skip this sequence, press ➡ twice to go to step 22.

UPS Phone Number

12. Press ⬆ and this confirmation screen will appear, asking whether you want to enter a phone number.

Confirm Yes=UP No=DN

13. Press ⬆ again if you do wish to enter a phone number. This screen will appear.

Enter Phone Number _

Notice the blinking cursor at the bottom line. Pressing ⬆ or ⬇ will change the character under the cursor (originally a space). You can move through the available characters faster by holding down the ALARM SILENCE button while pressing ⬆ or ⬇. To move the cursor to the right, press ➡; to move it to the left, press ⬅.

14. When all the characters have been entered, the screen will look like this. Press ↵.

Enter phone Number: XXXXXXXXXX

15. Press ⬆ to save the change.

Save Change? Yes=UP No=DN

16. This sequence is for entering a 24–hour telephone number which can be called by Factory Field Service personnel to tell you that your UPS has reported an alarm condition via its Phone Home capability. Press ➡ once to obtain this screen. If you wish to skip this sequence, press ➡ once to go to Step 21.

24 Hr. Voice Phone Number

17. Press ⬆ and this confirmation screen will appear asking whether you want to enter a phone number.

Confirm Yes=UP No=DN

18. Press ⬆ again if you do wish to enter a phone number. This screen will appear.

Enter phone Number:
_

Notice the blinking cursor at the bottom line. Pressing ⬆ or ⬇ will change the character under the cursor (originally a space). You can move through the available characters faster by holding down the ALARM SILENCE button while pressing ⬆ or ⬇. To move the cursor to the right, press ➡ to move it to the left, press ⬅.

19. When all the characters have been entered, the screen will look like this. Press ↵.

Enter phone Number:
XXXXXXXXXX

20. Press ⬆ to save the change.

Save Change?
Yes=UP No=DN

21. Press ➡ to obtain this screen.

Return to Previous Menu

22. Press ↵ to return to the System Maintenance Menu.

System Maintenance Menu

3.6.3.5 Password Maintenance Menu

1. Press ➡ to advance to the Password Maintenance Menu.

Password Maintenance Menu

2. Press ↵ to obtain this screen. There are four (4) levels of passwords. Press → as often as necessary to reach the desired level. The number in the lower left will change, indicating the level attained. (NOTE: You cannot go beyond the level for which the system is set when you start.)

No Password Password 0

3. Press ↑. The system will ask you to confirm the password level.

Confirm Yes=UP No=DN

4. Press ↑ as requested in the previous message. You are now ready to modify the password. Follow the procedure you used in steps 3 through 6, Section 3.6.3 to get to the UPS Maintenance Menu. When you have finished, press ↵.

Enter Password 0

5. You will see this message briefly flashed on the screen –

Verify Password

6. Then this message will appear again. It is necessary to repeat step 4, entering the new password again. Then press ↵.

Enter Password 0

7. Press ↑ to save the new password

Save Change? Yes=UP No=DN

8. Press ↑ to obtain this screen.

Return to Previous Screen

9. Press ↵ to return to the Password Maintenance Menu.

Password Maintenance Menu

10. Press → to return to the previous menu.

11. Press ↵ to leave the UPS Maintenance Menu.

3.6.4 System Shutdown

1. Perform the Bypass/Shutdown procedure (Paragraph (3.6.3.3).

   NOTE: This leaves the critical load powered by the utility power source through the bypass.

2. To remove all power to the load, open the **BYPASS CIRCUIT BREAKER**.

3.6.5 CPU Fault

If this message should appear on the screen, the UPS is transferred to bypass. Call **Service Hotline** at **(800) 777–8922**.

CPU fault Service Required

SECTION IV
MAINTENANCE

4.1 General

Proper maintenance, both preventive and remedial, is the key to optimal operation of the UPS and will ensure long and useful life of the equipment. Preventive maintenance includes regularly performed procedures designed to prevent system malfunction and obtain maximum operational efficiency. Remedial maintenance consists of troubleshooting the system in order to effect repairs. Troubleshooting the UPS involves following a logical sequence of steps which will determine the cause of an alarm or malfunction within the shortest time frame possible to expedite the repair safely and return the equipment to normal service.

The manufacturer recommends that the monitor panel be inspected visually every eight–hour shift to see that the green light is visible, indicating no alarm conditions exist. The Alarm History should be checked at this time (see Paragraph 3.6.2) to determine if any recent alarms have gone unnoticed. If any unusual conditions exist, call facility maintenance personnel or IPM Service Hotline (800–777–8922) or 214–342–6100.

4.2 Safety Precautions

Remember that your UPS is designed to supply power EVEN WHEN DISCONNECTED FROM THE UTILITY POWER. The UPS interior is unsafe until the DC power source is disconnected and the electrolytic capacitors are discharge. After disconnecting the utility power and the DC power, authorized service personnel should wait at least 5 minutes before attempting internal access to the UPS system.

WARNING
LETHAL VOLTAGE PRESENT. This unit should not be operated with the cabinet doors open or protective panels removed. Do not make any assumptions about the electrical state of any cabinet in the UPS system.

WARNING
Battery maintenance or battery replacement should be performed by authorized service personnel only. Keep unauthorized personnel away from battery room.

The following basic safety practices should always be observed:

1. **Always be aware that hazardous voltages are present within the UPS even when the system is not operating.**

2. Ensure that **UPS** operating and maintenance personnel are thoroughly familiar with the equipment and with the contents of this manual.

3. Never wear metal jewelry such as rings or wrist watches when working on the UPS equipment.

4. Keep cabinet doors closed and secured during normal **operation**.

5. Never guess about safety procedures. If any doubt exists, **ask** *someone who knows.*

6. **Always be aware of the presence of high voltage** within the UPS. Check with a voltmeter to make sure power is off and conditions are safe before attempting to make repairs, adjustments, etc. within the unit.

7. Above all, always **USE COMMON SENSE!**

4.3 Preventive (Periodic) Maintenance

The following paragraphs describe preventive maintenance procedures which, when followed, will increase the reliability and efficiency of the UPS system operations.

4.3.1 Air Filters

Permanent, removable, louvered filter hatches near the bottom of the system house disposable filters, which eliminate particles from the air used to cool the UPS. In time, particle accumulation in the filters will reduce air flow through the system. The resulting rise in operating temperature may trigger an alarm condition that may result in shutdown of the UPS.

Filters should be checked and cleaned or replaced at least every thirty (30) days in a clean environment, and at least every seven (7) days in a dirty environment.

4.3.2 Air Flow

Blower fans should be checked for cleanliness and proper operation at least annually. These are located within the power section and should be checked only during a period when the UPS is in Maintenance Bypass mode. Excessive dirt or imbalance can reduce blower effectiveness, causing a rise in system temperature that may result in an over–temperature alarm and possible system shutdown.

4.3.3 Cable Connections

Cable connections to circuit breaker and switch terminals should be checked whenever the system is powered down and at least annually. The circuit breaker and fuse panels must be removed to gain access.

WARNING

Be aware of the presence of high voltages within the UPS! When the system is shut down, wait at least five (5) minutes after all panel lights go out before proceeding. Then check for the presence of power with a voltmeter across the input and output terminals.

4.4 Remedial Maintenance (Troubleshooting)

Remember the International Power Machines 24–Hour Hot Line:

Phone: (800) 777–8922 or (214) 342–6100

is always available to provide advice and assistance on your UPS.

4.4.1 General

When properly installed, operated and maintained, your International Power Machines **BalancedPower *II*** (BP/*I*/) UPS will provide long, reliable power protection with little need of remedial or corrective maintenance actions. However, this section contains information on problem isolation techniques and recommended actions to repair the UPS.

Because of the modular design of the **BalancedPower *II*** (BP/*I*/) UPS, corrective action in many instances requires replacement of a major assembly or subassembly. For this reason, troubleshooting information contained here is generally limited to immediate action that may be taken on site to correct a specific alarm condition. If such immediate action does not remedy the situation, contact the IPM 24–Hour Hotline for assistance.

The **BalancedPower *II*** (BP/*I*/) UPS is designed so that the operator should not have to access any area of the equipment except the Digital Monitor Panel and the circuit breakers, switches and fuses inside the front doors.

WARNING

Do not remove the top panel, front panel around the circuit breakers or either side panel unless all power to the UPS is OFF. Only trained maintenance personnel should remove any of these panels.

4.4.2 Status/Alarm Indicator

The LED status/alarm indicator on the monitor panel is described in Paragraph 3.4.1. Specific action that may be taken in case of alarm conditions is described in Table 3–2, a part of Paragraph 3.6.2.

4.5 Fuses

There are two (2) fuses below the UPS CONTROL switch inside the front door. These are the only fuses available to the user who has not had factory–authorized training. If one of these fuses is blown, the control logic may not become energized at startup. Once the UPS is started, it will operate even though one or more of the fuses are blown.

In case a fuse blows, replace it with a fuse of the same make and size.

SECTION V
SPARES, MAINTENANCE

5.1 GENERAL

To facilitate service on the UPS, it is recommended that a spare parts inventory be maintained on site. Investment in a spare parts stock ensures immediate part availability when required, thereby providing faster service and greater protection against dangerous or costly system downtime.

International Power Machines can supply any of several recommended spares levels to meet different requirements. The desired mean–time–to–repair and the approximate travel time from IPM's nearest Service Center normally will determine the approximate level of spares needed. This section lists the spare parts specifically recommended for your application.

For further information concerning stocking of spares, or to order replacement parts, please contact:

Customer Service Representative
International Power Machines
Worldwide Services Group, IPRC
8380 Capital Blvd.
Raleigh, NC 27616

Phone: 1–800–777–8922
Fax: (919) 981–8150

5.2 CONTINUING MAINTENANCE PROGRAM

We consider regular maintenance of your UPS to be insurance for your equipment investment. We have, therefore, developed a continuing maintenance program that can go into effect upon expiration of the standard new equipment warranty. The program provides one preventative maintenance call per year, plus unlimited remedial maintenance calls as required, with all parts, labor and expenses included. Similar battery maintenance programs are available. For additional information and prices contact:

Worldwide Services Group
International Power Machines
Maintenance Sales Department
10451 Brockwood Rd
Dallas, TX 75238–1641

Phone: 1–800–777–8922
Fax:(214) 342–6115

5.3 CRITICAL SPARE PARTS REQUIREMENTS

Model Number BPII–HE–30–4848; International Power Machines Balanced Power II ®– HE; 30 kVA, 480/480 VAC UPS System.

Part Number	Description	Quantity / Unit	UMO
950–016–A027–1	PWB ASSY RECTIFIER DRIVE	1	EA
950–016–A063–1	PWB ASSY SBS DRIVE	1	EA
950–026–A010–1	PWB ASSY UPS CONTROL	1	EA
941–016–A040–1	PWB ASSY UPS INTFC	1	EA
950–016–A041–1	PWB ASSY REMOTE INTERFACE	1	EA
950–016–A042–1	PWB ASSY SITE INTERFACE	1	EA
950–016–A051–1	PWB ASSY USER SPECIFIED ALARM	1	EA
2353–016–A600–1	PWB ASSY, ALARM RELAY	1	EA
600–0035–001	PCB,ASSY,INTERFACE,IPM DRIVE TO LCI INVERTER	1	EA
950–016–A013–1	PWB ASSY TRANSIENT SUPPRESSOR	1	EA
941–016–A003–1	PWB ASSY CT BOARD	1	EA
600–0032–003	PCB ASSY,IGBT 1–PH DRIVE TYPE 3	1	EA
600–0034–003	PCB ASSY,IGBT 1–PH SNUBBER TYPE 3	1	EA
600–0003–000	TEMPERATURE PROBE ASSEMBLY	1	EA
950–016–A044–1	PWB ASSY INTERFACE CABLE	1	EA
2015–016–A036–1	PWB TEMPERATURE SENSOR	1	EA
950–026–A049–1	PWB, DISPLAY PCB	1	EA
100838–002	DUAL SCR MODULE 210A 1200V	1	EA
100818–001	THERMAL PAD SCR 1.97X3.66	1	EA
100629–001	SCR MODULE 90A 1200V	1	EA
292–4200–051	XSTR,IGBT,PWR,HBRIDGE,WIDE,300A,600V	3	EA
100818–002	THERMAL PAD SCR 2.44X4.25	3	EA
100424–008	FUSE 600VAC 3A DUAL ELEM UL	4	EA
208–0009–222	CAP,FIX,ELYTC,ALUM,RAD,160V,20%,22000UF	2	EA
203–2001–001	ASSY,ELECT,FAN,BALL,TERM,4.69SQ,110CFMR,3100RPM,15W,180MA,11	1	EA
100449–003	CAP 40UF 440VAC METALLIZED FOIL	1	EA
207–3006–515	CAP,FIX,ESTAT,FILM,METL,PESTR,OIL,RND,440VAC,10%,15.0UF	1	EA
212–0012–250	CIR–PROT,FUSE,AXL,BLADE,CUNO–PL,IR=200KA,500VDC,500A	2	EA