Features

- Standard Cabinet
- Micro Cabinet (optional)
- Interface Display Panel

Galaxy 3000

10-30 KVA
Uninterruptible Power Systems

Installation and User Manual

MGE
UPS SYSTEMS

Galaxy 3000

10-30 KVA
Uninterruptible Power Systems

Installation and User Manual

Revision History

Galaxy 3000 10-30 KVA Uninterruptible Power Systems Installation and User Manual

Revision:	A00	Initial Release	05/01
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MGE
UPS SYSTEMS

IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS – This manual contains important instructions for the Galaxy 3000 that must be followed during operation and maintenance of the equipment.

WARNING **Opening enclosures expose hazardous voltages. Always refer service to qualified personnel only.**

ATTENTION **L'ouverture des cabinets expose des tensions dangereuses. Assurez-vous toujours que le service ne soit fait que par des personnes qualifiees.**

WARNUNG! **Das öffnen der Gehäuse legen gefährliche Spannungen bloss. Service sollte immer nur von qualifizierten Personal durchgeführt werden.**

WARNING **As standards, specifications, and designs are subject to change, please ask for confirmation of the information given in this publication.**

ATTENTION **Comme les normes, spécifications et produits peuvent changer, veuillez demander confirmation des informations contenues dans cette publication.**

WARNUNG! **Normen, Spezifizierungen und Pläne unterliegen Anderungen. Bitte verlangen Sie eine Bestätigung über alle Informationen, die in dieser Ausgabe gemacht wurden.**

NOTE **This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.**

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at user's own expense.

WARNING **To reduce the risk of fire or electric shock, install in a controlled indoor environment free of conductive contaminants.**

This equipment is intended only for installations in a RESTRICTED ACCESS LOCATION.

ATTENTION **Pour réduire le riske d'inccendie ou d'électrocution, installer dans une enciente intérieure contrôlée en température et humidité et sans contaminants conducteurs.**

Ce matériel est destiné seulement pour des installations dans un EMPLACEMENT RESTREINT D'ACCES.

WARNUNG! **Um die Gefahr von Feuer und elektrischem Schock zu reduzieren, muss das Gerät in einem temperatur - und feuchtigkeitskontrollierten Raum, frei von leitungsfähigen Verunreinigungen, installiert werden. Dieses Gerät ist nur für die Installation an einem Ort mit qeingeschränkter Zugangserlaubnis vorgesehen.**

Diese Ausrüstung ist nur für Anlagen in einem EINGESCHRäNKTEN ZUGRIFF STANDORT bestimmti.

WARNING
ATTENTION
WARNUNG!

HIGH LEAKAGE CURRENT. Earth connection essential before connecting supply.

COURANT DE FUITE ELEVE. Raccordement a la terre indispensable avant le raccordement au reseau.

Hoher Ableitstrom Vor Inbetriebnahme Schutzleiterverbindung herstellen.

Certification Standards – Three Phase

- IEC1004/ANSI C62.41 1980 Standards for Surge Withstand Ability
- FCC rules and regulations of Part 15, Subpart J, Class A
- UL listed under 1778, Standards for Uninterruptible Power Supply Equipment
- UL Canada (CUL)
- NEMA PE 1 (National Electrical Manufacturers Association) – Uninterruptible Power Systems
- NEMA 250 (National Electrical Manufacturers Association)
  Enclosures for Electrical Equipment (1000 Volts Maximum)
- NFPA 70 – National Electrical Code
- ISO 9001
- Occupational Safety & Health Administration (OSHA)

Safety of Persons

- The UPS has its own internal power source (the battery). Consequently, the power terminals may be energized even if the UPS is disconnected from the AC power source.
- The UPS must be properly grounded.
- The battery supplied with the UPS contains small amounts of toxic materials. To avoid accidents, the directives listed below must be observed:
  - Never burn the battery (risk of explosion).
  - Do not attempt to open the battery (the electrolyte is dangerous for the eyes and skin).
  - Comply with all applicable regulations for the disposal of the battery.
  - Batteries constitute a danger (electrical shock, burns). The short-circuit current may be very high. Precautions must be taken for all handling: remove watches, rings, bracelets and any other metal objects, use tools with insulated handles.
  - Do not lay tools or metal parts on top of batteries.

Product Safety

- Upstream protection must be installed and be easily accessible.
- The UPS can be disconnected from the AC power source by opening the input protective devices.
- UPS must be connected to a nearby power source that is easily accessible.
- Never block the ventilation openings of the UPS.
- The UPS must be installed in a controlled environment.

Special Precautions

- The UPS connection instructions and operation described in the manual must be followed in the indicated order.
- Check that the indications on the rating nameplate correspond to your AC powered system and to the actual electrical consumption of all the equipment to be connected to the UPS.
- Before and after the installation, if the UPS remains de-energized for a long period, the UPS must be energized for a period of 24 hours, at least once every 3 months (for a normal storage temperature less than 25°C). This charges the battery, thus avoiding possible irreversible damage.

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Contents

section description page

Section 5 Maintenance

Section 6 Appendices

Section 7 Warranty, Registration & Customer Support

Figures

Tables

This manual provides technical information required for operation and maintenance of the Galaxy 3000. Please read this manual before operating the equipment. Please retain this manual for future reference.

Symbol Usage

This manual uses five icon symbols with text to convey important information and tips.

WARNING	**Information provided to protect the user and service personnel against safety hazards and/or possible equipment damage.**
CAUTION	**Information provided to protect the user and service personnel against possible equipment damage.**
ELECTRICAL	**Information provided to protect the user and service personnel against possible electrical hazard and equipment damage.**
IMPORTANT	**Information provided as an operating instruction, or as an operating tip.**
NOTE	**Information provided as an operating tip or an equipment feature.**

Section Descriptions

1 Introduction

Provides a general description of the Galaxy 3000 system, major components, single line diagram, and mechanical specifications.

2 Setup and Installation

This section describes scheduling of MGE Field Service Engineers, installation, and cable connections for the Galaxy 3000 10-30 KVA UPS. Topics include receiving, handling, and storage procedures, prerequisites to the installation and basic installation procedures, electrical specifications, environmental recommendations and connection details.

3 Display Panel

Describes the operator interface screens, keys, and mimic diagram.

4 Operation

Provides startup, shutdown, and normal operation of the Galaxy 3000 UPS. Included are pre and post startup safety checklists.

5 Maintenance

Provides preventive maintenance information for the Galaxy 3000 system, servicing battery safety instructions, replacement parts, and bypass maintenance procedures.

A Glossary provides definitions of abbreviations and terms used in this manual.

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1.0 Scope

Provides a general description of the Galaxy 3000 system, major components, single line diagram and mechanical specifications.

1.1 General Description

The Galaxy 3000 is the world's first data center grade Uninterruptible Power Supply system designed specifically for mid-range enterprise level applications. The Galaxy 3000 family consists of units available in power ratings from 10-30 KVA, and are optimized for compatibility with nonlinear computer-type loads. The Galaxy 3000 20 KVA and 30 KVA units can be connected in parallel for capacity or redundancy.

By incorporating the Ultra High Availability Topology (UHAT), the Galaxy 3000 family of UPS systems is designed to provide the optimal level of reliability and to react to any power disturbance in an inherently safe way to protect the critical load.

The Galaxy 3000 all-in-one design incorporates every feature into one compact cabinet, including a graphical user interface, power factor corrected input, batteries, and communication cards that support network based power management.

The Galaxy 3000 UPS and its auxiliary equipment is designed for installation in a room where humidity and temperature can be controlled.

Figure 1-1: Galaxy 3000 UPS Systems.

1.2 Major Components

Rectifier Converts AC input voltage to DC voltage. The rectifier uses IGBT (Insulated Gate Bipolar Transistor) power transistors and a Pulse Width Modulated (PWM) technique to provide input power factor correction and to minimize any harmonic reflected onto the input power lines.

Inverter Converts DC voltage from the rectifier or from the batteries into AC output voltage to maintain the attached load. This module uses the IGBT technology to provide digital power quality.

Static Switch Automatically supplies the attached load from the bypass source when the inverter is off.

Battery System Stores energy for utilization by the inverter and attached load in the event that utility AC power is lost or is of unacceptable quality.

1.3 Single Line Diagram

During normal operation, the utility power (Main input) is supplied to the UPS rectifier. The rectifier converts the AC power to DC that is supplied to the inverter. The inverter converts the DC voltage to three-phase regulated AC voltage, which is supplied to the attached load.

During power failure conditions, the inverter is supplied by the stored energy in the battery system, and the load is powered continuously with no interruption.

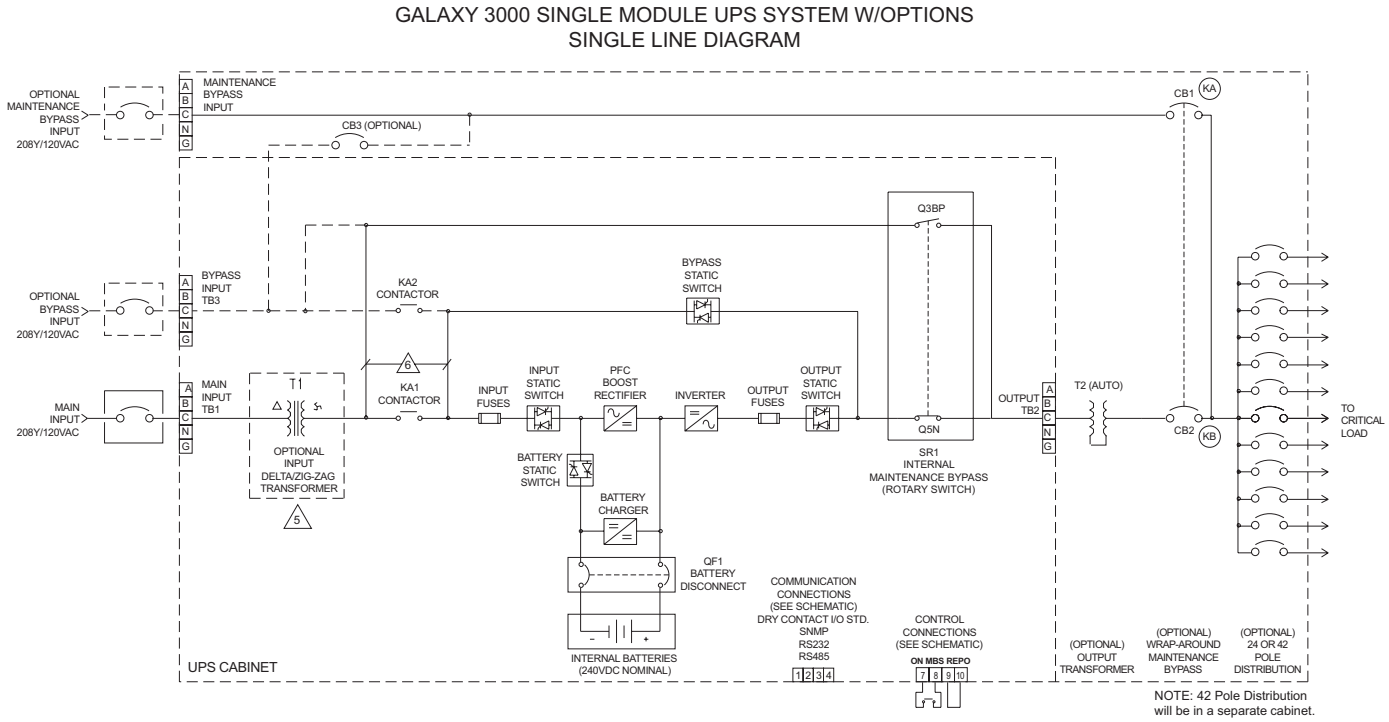
The UPS will run on battery power until "Low battery shutdown". At this point the inverter will turn OFF but the Power Factor Correction (PFC) module will stay ON to keep the DC BUS and power supply running for up to 2 hours. This period of time is called "Sleep mode".

If the input power returns while the unit is in "Sleep mode", and the unit is set to autostart, the unit will restart the inverter and supply the load. "Sleep mode" isn't active for a parallel system with a single input or dual input when both input and bypass are not available.

The Galaxy 3000 UPS is designed for internal operation of 208 VAC input and output. When different input and/or output voltages are specified, transformers (either internal to the standard cabinet, or external to the micro or standard cabinet) provide step-up/down functions as required.

Additional (extended life) batteries, external maintenance bypass switches, and/or output distribution panel boards may be contained in auxiliary cabinets similar in design to the Galaxy 3000 cabinet, or may be contained in third party cabinets or wall mounted units.

Figure 1-2: Galaxy 3000 UPS System – Single Line Diagram.



For parallel systems single line diagram refer to Appendix A.

1.4 Galaxy 3000 Micro and Standard Cabinets

The Galaxy 3000 UPS system is available in two different cabinet sizes, the Micro cabinet and the Standard cabinet. Dimensions for the cabinets are:

- Micro cabinet: 48.5” (1231.9) H x 23.0” (584.2) W x 33.5” (850.9) D
- Standard cabinet: 62.4” (1584.9) H x 32.8” (833.12) W x 35.5” (901.7) D

Both cabinets are designed to provide for top and bottom entry of the utility power feed. The Micro cabinet is typically supplied assuming bottom entry only.

Operating internally on 208 VAC, the Galaxy 3000 UPS system can be purchased to accept 208 VAC, 220 VAC, 480 VAC, or 600 VAC utility feed with the use of an internal input transformer contained in a Standard cabinet.

The Micro cabinet was designed to provide all of the features of the Galaxy 3000 system in the smallest possible enclosure. Without an auxiliary cabinet, the Galaxy 3000 system in a Micro cabinet provides only 208 VAC input and 208 VAC output.

An output voltage of 208 VAC is standard with the Galaxy 3000 and does not require any additional cabinetry. If output voltages of 240 VAC, 480 VAC or 600 VAC are required, an auxiliary cabinet is required for the output transformer.

The complete list of additional cabinets that could be included with your Galaxy 3000 system are:

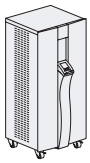
- External Maintenance Bypass cabinet
- Extended Battery cabinet
- Distribution cabinet
- SBC – System Bypass Cabinet (for parallel system only)

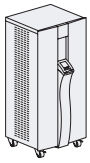
1.5 Maximum Allowable Power for Parallel System

The 20 KVA and 30 KVA UPS (only 208 VAC input and 208 VAC output), can be connected in parallel. Maximum of 4 units can be connected in parallel to achieve redundancy or load capacity of up to 3 times a unit's full load.

Pn = Unit's nominal power

Without SBC (System Bypass Cabinet)


= 1 x Pn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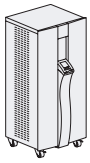
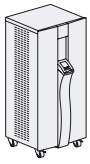

= 1 x Pn

With SBC (System Bypass Cabinet)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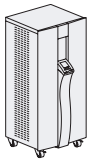
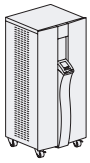

= 2 x Pn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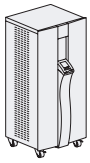
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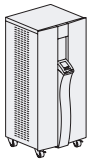
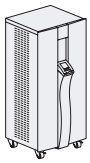

= 3 x Pn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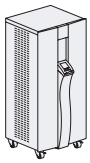
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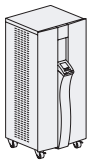
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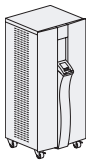

= 3 x Pn

The maximum allowable power for 4 parallel UPS units is limited to 3 x Pn.

1.6 Heat Rejection and Air Flow

The Galaxy 3000 UPS cabinets generate heat and exhaust air through the top portion of its enclosures. Air intake is through the bottom of the cabinet. All other cabinets are convection cooled. To assist you in planning for your HVAC needs, heat rejection data is provided in Table 1.1 (i.e., 480 VAC input/480 VAC output).

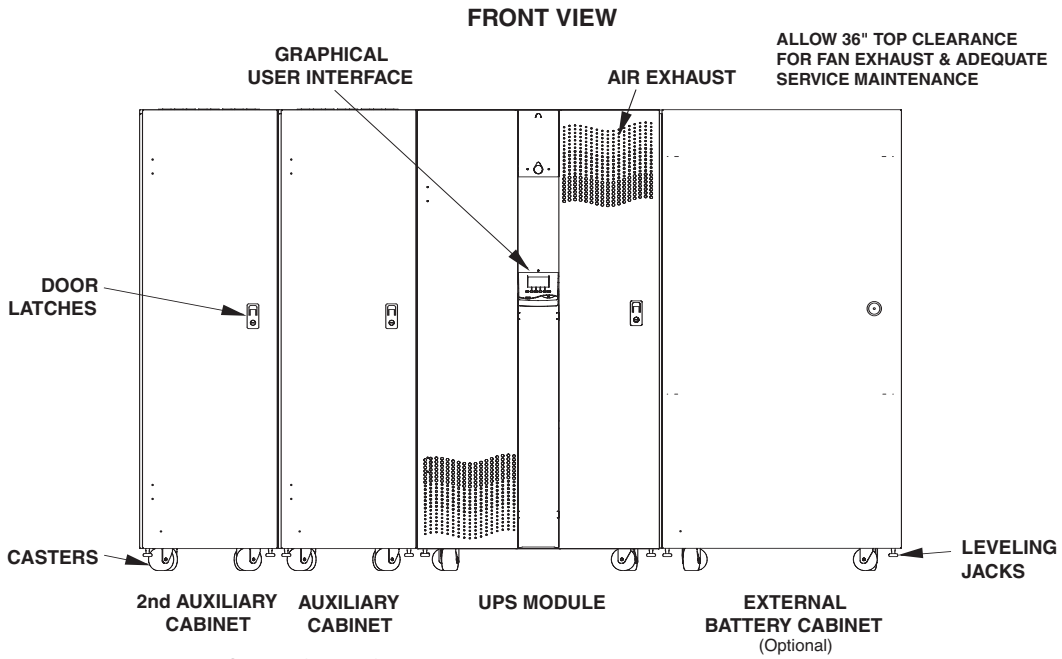
Table 1-1: Heat Rejection Data.

Heat Rejection Data @ 480/480 VAC	
UPS Module	BTU/Hr
10 KVA	6,824
15 KVA	10,235
20 KVA	12,965
30 KVA	19,447

1.7 Cabinet Placement For Single Module UPS

The complete UPS system may consist of one to four cabinets depending on the options selected. The UPS cabinet allows system options to be selected based on the application. When facing the Galaxy 3000 UPS from the front, the standard arrangement provides for any external batteries to be located on the right hand side. On the left hand side, an auxiliary cabinet may contain 2 or 3 CB Maintenance Bypass (MBP) and/or output transformer and/or a 24 pole distribution. The next cabinet to the left contains a 42 pole distribution. Refer to Figure 1-3 for cabinet placement.

Figure 1-3: Cabinet Placement Airflow and Recommended Clearance.



1.7.1 Conduit Plate Locations for Top Entry

The Standard cabinet for the Galaxy 3000 is capable of accepting power input and output cables through a top entry. The conduit plate on the top of the cabinet provides six (6) knockouts for conduit and is secured to the cabinet with four (4) machine screws. The Micro cabinet is supplied with bottom entry only, however, an optional side mounted cable raceway can be specified to allow top entry for power connections.

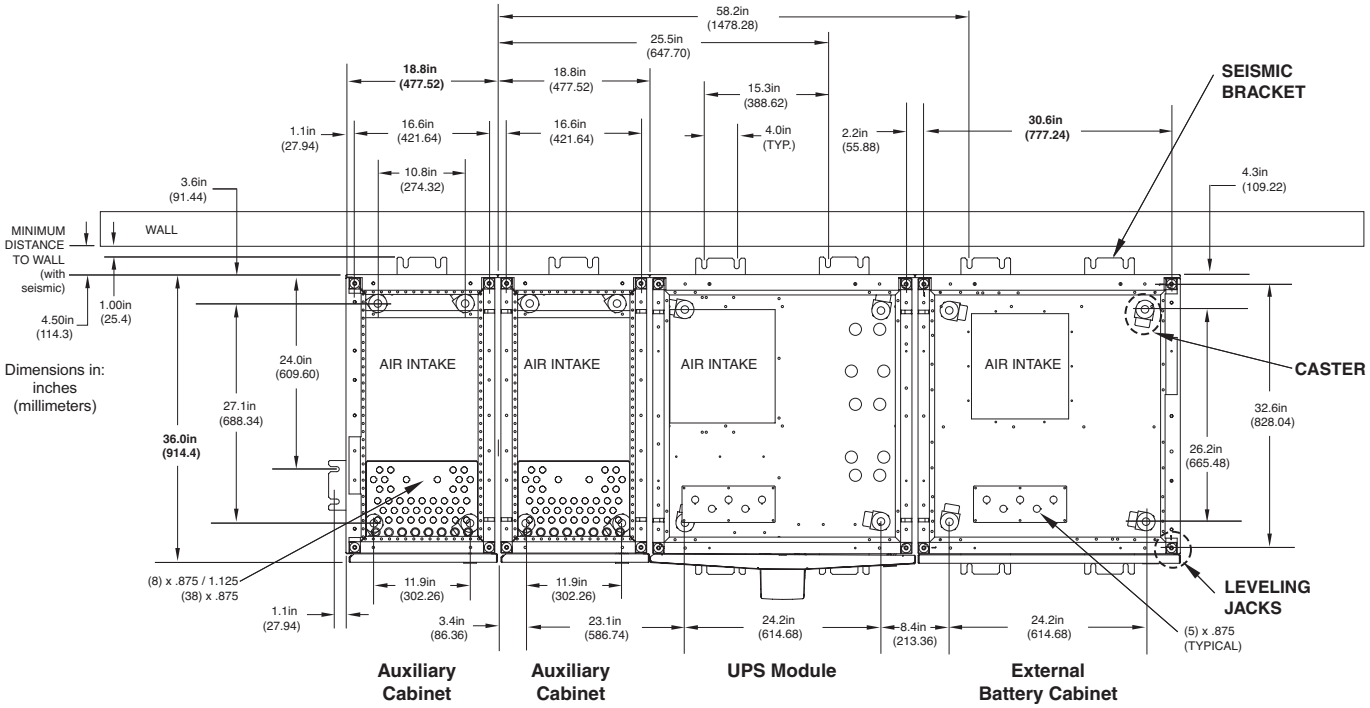
1.7.2 Conduit Plate Locations for Bottom Entry

Cable entry through the bottom is the standard preferred design for both the Galaxy 3000 Standard cabinet as well as the Micro cabinet. The bottom entry conduit plate provides for five (5) separate conduit entries. The plate is secured with six (6) screws which should be retained for the conduit plate after the power connections are made. Please see Figure 1-4 for the location of the bottom entry conduit plates.

NOTE

To provide for adequate ventilation, and service space, a minimum of 36in (914.4mm) clearance should be maintained above the top of the Galaxy 3000 cabinet.

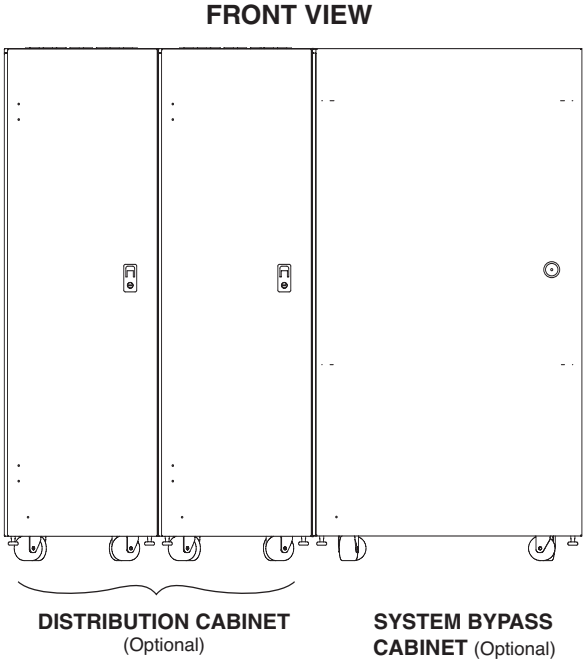
Figure 1-4: Typical Configuration for Bottom Entry Knockouts and Footprints for Galaxy 3000.



1.8 Cabinet Placement For Parallel System

The complete UPS system may consist of one to four UPS modules, battery cabinet(s), system bypass cabinet (SBC), and distribution cabinet(s). The distance between the UPS modules is limited by the interconnecting cables (supplied by MGE) to 33 feet. Viewed from the front, the standard arrangement provides for any external batteries to be located on the right hand side of the UPS modules. The SBC is a stand alone cabinet. Up to two 42 pole distribution cabinets may be installed adjacent to the left side of the SBC. Refer to Figure 1-5 for SBC and distribution cabinets placement.

Figure 1-5: Cabinet Placement Parallel System.



2.0 Scope

This section describes scheduling of MGE Field Service Engineers, installation, and cable connections for the Galaxy 3000 10-30 KVA UPS. Topics include receiving, handling, and storage procedures, prerequisites to the installation and basic installation procedures, electrical specifications, environmental recommendations and connection details.

MGE recommends scheduling an MGE UPS SYSTEMS, INC. Field Service Engineer to perform the initial startup for single and parallel units.

CAUTION

Scheduling of the MGE Field Service Engineers typically should be done 7 to 10 days before they are required on-site. If the startup of the UPS is critical to maintaining your schedule, please call the MGE toll free telephone number at 1-800-438-7373 for assistance.

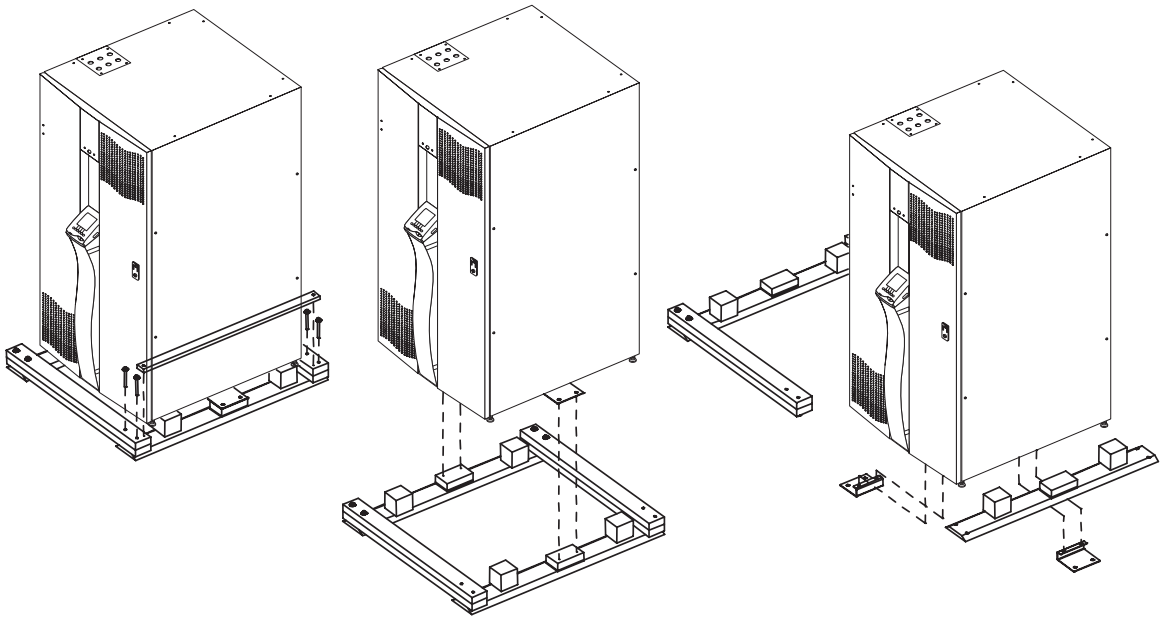
2.1 Receiving and Handling

Prior to any installation, the following items should be observed upon receipt of the Galaxy 3000 10-30 KVA UPS. The casters on the unit will allow it to be positioned into the final installation location. At this point, the leveling legs can be adjusted to provide a level and stable footing for the Galaxy 3000 UPS system. See Figure 2-1.

1) Inspect shipment for any damage prior to receipt. Damage claims should be filed directly with the courier. Replacements for damaged components should be ordered through MGE Customer Care Center at 1-800-438-7373.
2) Move equipment as close to the final location as possible if using a pallet jack or forklift.
3) Once equipment is close to the installation location, and if configuration is optional pallet mount, remove the Galaxy 3000 UPS from the shipping pallet using extreme caution when rolling the cabinet off the pallet as its weight may exceed 500 lbs.
4) All cabinets are equipped with casters allowing the equipment to be placed into final position. Push cabinets very slowly into position to avoid any tipping hazard.
5) Once in position, adjust the leveling legs to provide a fixed and stable footing for the Galaxy 3000 UPS system.
6) At this point, the UPS system can either be prepared for operation, or for storage until such time as it may be required for service.

Once the Galaxy 3000 UPS System has been inspected and received from the shipping courier, the unit should be moved with the use of a forklift or pallet jack to a position as close to the final installation location as possible.

Figure 2-1: Pallet Mounting Configuration for the Galaxy 3000.



Installation should be performed by a qualified electrician and should conform to local and national electrical codes.

2.2 Storage

If the equipment is to be stored prior to installation, it should be stored in a cool, dry, well-ventilated location that is protected against rain, splashing water, chemical agents, etc.. The equipment should be covered with a tarpaulin or plastic wrapper to protect it against dust, dirt, paint, or other foreign materials. See the section of this manual titled "Environmental Recommendations" for recommended storage environmental conditions.

NOTE

Batteries should be stored no longer than three (3) months at 25°C (77°F) or lower prior to recharging. Exceeding the recommended ambient storage temperature will reduce battery back-up time and may adversely affect battery life.

2.3 Placement

The complete UPS system may consist of one to four cabinets depending on the options selected. The UPS will be housed in either a "Standard" or "Micro" cabinet. The Micro cabinet is offered for applications where space is at a premium, while the Standard cabinet is offered for either larger KVA requirements or for applications with input transformer requirements.

For the Micro cabinet to achieve the maximum space savings, the configuration must be offered with a minimum number of options. The Micro cabinet based Galaxy 3000 is available where the input/output voltage is 208/208 VAC and options such as an external maintenance bypass, output distribution, input isolation or extended batteries are either not required or are accomplished with existing auxiliaries or third party solutions.

The Standard Cabinet allows all such system options to be selected based on the application. When facing the Galaxy 3000 UPS from the front, the standard arrangement provides for any external batteries to be located on the right hand side, and all other auxiliary cabinets to be located on the left hand side of the UPS.

2.4 Prerequisite to Installation

Installation should be performed by a qualified electrician and should conform to local and national electrical codes.

Several items must be considered when preparing the Galaxy 3000 UPS system for operation.

A. The UPS cabinet and its auxiliary cabinets must be arranged in the required configuration to insure that the interconnection cables are located in the correct adjacent cabinets.

B. The cabinets must be in a location that provides for proper air flow and heat rejection.

C. The room in which the Galaxy 3000 UPS system is located must maintain environmental conditions within recommended tolerances.

D. All electrical connections must utilize the top or bottom conduit entries provided.

2.5 Installation Procedures

If AC power is required on site prior to the arrival of the MGE Field Engineer, the following procedure will provide the AC power without powering the UPS. If there are any questions about this procedure, contact the MGE Field Service support line at 800-438-7373.

For Single Module UPS:

A. Insure that the SR1 Switch is in the BYPASS position.

B. Insure that the battery disconnect, QF1, is open.

C. Close the input power disconnect to energize the AC power.

D. At this point, power will be available for site usage until the UPS is properly commissioned.

E. Upon arrival of the MGE Field Service Engineer, the main power must be disconnected so that a safe and proper commissioning of the unit may be accomplished.

WARNING **Do not, under any circumstance, rotate the SR1 switch to the TRANSFER or NORMAL position, or close the battery disconnect, QF1, until the unit has been commissioned by an MGE Field Engineer.**

For Parallel System With SBC:

A. For all units in the system: Insure that the SR1 Switch is in the ISOLATED BYPASS position.

B. For all units in the system: Insure that the battery disconnect, QF1, is open.

C. On the SBC, close CB1 and open CB2 and CB3 (if installed).

D. Close the input power disconnect that is feeding the SBC.

E. At this point, power will be available for site usage until the UPS is properly commissioned.

F. Upon arrival of the MGE Field Service Engineer, the main power must be disconnected so that a safe and proper commissioning of the unit may be accomplished.

For Parallel System Without SBC:

A. For the first unit in the system: Insure that the SR1 Switch is in the ISOLATED BYPASS position. For the second unit Insure that SR1 is in the BYPASS position. (Move SR1 stopper to the right side of SR1 to allow rotating SR1 to the right).

B. Insure that the battery disconnect, QF1, is open in both units.

C. Close the input power disconnect that is feeding the Bypass of the second unit.

D. At this point, power will be available for site usage until the UPS is properly commissioned.

E. Upon arrival of the MGE Field Service Engineer, the main power must be disconnected so that a safe and proper commissioning of the unit may be accomplished.

2.6 Environmental and Electrical Specifications

2.6.1 Environmental Recommendations

The Galaxy 3000 is intended for use in an environment where control of temperature and humidity is provided. The cabinet airflow and recommended top clearance are provided in Figure 1-3.

Operating temperature 0° to 40°C (32° to 104°F.) except battery

Storage -20° to +70°C (-4° to 158°F.)

Humidity 0 to 90% non-condensing (operating)

Altitude sea level to 1,000 meters without derating

Acoustic noise 69 dBA Acoustic noise at rated load as measured 3 feet from the front of the UPS module

2.6.2 Electrical Specifications

Table 2-1: Electrical Specifications for the Galaxy 3000.

Output Power Rating (0.8 PF)	10 kVA					15 kVA				
UPS Voltage (input / output)	208/208	220/220	480/208	480/480	600/208	208/208	220/220	480/208	480/480	600/208
Input / Output Requirements & Frequency	Three Phase, 4 Wire + G 60 Hz									
Input Phase Rotation	A,B,C Clockwise									
Input Power Factor	>.98									
Max. Nominal Input Current (-15% Input Line at 100% Load)	31 A	31 A	14 A	14 A	11 A	46 A	46 A	21 A	21 A	17 A
Output Current	28 A	26 A	28 A	12 A	28 A	42 A	39 A	42 A	18 A	42 A
DC Voltage	198 VDC End Voltage 240 VDC Nominal 277 VDC Max. Maintenance Voltage									
Max. Battery Current at Nominal Battery Voltage (240 VDC at 100% Load)	39 ADC	41 ADC	39 ADC	41 ADC	39 ADC	59 ADC	61 ADC	59 ADC	61 ADC	59 ADC
Max. Battery Current at Battery End-Voltage (198 VDC at 100% Load)	48 ADC	49 ADC	48 ADC	49 ADC	48 ADC	71 ADC	74 ADC	71 ADC	74 ADC	71 ADC
Battery Disconnect Current	63 A (7 min. back-up time) 70 A (>7 min. back-up time)									
Max. System Heat Generation (BTU/hr)	4777	6824	5800	6824	5800	7165	10235	8871	10235	8871
SR1 Maintenance Bypass and Isolation Switch Rating	50 A	50 A	50 A	50 A	50 A	50 A	50 A	50 A	50 A	50 A
Input / Output Fuse Current	70 A	70 A	70 A	70 A	70 A	70 A	70 A	70 A	70 A	70 A
Input and Optional Bypass Contactor Current	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A	40 A

Output Power Rating (0.8 PF)	20 kVA					30 kVA				
UPS Voltage (input / output)	208/208	220/220	480/208	480/480	600/208	208/208	220/220	480/208	480/480	600/208
Input / Output Requirements & Frequency	Three Phase, Three Wire + N + G 60 Hz									
Input Phase Rotation	A,B,C Clockwise									
Input Power Factor	>.98									
Max. Nominal Input Current (-15% Input Line at 100% Load)	61 A	61 A	28 A	28 A	22 A	91 A	91 A	42 A	42 A	33 A
Output Current	56 A	53 A	56 A	24 A	56 A	83 A	79 A	83 A	36 A	83 A
DC Voltage	198 VDC End Voltage 240 VDC Nominal 277 VDC Max. Maintenance Voltage									
Max. Battery Current at Nominal Battery Voltage (240 VDC at 100% Load)	78 ADC	80 ADC	78 ADC	80 ADC	78 ADC	116 ADC	120 ADC	116 ADC	120 ADC	116 ADC
Max. Battery Current at Battery End-Voltage (198 VDC at 100% Load)	94 ADC	97 ADC	94 ADC	97 ADC	94 ADC	141 ADC	146 ADC	141 ADC	146 ADC	141 ADC
Battery Disconnect Current	125 A									
Max. System Heat Generation (BTU/hr)	8871	12965	10918	12965	10918	13306	19447	16377	19447	16377
SR1 Maintenance Bypass and Isolation Switch Rating	100 A	100 A	100 A	100 A	100 A	100 A	100 A	100 A	100 A	100 A
Input / Output Fuse Current	125 A	125 A	125 A	125 A	125 A	125 A	125 A	125 A	125 A	125 A
Input and Optional Bypass Contactor Current	110 A	110 A	110 A	110 A	110 A	110 A	110 A	110 A	110 A	110 A

NOTE: Interrupted Transfer to Bypass Source:

If the bypass source is beyond the conditions stated below, the UPS will make an interrupted transfer (not more than 500 msec. in duration).

1. Bypass voltage greater than +10%, -10% from the UPS rated output voltage.

2. Bypass frequency greater than ±2 Hz from the UPS rated output frequency.

For Single Module UPS:

The output from the Galaxy 3000 UPS system should be connected to the left most set of terminal blocks (TB2).

For Single Module UPS with output transformer:

The Galaxy 3000 UPS system offers a standard 208 VAC output voltage. Optionally, a transformer can be provided in an auxiliary cabinet that will provide 480 VAC for the output.

The output from either the Galaxy 3000 cabinet or from the external auxiliary transformer cabinet should be wired to the existing power distribution panel, or to an appropriate power management panel.

For Parallel System Without SBC:

The output from unit #1 TB2 should be connected to TB2 at unit #2. The load can be connected to TB2 on unit #1 or unit #2.

For Parallel System With SBC:

The load should be connected to the OUTPUT busbars in the SBC.

2.7 Electrical Connections

CAUTION **Only an authorized electrical professional should access electrical connections. A severe shock hazard exists.**

The ONLY user serviceable items in the Galaxy 3000 unit are:

- **A.** The main and bypass power connections.
- **B.** The load connection.
- **C.** Any cable connection to external or auxiliary module.
- **D.** The communication card options.

The access method for connections made to the communication cards is clearly seen when the front door to the Galaxy 3000 unit is opened. However, access to the main, bypass and load connections is made through the removal of the safety panel located in the lower left of the Galaxy 3000 (with the door open). This safety panel is removed by first removing the four (4) screws securing the panel. It can then be removed by lifting the safety panel away from the unit.

2.7.1 UPS Connections

Electrical connections and cabinet interconnection will vary depending upon the configuration and options selected with your Galaxy 3000 UPS system. Refer to the installation drawings supplied with your equipment.

Connecting Power Cable Connections: to access the connection terminal blocks, open the door to the Galaxy 3000 UPS. Remove the safety panel located in the lower left hand section of the unit.

a. The ground and neutral conductors must be connected to the ground and neutral terminal busbars, respectively.

b. Connect the three conductors of the Normal AC source to terminal block TB1.

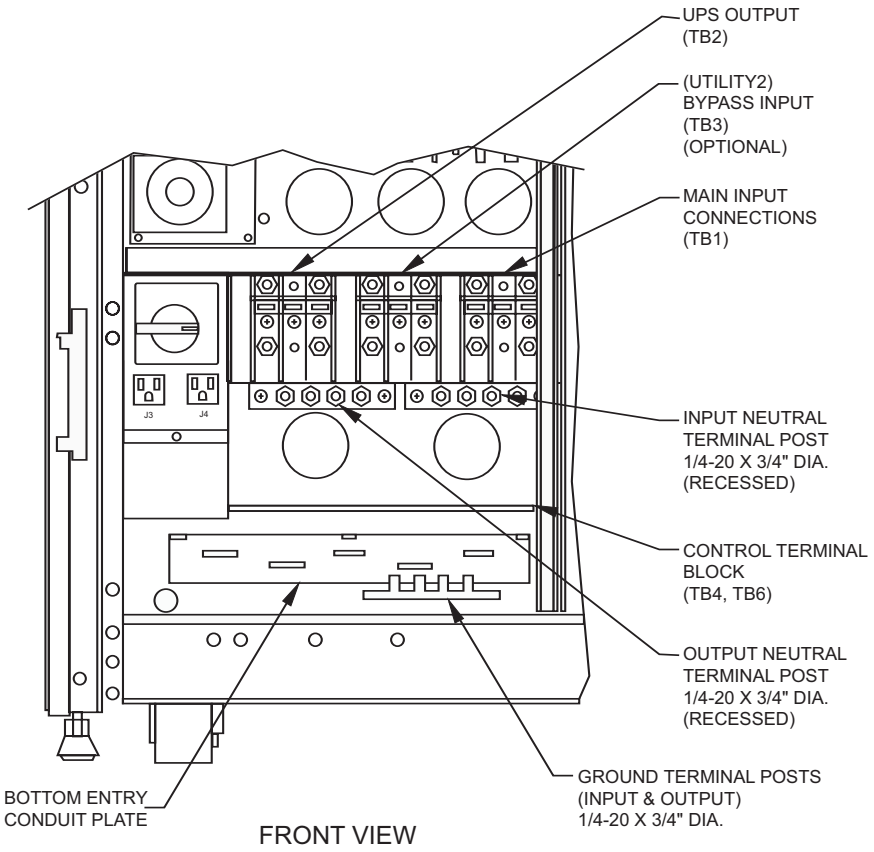
c. If bypass source is present, connect the conductors of the bypass AC source to terminal block TB3. If bypass source is not present, verify jumpers in place between TB1 and TB3.

d. Connect the three conductors supplying the load to terminal block TB2.

e. Secure all cables with cable ties.

f. Put all panels and covers back in place.

Figure 2-2: Terminal Blocks.



2.7.2 Main AC Input Connections

All Galaxy 3000 UPS systems provide the option for dual (redundant) utility power inputs. Whether the single or dual inputs are selected, the connection of the utility feed is made to the same terminal block in the Galaxy 3000 UPS system.

The connections to be made are the three phases, neutral and ground cables from the utility AC power source to the UPS. The main AC input cables are terminated at the Main Input Terminal Blocks (TB1) on the right hand side. See Figure 2-2.

2.7.3 Bypass AC Input Connections (Optional)

If the Galaxy 3000 system was specified for a second (bypass) AC source, but a separate power source is not available, then jumpers should be installed from the primary AC source to the terminal blocks for the bypass AC source.

NOTE

The three phase power should be supplied as a Wye with a separate neutral that will be connected to the input neutral busbar.

If the second (bypass) AC source is provided from a source other than that of the main input, it is recommended to use isolation transformers so that the neutral of both AC sources can be grounded to the same potential.

The connections to be made are the three phases, neutral and ground cables from the bypass AC input power source to the UPS. The bypass AC input cables are terminated at the Bypass Input Terminal Blocks (TB3). This option provides a separate AC input source for bypass operation. See Figure 2-2.

2.7.4 AC Output Connections

The connections to be made are the three phases, neutral and ground cables from the load or power distribution panel to the UPS. The output cables are terminated at the Output Terminal Blocks (TB2). Load cables must be routed separately from all other cables (power supply or computer-system interconnection cables). They should not pass near interference-emitting equipment or sensitive loads. See Figure 2-2.

For Single Module UPS:

The output from the Galaxy 3000 UPS system should be connected to the left most set of terminal blocks (TB2).

For Single Module UPS With Output Transformer:

The Galaxy 3000 UPS system offers a standard 208 VAC output voltage. Optionally, a transformer can be provided in an auxiliary cabinet that will provide 480 VAC for the output.

The output from either the Galaxy 3000 cabinet or from the external auxiliary transformer cabinet should be wired to the existing power distribution panel, or to an appropriate power management panel.

For Parallel System Without SBC:

The output from unit #1 TB2 should be connected to TB2 at unit #2. The load can be connected to TB2 on unit #1 or unit #2.

For Parallel System With SBC:

The load should be connected to the OUTPUT busbars in the SBC.

2.7.5 Remote Emergency Power Off Connections

For Single Module UPS:

The control connections are available for Remote Emergency Power Off (REPO) through a customer-supplied normally closed pushbutton. With REPO connected, the jumper on the REPO terminal blocks must be removed. The UPS is also equipped with a local Emergency Power Off button on the front of the UPS cabinet.

1. Remove the jumper from terminal block TB4 located across terminals 7 and 8. See Figure 2-2.
2. Connect the emergency power off NC contact to terminals 7 and 8.

For Parallel System:

Use the same connections on TB4 as for the single module UPS. However, the Remote Emergency Power Off (REPO) from all UPS units in the system should be connected to one remote switch (provided by others) with individual normally closed (N/C) contacts for each unit (up to 4) within the system. This setup will provide a simultaneous emergency power off to all units in the system.

CAUTION — **The local Emergency Power Off (EPO) button located on the front of the unit will ONLY power off that individual unit, NOT the remaining units in the parallel configuration. Local EPO will not remove the power from the output terminal block (TB2) of the unit.**

2.7.6 External Battery Connections

The connections to be made are the positive, negative, and ground cables from the battery cabinet to the UPS. The battery cables are terminated at the positive, negative, and ground terminal block (TBS).

2.7.7 External Maintenance Bypass Control Connections Single UPS (Optional)

The external maintenance bypass (MBP) control connections are made with the MBP control cables from the external MBP TB11 to the UPS terminal block TB4-9 & TB4-10.

ELECTRICAL — **These wires carry HIGH VOLTAGE 120 VAC.**

2.7.8 External System Bypass Control Connections Parallel System (Optional)

The external system bypass cabinet (SBC) control connections are made with the SBC control cables from the external SBC TB11 to the UPS terminal block TB6-3 & TB6-4 and from SBC TB2 to UPS INTN PCA.

2.7.9 Accessories Outlets

The 120 V outlets are to be used for MGE authorized accessories only. The outlets total current not to exceed 15 amps.

CAUTION — **Improper use of outlets may cause failure or damage to UPS.**

ELECTRICAL — **These wires carry HIGH VOLTAGE 120 VAC.**

CAUTION — **Before making any electrical connections, verify that all battery disconnect(s) (QF1) are in the "off" position. Customer-supplied upstream protective devices and distribution circuits should be OFF.**

2.8 Relay Communication Card

The relay communications card contains six programmable dry contact outputs and two programmable dry inputs and is standard on the Galaxy 3000. The inputs and outputs are factory programmed according to functions listed in Table 2-2.

Table 2-2: Relay Contacts (Communications Card).

Inputs		Factor Setting	Options (available on both contacts)
1.A	—/—	UPS ON	- Room temperature fault - Transfer to bypass disabled - Transfer to bypass disabled if Bypass AC source out of tolerance - Desynchronize UPS from Bypass AC source
1.B	—/—	UPS OFF	
Outputs		**Factor Setting**	**Options (available on all contacts)**
1.1	—/—	General alarm	- Overload - PFC fault - Inverter fault - Charger fault - Automatic-bypass fault - Bypass AC source out of tolerance - Battery-temperature fault - Fan fault - Emergency power off activated - Battery disconnect(s) open - Phase-sequence fault on Normal or Bypass AC source - Blown fuse(s) - Transfer to Bypass AC source disabled - UPS on Bypass AC source
1.2	—/—	Battery fault	
1.3	—/—	Load on UPS	
1.4	—/—	Load on automatic bypass	
1.5	—/—	Load on battery power	
1.6	—/—	Low battery warning	

The output contact numbers for a second relay board installed will be 2.1 to 2.6. Contacts are of the N/O (normally open) type. For dry contacts setting, see Section 3.7.

CAUTION

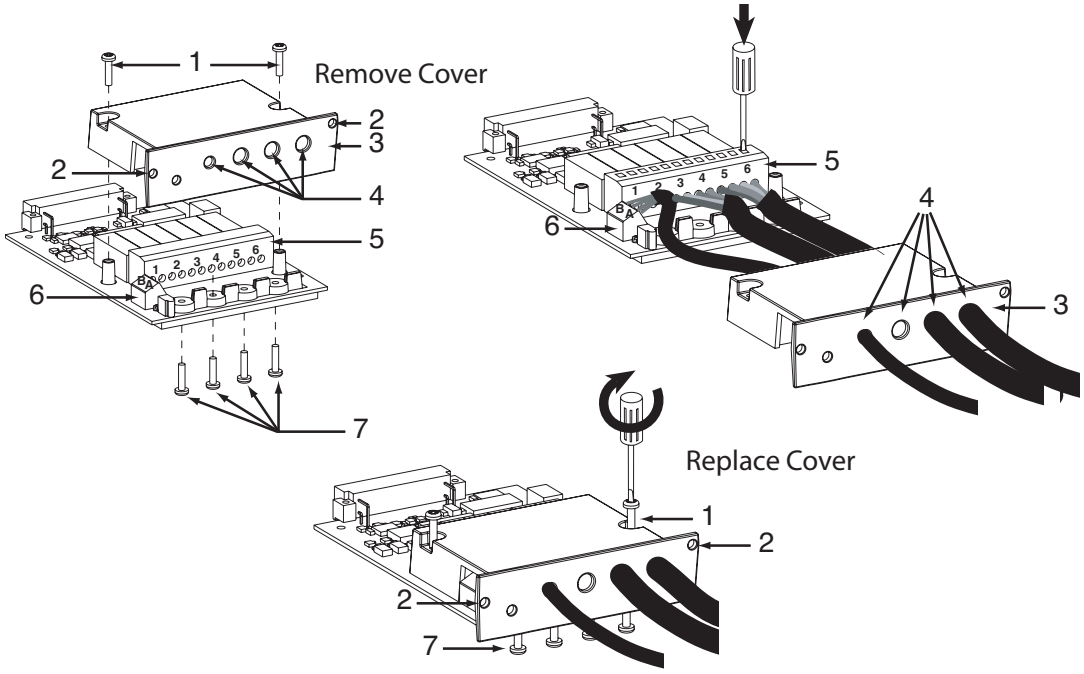
Isolate and lock-out all power sources for this card before making connections. Never connect ELSV (extra low safety voltage) and non-ELSV circuits to the different outputs of the same card.

2.8.1 Relay Communication Card Connections

Refer to Figure 2-3 for relay communication card, cover, and hardware details.

1. Remove the cover “3” secured by the screws “1”.
2. Run the communication cables through the cable entry holes “4”.
3. Connect the conductors to the input “6” and output “5” terminal blocks (refer to Figure 2-3 for a connection example.)
4. Put the cover back in place and secure it with the screws “1”.
5. Tighten the screws “7” to clamp the cables.
6. Indicate the locations of the power sources on the labels.
7. Insert the card in its slot.
8. Secure the card with two screws “2”.

Figure 2-3: Relay Communication Card.



2.8.2 Characteristics of the Output Contacts

Relay Type	Normally Open
Max. voltage	250V AC, 30V DC
Max. current	2A
Cable	4 x 0.93 mm^2, 6.6 ±0.3 mm

2.8.3 Characteristics of the Input Contacts

Switched voltage	5V DC
Consumption	10 mA
Cable	4 x 0.34 mm^2, 5 ±0.5 mm

Output alarms are always activated on the conditions stated unless requested by customer to operate on other conditions. Input contacts are designed for remote UPS operation. Use extreme caution when using these contacts so as not to endanger persons or compromise the UPS load.

3.0 Scope

Describes the operator display panel, interface screens, keys, and mimic diagram.

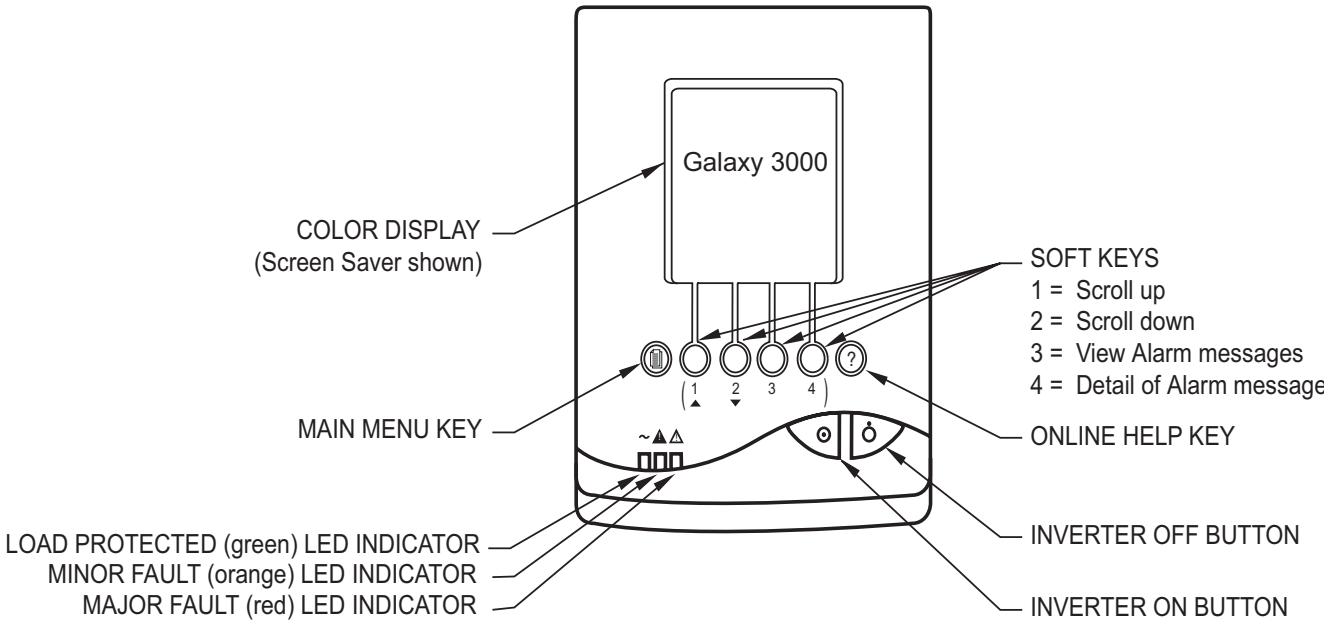
3.1 Operator Interface Keys and Indicators

The operator interface screens contained on the Galaxy 3000 display panel provide an easy to use method to access and control the Galaxy 3000 features.

The Soft Keys are programmed to allow you to scroll up and down through the list of alarms (soft keys #1 and #2). Soft key #3 allows you to delete a specific alarm message. Soft key #4 allows you to examine in further detail a specific alarm message. Although slightly different in operation, the detail key (soft key #4) must be held down to examine the message details. See Figure 3-1.

The four dedicated purpose keys are the main menu, online help, ON (green), and OFF (gray) buttons. For inverter OFF a confirmation will always be requested.

Figure 3-1: Display Panel Keys and Indicators.



NOTE **The display screen information may change with software updates.**

3.1.1 LED Indicator Functions

The three LED indicators (see Figure 3-1) provide the following information as shown in Table 3-1:

Table 3-1: Three LED Indicators.

Green LED		Orange LED		Red LED	
ON	Load on UPS	**ON**	Minor fault such as: ◗ Loss of AC input power ◗ Battery problem ◗ Overload ◗ Load on bypass ◗ Loss of redundancy (parallel)	**ON**	Major fault such as: ◗ Internal fault ◗ Rectifier fault ◗ Inverter fault ◗ Bypass static switch fault ◗ Battery not connected
Flashing	Load is on battery power				
OFF	Inverter not connected to load				

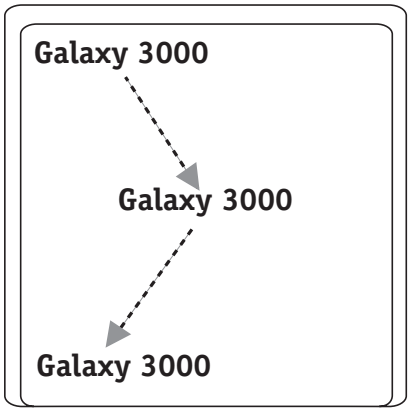
IMPORTANT **When the Red LED is ON, the load is not protected.**

3.1.2 Screen Saver

When the Galaxy 3000 system has been in continuous operation, the operator interface will present a screen saver display. See Figure 3-2.

The product name, "Galaxy 3000", will be moving around the screen to provide an indication that the unit is functional.

Figure 3-2: Screen Saver.

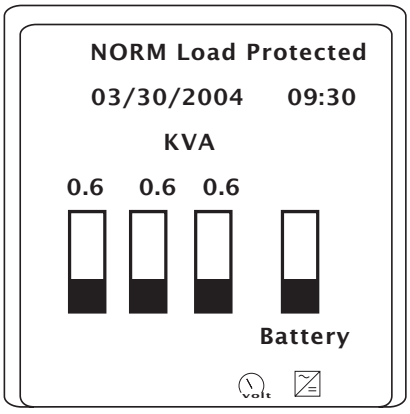


3.1.3 Operational Summary Screen

When the screen saver is active, pressing any of the keys will cause the unit to provide an operational summary display with the following information. This display will quickly show the operator the time/date, the KVA load on all three phases, as well as the battery level. See Figure 3-3.

To get to this screen from other screens, return to the Main Menu and press the ESC key.

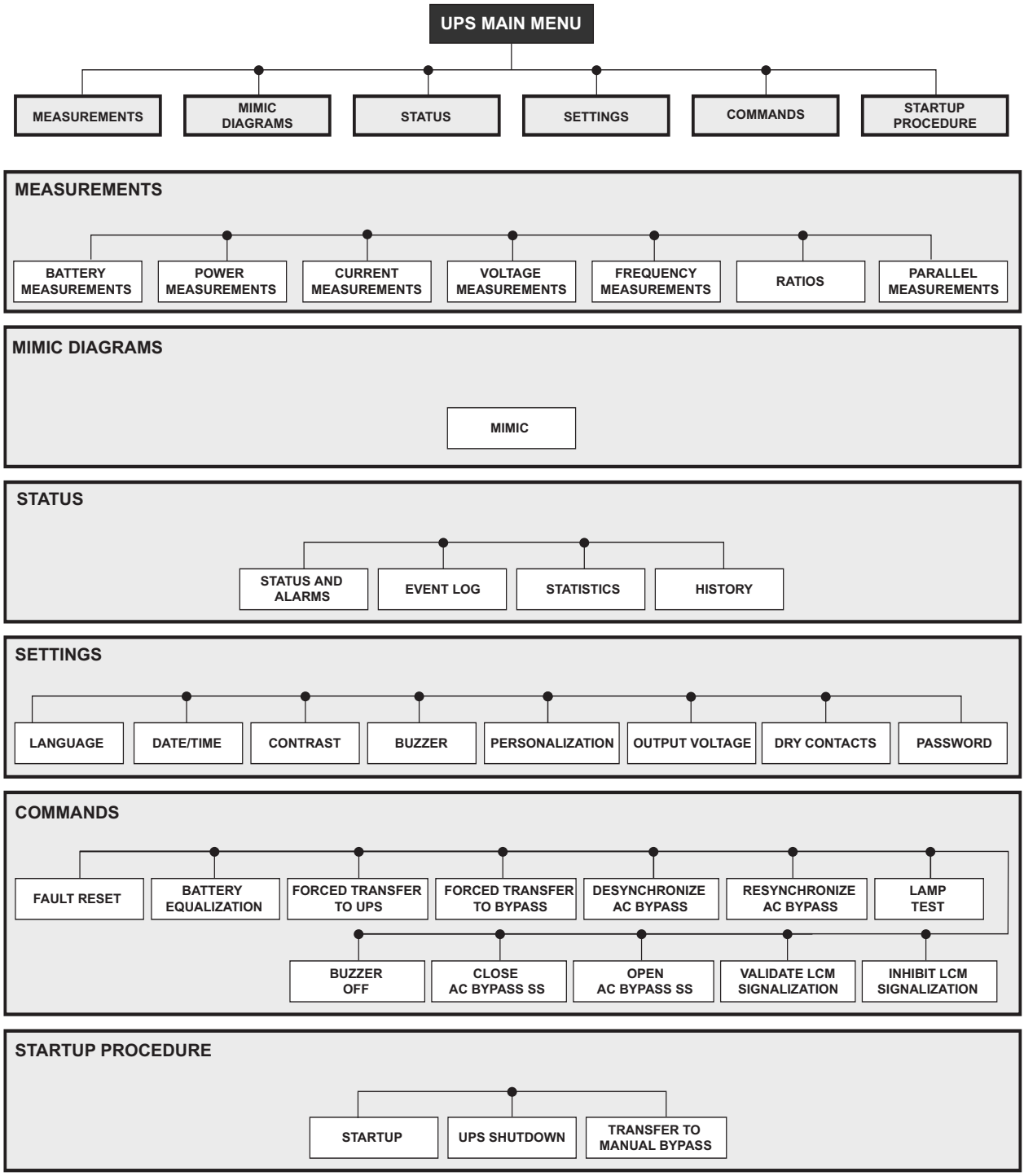
Figure 3-3: Operational Summary Screen.



3.2 Display Menu Structure

This display menu structure is provided below for the Galaxy 3000 system in Figure 3-4.

Figure 3-4: UPS Display Menu Structure.

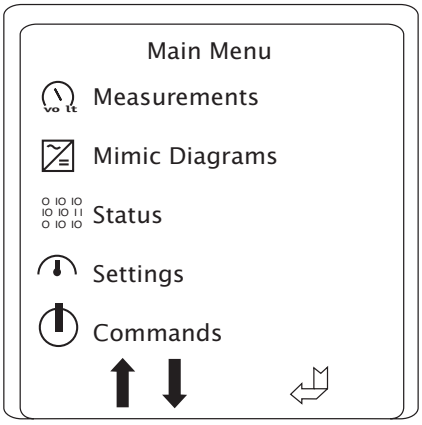


3.3 Main Menu Screen

The **Main Menu** screen allows the operator to access many displays to monitor the operating performance of Galaxy 3000, obtain alarm information, change operational settings, as well as issue software based commands.

The Main Menu conveniently displays groups of items according to function. By using one of the first two soft keys, the selection cursor may be moved up and down until the desired display group is selected. Then by pressing the fourth soft key, the selected display (or display group) will be summoned. See Figure 3-5.

Figure 3-5: Main Menu Screen.



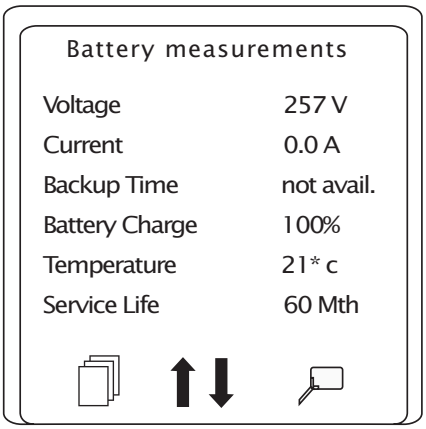
3.4 Measurements

Selecting the Measurements option from the main menu provides the following screen selections: battery, power, current, voltage, frequency measurements, and ratios.

3.4.1 Battery Measurements Screen

The **Battery Measurements** screen provides a rapid assessment of the available battery voltage, current, battery charge, temperature as well as expected service life. See Figure 3-6.

Figure 3-6: Battery Measurements Screen.



The backup time measurement will be calculated by the battery parameter identification (BPI), if the following requirements are met:

Required Conditions to Initiate BPI:

- BPI set to automatic in personalization.
- Battery charge level = 100%.
- UPS On-line (Inverter Coupled).
- Mains 2 within tolerance.
- Percent load is > 15%.
- Battery temperature 0-40°C (32-104°F).
- No battery faults.
- No rectifier or inverter overload condition.

If the above conditions are met and maintained then the UPS will run a successful BPI. A normal BPI will drain the batteries to a level of 80% capacity. When the BPI is completed successfully, the backup time will be displayed when the batteries are 100% charged. If the load does not change by more than ±20%, then a BPI will be run again in one year. Another BPI will run, only if the load changes by ±20% or the BPI is a year old.

If one of the conditions below occurs during the performance of the BPI, the BPI will be aborted.

Factors Leading to Abort a BPI:

- Inverter to mains 2 source transfer.
- Load percent drops to < 15%.
- Battery temperature outside 0-40°C (32-104°F).
- Percent load changes more than +/-5% from starting power level.

- Battery temperature does not stay within ±10°C from the starting temperature point.
- Communication fault.
- Input current 0 amps or > 100% load current.
- Rectifier or inverter overload.
- Mains 1 or Mains 2 failure.

In case the BPI cannot be done, a simplified autonometer will be used. This autonometer will start and display backup time when the batteries are 100% charged. Because the calculation used is more simplified than the one used for calculating backup time using a BPI, these will be less accurate. Therefore it is preferable to use the BPI whenever possible. This provides an option for example, when less than 15% load or cannot run a BPI.

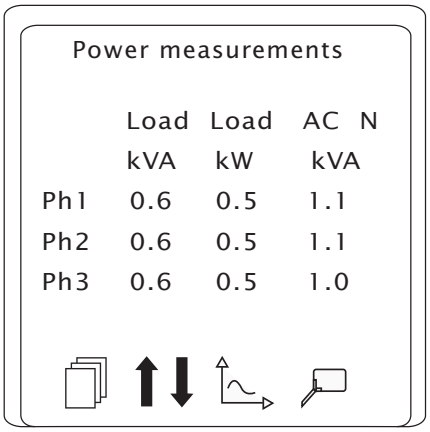
NOTE

Any of the displayed items can be examined further by using the soft key with the double arrows to select the item of interest and then pressing the soft key with the magnifying glass.

3.4.2 Power Measurements Screen

The **Power Measurements** screen displays the load power on each phase in KVA and in KW. Additionally, the AC "normal" (AC N) source is shown with the KVA. The KW reading accuracy at full load is approximately 7%. See Figure 3-7.

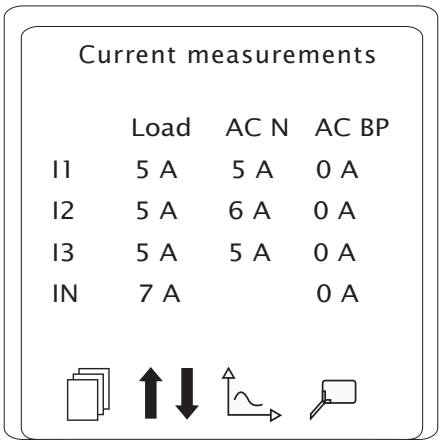
Figure 3-7: Power Measurements Screen.



3.4.3 Current Measurements Screen

The **Current Measurements** screen displays the current on the load, AC “normal” (AC N), and AC “bypass” (AC BP) on each of the three phases and neutral. See Figure 3-8.

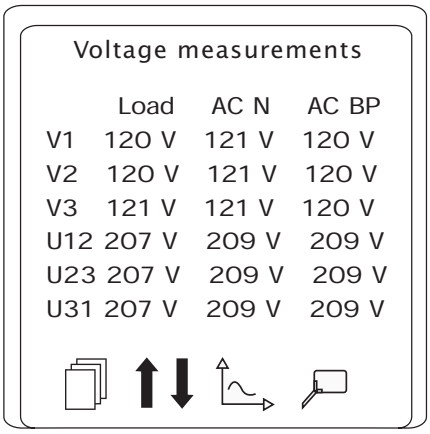
Figure 3-8: Current Measurements Screen.



3.4.4 Voltage Measurements Screen

The **Voltage Measurements** screen displays the voltage presently on any one of the input phases (AC N and AC BP) and each phase of the load, as well as the differential voltage as measured between any two phases of the inputs and the load. See Figure 3-9.

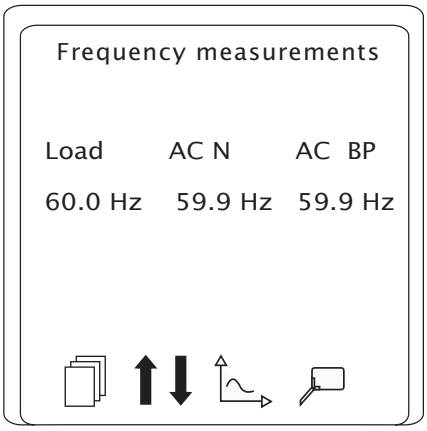
Figure 3-9: Voltage Measurements Screen.



3.4.5 Frequency Measurements Screen

The **Frequency Measurements** screen displays the frequency presently on any one of the input lines (AC N and AC BP) and the load. See Figure 3-10.

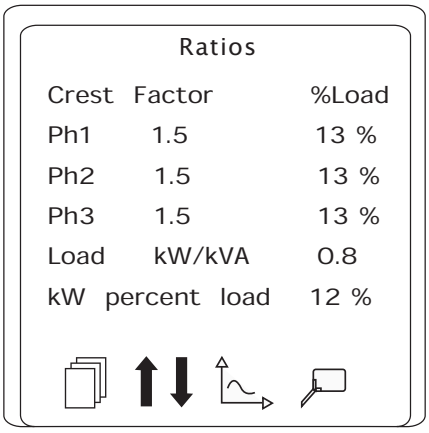
Figure 3-10: Frequency Measurements Screen.



3.4.6 Ratios Screen

The **Ratios** screen displays the crest factor for each phase, the present percentage of load for each phase and for the total unit. Additionally, the load in KVA/KW is provided. See Figure 3-11.

Figure 3-11: Ratios Screen.



3.5 Mimic Diagrams

The **Mimic Diagrams** screen is unlike any of the other screens we have examined. This screen is actually two screens in one. The top half of the screen contains a single line representation of the current operating condition of the Galaxy 3000 unit. Through the use of color changes in the screen, it will indicate whether the unit is operating normally, is on bypass, or is currently running on batteries. Segments are green when the function is active, orange when not active, and red when a fault has occurred. See Figure 3-12.

The lower half of the screen will show any existing alarm conditions.

Soft Keys

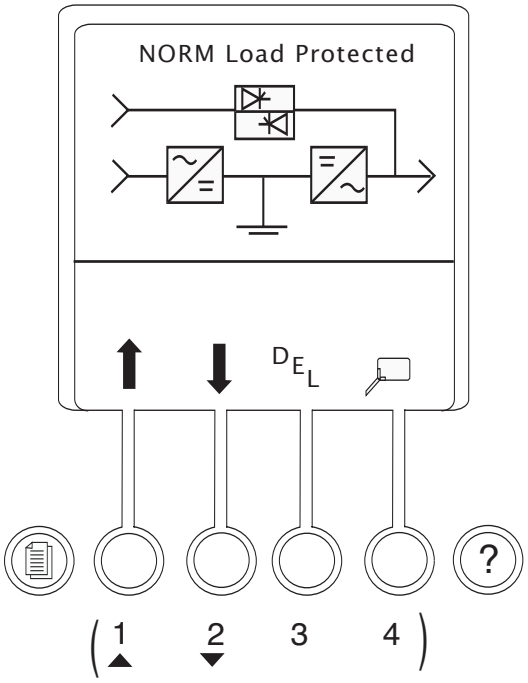
1 & 2 Soft keys are now programmed to allow the user to scroll up and down through the list. See Figure 3-12.

3 To delete a specific alarm message from the display screen when the fault is no longer present.

4 To further examine a specific alarm message.

The detail key (4) must be held down to examine the message details. To exit this display, it is necessary to press the **Main Menu** key.

Figure 3-12: Mimic Diagrams Screen.



3.6 Status Screen

Selecting the **Status** option from the **Main Menu** provides the following screen selections: Status and Alarms, Event log, Statistics, and History. See Figure 3-13.

Figure 3-13: Status Screen.

Status and Alarms

Provides the user with the present list of alarms and warnings.

Event Log

Provides the user with the history of events with date and time stamp.

Statistics

Provides total time:
- on battery power.
- on AC Bypass (AC BP).
- on UPS (AC N or battery).
- with battery temperature (TBatt) > 25°C.

History

Provides history after 60 days for:
- battery capacity.
- backup time.
- % of load.

3.7 Settings Screen

From the main menu, select **Settings**, press **Enter**.

The **Settings** screen provides a variety of options for the operation of the Galaxy 3000 system. See Figure 3-14.

The Settings screen provides the following:

Language

With an opportunity for the Galaxy 3000 unit to be located in any country, it is possible to select the language of preference from several options.

Date/Time

Can be set to insure that the time stamps on the event and alarm logs reflect the current local time and date.

Date/Time Settings

- Select **Date/Time**, press **Enter**.
- Using the **up/down arrows**, select the parameter you want to change.
- Using the **+/-** adjust the parameter.
- Press **Enter**.
- At the confirm screen, using the **up/down arrows**, select **Yes**, press **Enter**.

Contrast

Allows the contrast of the operator interface unit to be adjusted to maximize its visibility in the current ambient lighting conditions.

Buzzer

Allows the volume of the buzzer to be set.

Personalization

Allows the operator to select any number of operating parameters for the UPS.

Output Voltage

Factory set. Requires a password.

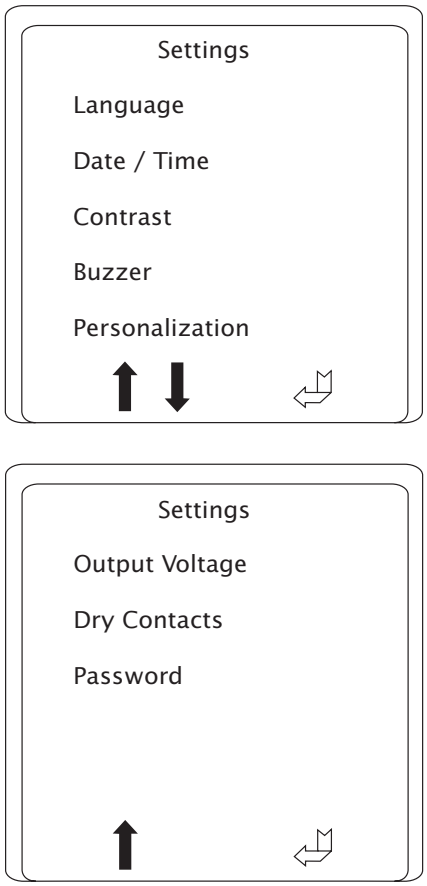
Dry Contacts

Factory set. Requires a password.

Password

Factory set. (factory default 000)

Figure 3-14: Settings Screens.



CAUTION

Do NOT adjust any parameters in the personalization section without a clear understanding of the implications to your operation. Should there be any questions about a factory or present setting, please do not hesitate to contact the Customer Support Center at MGE UPS Systems, Inc.

3.8 Commands Screen

The **Commands** screen presents options that impact the operation of the UPS system. Extreme care should be exercised when selecting ANY of these menu options. See Figure 3-15.

The **Commands** screen provides the following:

Fault reset

Allows the user to reset a fault condition.

Battery equalization

Turns the charger on to the maximum battery voltage.

Forced transfer to UPS

Allows transfer to UPS when bypass is not in tolerance. Use of this command will cause a load loss.

Forced transfer to BP (Bypass)

Allows transfer to bypass with 100ms break. Use of this command will drop load.

Desynchronize / AC BP

To desynchronize the Inverter from the AC bypass. Transfer inhibit will not allow transfer to and from inverter. This command is disabled for a parallel system.

Resynchronize / AC BP

To resynchronize the Inverter to the AC bypass.

Lamp Test

Allows the user to test the display backlight and LEDs.

Buzzer Off

Allows the user to disable the buzzer.

Close AC Bypass SS (static switch)

Closes the bypass static switch. Normally closed.

Open AC Bypass SS

Disconnects the bypass source.

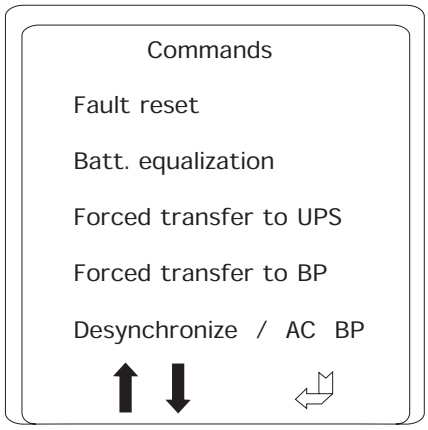
Validate LCM Signalization

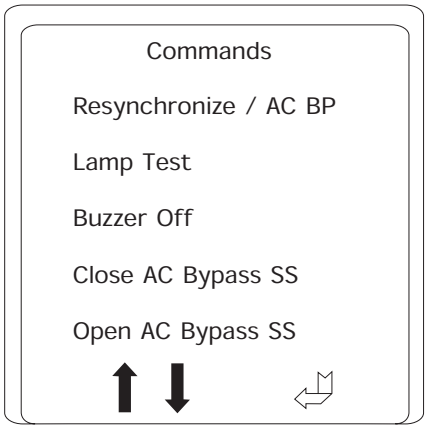
Factory set. Requires password.

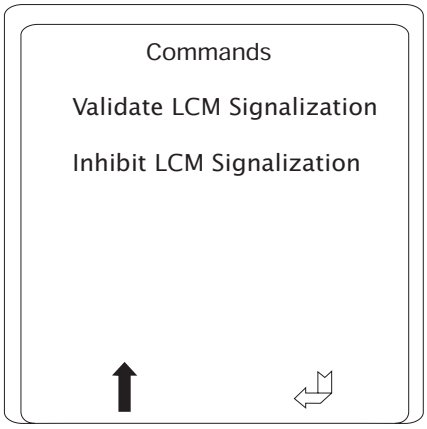
Inhibit LCM Signalization

Factory set. Requires password.

Figure 3-15: Commands Screens.







3.9 Startup Procedure Screen

The Startup Procedure screen provides the user general information for startup, shutdown and transferring to manual bypass.

3.10 Display Panel for Parallel System

When the Galaxy 3000 UPS is configured for parallel operation, there are differences on the display interface.

As a summary, the changes are described as the following and discussed in more detail below.

- An installation screen checks the units in the installation.
- A specific measurement screen is provided.
- The mimic diagram indicates the type of unit.
- The “forced desynchronization” command is eliminated. (Refer to Section 3.8.)

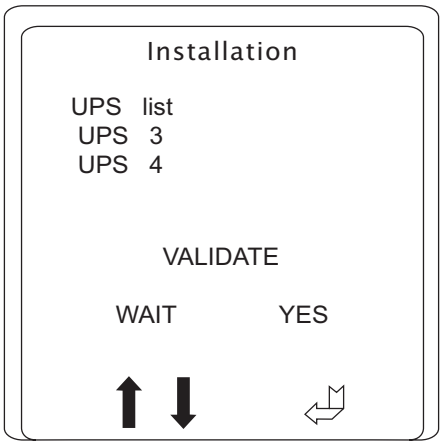
3.10.1 Parallel Installation Screen

When the unit is energized, an installation screen is displayed to list the units detected in the installation with their identification number.

The purpose of the check is that the operator is aware of the units that are present on line.

Figure 3-16 shows an example of UPS 3 and 4 detected. The number of units detected will depend on the parallel installation and configuration.

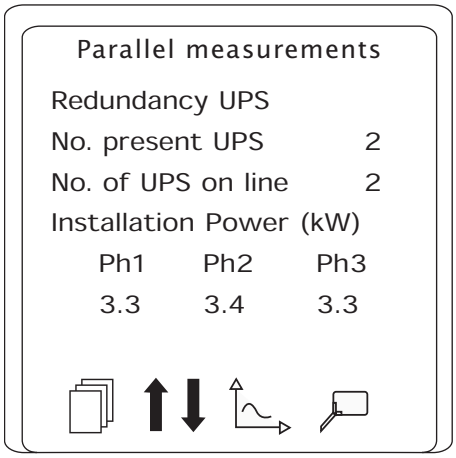
Figure 3-16: Parallel Installation Screen.



3.10.2 Parallel Measurements Screen

The **Parallel Measurements** screen displays the consolidated data for the entire installation. It may be accessed via the Measurement menu. See Figure 3-17.

Figure 3-17: Parallel Measurements Screen.



The data below is displayed.

Redundancy UPS:

Operating mode of the unit in the installation can be:

- “redundancy”, i.e. unit without external bypass (No SBC)
- “parallel for capacity”, i.e. unit with external bypass (with SBC).

No. present UPS:

Indicates the total number of units detected in the installation.

No. of UPS on line:

Indicates the number of units connected in the installation.

Installation Power (kW):

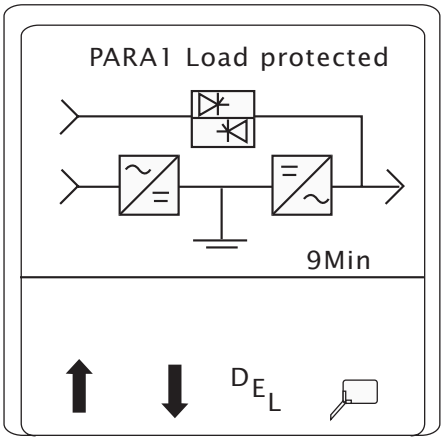
Indicates the total active power drawn by the installation.

3.10.3 Parallel Mimic Diagrams

The **Parallel Mimic Diagrams** screen is similar to those described in Section 3.5, except for the following:

"Normal" (NORM) is replaced by PARAX where X corresponds to the unit number entered in the personalization settings. See Figure 3-18.

Figure 3-18: Parallel Mimic Diagram Screen.

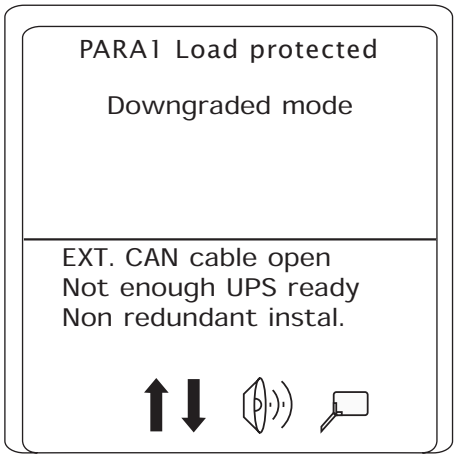


3.11 Downgrade Modes for Parallel System

The downgraded modes for a parallel system correspond essentially to faults related to communication. Whatever the origin of the fault that caused the installation to shift to downgraded mode, all the units in the installation act in the same manner to ensure supply to the load.

The unit will no longer execute any sequences and remains in the operating mode in effect before downgraded mode. See Figure 3-19.

Figure 3-19: Downgraded Mode Screen.



All user commands (display, UPS TUNER, and via communication cards) for connection or disconnection are refused. The connected units remain connected until a major fault occurs. They do not disconnect due to current limiting even when the bypass AC input is within tolerances. If a major fault occurs, a connected unit disconnects, but the static switch on its AC bypass does not close.

This disabling of sequences can be halted if the fault that caused downgraded mode has been cleared and all the units in the installation are again ready to exchange the information required for sequencing.

Two faults may cause downgraded mode. These are described in more detail below.

1. Loss of communication between boards in a unit
2. Detection of a break in the external CAN bus

1. Loss of communication between boards in a unit

The cause of the loss of communication may be a wiring fault (cables or connectors) on the CAN bus, either inside or outside the unit, or a fault on the control boards.

In this case the display will have a flashing message "**Downgraded mode**" on the dimmed mimic diagram. The control and measurement screens are no longer available. A fault is signalled by the communication cards (if provided) to alert external software programs that the data received is no longer necessarily valid.

2. Detection of a break in the external CAN bus

The connection status of the external CAN bus is signalled by a green LED on the front of INTN PCA, between the two external CAN connectors. This LED is ON on all units if the wiring is correct and it goes OFF on all units if a cable or line terminator is disconnected.

A system detects disconnection of the CAN cable between units or of one of the two line terminators. This system is made up of a current loop flowing through all the external CAN cables between the line terminators. A break in the circuit (cable or line terminator) is detected simultaneously by all units which display the CAN-cable fault. This fault disables all sequences on all units.

The connected units remain connected until a major fault occurs. They do not disconnect due to current limiting even when the bypass AC input is within tolerances. If a major fault occurs, a connected unit disconnects, but the static switch on its AC bypass does not close. Commands (display, UPS TUNER, and via communication cards) for connection or disconnection are refused. When all connections have been re-established, the units update their information and normal operation resumes. The fault automatically disappears.

4.0 Operation

Provides startup, shutdown, and normal operation of the Galaxy 3000 UPS. Included are pre and post startup safety checklists.

4.1 Preparing for Startup

Before being able to use the operator interface to monitor and control your Galaxy 3000 system, a number of items should be verified to insure that all conditions will provide for safe operation. The following check lists are provided to aid in the successful pre and post startup of the Galaxy 3000. They include items to verify prior to applying power, and then tests that should be performed (when appropriate) after startup to verify the health and functionality of all critical modules within the system.

Before starting the Galaxy 3000, read this Installation and Users Manual thoroughly. Be certain that you fully understand the operation of the indicators, controls, and operational sequences. Before applying power to your Galaxy 3000, MGE recommends contracting a MGE Field Engineer to perform the initial startup.

4.1.1 Pre-Startup Safety Check List

- Ensure all power and control wires have been properly connected and securely tightened.
- Verify the upstream and downstream protective devices are not tripped, and have been sized properly for the UPS and load requirements.
- Verify that the input voltage is the same as indicated on the UPS nameplate, located inside the door of the Galaxy 3000 UPS module.
- Ensure that nothing is blocking the air intake underneath and around the front bottom of the UPS module and that the air exhaust on the top of the UPS module is free of all obstructions.
- Verify that the manual bypass rotary switch SR1 is set to BYPASS position (or ISOLATED BYPASS for parallel system). See Figure 4-1 for 10-15 KVA and Figure 4-2 for 20-30 kVA.
- If present, verify the optional maintenance bypass disconnects Q3BP and Q5N are in the OFF (open) position.
- Verify the battery disconnect QF1 is in the OFF (open) position.
- Ensure that the cabinet is resting on its lifting leveler jacks and are not on the 4 casters.
- Verify the load disconnects (where applicable) are in the OFF position.

Figure 4-1: SR1 Rotary Switch 10-15 KVA in Bypass Position.

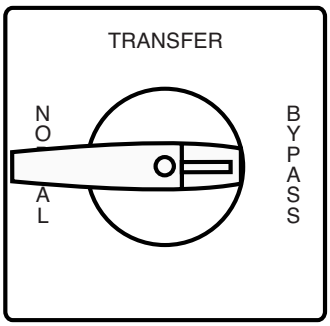
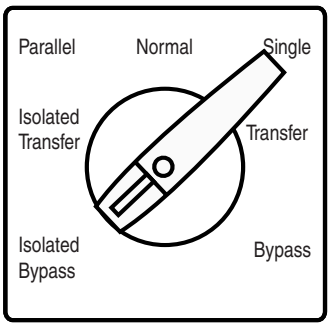


Figure 4-2: SR1 Rotary Switch 20-30 KVA in Isolated Bypass.



4.2 Normal Startup Procedure

CAUTION

As soon as AC input power is supplied to the Galaxy 3000 (customer supplied upstream disconnect is in the "ON" position), the load is initially supplied via the "Static Switch." Verify that no error indications are present on the operator interface panel.

CAUTION

Do not rotate the SR1 switch with the inverter ON. This action could cause load loss.

With all of the initial safety check lists verified, the Galaxy 3000 UPS system can now be powered. The following procedure should be used after the Galaxy 3000 UPS system has been commissioned (typically by an MGE Field Service Engineer).

NOTE

The inverter will start automatically if the UPS is set for automatic start when the upstream disconnect is closed.

4.2.1 Startup 10-15 KVA Units

1. Close upstream disconnect(s) which feed the UPS.
2. Rotate SR1 switch to TRANSFER position and wait for 20 seconds. In this mode, the UPS will start.
3. If green LED turns on, then turn it off by pressing the gray (inverter off) button. The display will show “Confirm UPS Shutdown”. Toggle the up and down scroll arrow button to “Yes” and press the return or enter button. The yellow LED will turn on.
4. Rotate SR1 switch to NORMAL position and close battery disconnect CB1 or QF1 (older UPS).
5. Press the green button to start the inverter. The green LED will turn on.
6. The display will show the load is being protected (NORM load protected).

4.2.2 Startup 20-30 KVA Single Module

1. Close upstream disconnect(s) which feed the UPS.
2. Rotate SR1 switch to NORMAL position and close the battery disconnect QF1.
3. If the unit isn't set to autostart, press the green button to start the inverter. The green LED will turn on.
4. The display will show the load is being protected (NORM load protected).

4.2.3 Startup 20-30 KVA Parallel System

1. Close upstream disconnects which feed the UPSs.
2. For all units in the system: rotate SR1 switch to NORMAL position and close the battery disconnect QF1.
3. For all units in the system: press yes validate at the installation screen.
4. If the units aren't set to autostart, press the green button to start the inverter. The green LED will turn on
5. The display will show the load is being protected (PARA (n) load protected, where n=ID number of unit).

4.3 Post Startup Safety Check List

After initial startup of the system, normal operation should be tested. At the minimum, the following tests should be performed as applicable to your installation.

- Emergency power off (EPO) test. For parallel system use SYSTEM EPO (Simultaneous REPO on all the units in the system).
- Remote emergency power off (REPO) test (if applicable). For parallel system use SYSTEM EPO (Simultaneous REPO on all the units in the system).
- Inverter start and stop.
- Battery transfer test.
- Maintenance bypass procedure.

4.4 Normal Shutdown Procedure For Single Module UPS and Parallel System Without SBC

For Parallel system without SBC: Perform steps 1 to 4 for both UPS units.

1. Press the gray (inverter off) button. The display will show “Confirm UPS Shutdown”. Toggle the up and down scroll arrow button to “Yes” and press the return or enter button. The yellow LED will turn on.
2. The UPS is now feeding the load from the static switch.

3. Open battery disconnect QF1.
4. Rotate SR1 switch to BYPASS position.
5. At this point, the UPS is completely down, and the load is being protected through maintenance bypass.
6. To power down the load, open the upstream disconnect(s) which feed the UPS.

4.5 Normal Shutdown Procedure for Parallel System With SBC

1. For all units in the system: press the gray (inverter off) button. The display will show "Confirm UPS Shutdown". Toggle the up and down scroll arrows button to "Yes" and press the return button. The yellow LED will turn on.
2. The UPS Parallel system is now feeding the load from the static switch.
3. For all units in the system: open battery disconnect QF1.
4. On the SBC, close disconnect CB1 (maintenance bypass disconnect) and open disconnect CB2 (output disconnect).
5. At this point the SBC is supplying the load.
6. To remove all power from the UPS modules, open CB3 (input/bypass disconnect), if provided, on the SBC and individual input and bypass feeder disconnects to all the UPS modules in the system.

4.6 Shutdown Using EPO

During an emergency situation the UPS and all downstream devices can be instantly shutdown by pressing the red emergency power off (EPO) pushbutton on the front door of the UPS cabinet, or pressing the remote emergency power off (REPO) pushbutton (if applicable) located within the room.

For parallel system, use only the REPO (REPO all modules simultaneously).

IMPORTANT **Pressing the EPO/REPO button disconnects the attached load. The emergency power off (EPO/REPO) is to be used during emergency situations only, where a hazard to personnel or equipment exists.**

CAUTION **Pressing the EPO/REPO button will cause a load loss.**

4.7 Recovery from EPO

To recover from an emergency power off press the EPO pushbutton again. Follow the normal startup procedure in Section 4.2.

NOTE **The EPO pushbutton is a latching device. The EPO condition will remain until the EPO button is depressed a second time.**

5.0 Scope

Provides preventive maintenance information for the Galaxy 3000 system, servicing battery safety instructions, replacement parts, and bypass maintenance procedures.

5.1 Preventive Maintenance

The following preventive maintenance routines should be considered the minimum requirements. Your installation and site may require additional preventive maintenance to assure optimal performance from your installed Galaxy 3000 and associated equipment. These routines should be performed twice a year (more often if required). We strongly recommend contracting MGE Customer Support Services for preventive and remedial maintenance at 1-800-438-7373.

The technician or electrician performing preventive maintenance on the UPS must be familiar with the indicators, controls, and operation of the UPS.

a. Isolate and de-energize all Galaxy 3000 equipment for all maintenance operations. Lock and tag all upstream disconnects during maintenance.

b. Ensure that all equipment is clean and free of dust, dirt, and debris. The exterior of the UPS enclosure may be cleaned with a mild solution of soap and water, lightly applied with a lint-free cloth.

c. Clean/replace the air intake filters, exhaust plates, and the enclosure interior with a vacuum cleaner.

d. Initiate the startup procedure, as described in Section 4.

e. Test the main operating sequences as applicable to your installation. See Section 4.

5.2 Servicing Batteries

IMPORTANT SAFETY INSTRUCTIONS FOR SERVICING BATTERIES

Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.

When replacing batteries, use the same model and manufacturer of batteries.

CAUTION — **Do not dispose of battery or batteries in a fire. The battery may explode. Do not open or mutilate the battery or batteries.**

ELECTRICAL — **Released electrolyte is harmful to the skin and eyes. It may be toxic.**
A battery can present a risk of electrical shock and high short-circuit current.

The following precautions should be observed when working with batteries:

- Remove watches, rings, or other metal objects.
- Use tools with insulated handles.
- Wear rubber gloves and boots.
- Do not lay tools or metal parts on top of batteries.

- Disconnect charging source prior to connecting or disconnecting battery terminals.
- Determine if the battery is inadvertently grounded. If inadvertently grounded, remove the source of ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.

5.3 Bypass Maintenance Procedures — for Single Module UPS

5.3.1 From Normal to Maintenance Bypass Mode

1. Press the gray (inverter off) button. The display will show “Confirm UPS Shutdown”. Toggle the up and down scroll arrow button to “Yes” and press the return or enter button. The yellow LED will turn on.
2. Silence the alarm by pressing the “Alarm” function key.
3. Open the battery disconnect QF1.
4. Rotate SR1 switch to TRANSFER position, then continue rotating to BYPASS position.
5. The display should go blank after approximately 30 seconds and all LEDs should be off.

Now the UPS is ready for maintenance.

CAUTION

The battery disconnect QF1 will automatically trip open if left in the “ON” position when the UPS is placed in the Maintenance Bypass Mode.

In this mode of operation, the UPS is ready for maintenance, but voltage is still present on the terminal blocks of various internal components.

The cooling fans will keep running when the UPS is placed in the Maintenance Bypass mode to prevent the optional input/output transformers inside the UPS from overheating. If it is necessary to de-energize the fans, move the fan control switch (S1) to the “OFF” position.

5.3.2 From Maintenance Bypass to Normal Mode

WARNING

Failure to follow the proper startup sequence will result in load loss. After SR1 is set to “Transfer,” it takes the UPS 5 to 6 seconds to test the input power before turning on the “Static Switch.” During this time, the load is still supplied by the Maintenance Bypass line, and moving SR1 to “Normal” will result in interruption of power to the load.

1. Verify that the Fan Control Switch (S1) is in the “ON” position.
2. Rotate SR1 switch to TRANSFER position.
3. Wait for the Alarm and diagnostics display to go on (at least 5 seconds).
4. Stop the Inverter by pressing the gray “Inverter OFF” pushbutton, then using the function keys choose “Yes” to confirm Inverter OFF.

CAUTION

ALWAYS turn the Inverter off before rotating the SR1 Rotary Switch.

5. Close the battery disconnect QF1.
6. Rotate SR1 switch from TRANSFER to NORMAL position.
7. Start the Inverter by pressing the green “Inverter ON” pushbutton on the front panel.
8. Verify that the green “Load Protected” LED illuminates.
9. Verify that the display indicates “NORM Load Protected”.

5.4 Bypass Maintenance Procedures for Parallel System

There are six bypass procedures for various parallel systems configurations. There are two for the UPS SR1 rotary switch, and four for the System Bypass Cabinet (SBC). Operating instructions are provided in the following sections.

UPS Procedures:

1. SR1 Operating Procedure for Parallel Module with SBC.Refer to Section 5.4.1
2. SR1 Operating Procedure for Parallel Module with no SBC. Refer to Section 5.4.2

SBC Procedures:

1. SBC 2CB with Electrical Interlock Operating Instructions. Refer to Section 5.4.3
2. SBC 2CB with Mechanical Interlock Operating Instructions. Refer to Section 5.4.4
3. SBC 3CB with Electrical Interlock Operating Instructions. Refer to Section 5.4.5
4. SBC 3CB with Mechanical Interlock Operating Instructions. Refer to Section 5.4.6

5.4.1 SR1 Operating Procedure for Parallel System with SBC (71-171553-00). See page 6—3 for single line.

SR1 OPERATING PROCEDURE FOR PARALLEL MODULE WITH SBC

CAUTION: Before transferring to 'ISOLATED TRANSFER' position, verify other UPS modules in system can support load. If the other units can't support load, transfer system to Maintenance Bypass through the System Bypass Cabinet (SBC).

CAUTION: **DO NOT ROTATE SR1 TO 'TRANSFER' POSITION.**
MECHANICAL STOPPER WILL PREVENT ROTATING TO 'TRANSFER' POSITION.

A. TRANSFER TO ISOLATED TRANSFER

1. TURN THE INVERTER OFF BY PRESSING THE GRAY INVERTER BUTTON ON THE FRONT PANEL AND THEN CONFIRM THE COMMAND.
2. VERIFY THE INVERTER IS OFF BY ENSURING THAT THE GREEN 'LED' (~ SYMBOL) IS TURNED OFF (NO GREEN LIGHTS ILLUMINATED ON THE FRONT PANEL).
3. OPEN BATTERY BREAKER 'QF1'.
4. ROTATE 'SR1' SWITCH TO 'ISOLATED TRANSFER' POSITION.
5. THE UPS OUTPUT IS ISOLATED FROM THE SYSTEM OUTPUT (UNIT Q5N AND Q3BP ARE OPEN).
6. IF THE SYSTEM BYPASS CABINET INCLUDES THE INDIVIDUAL OUTPUT ISOLATION CB OPTION, OPEN THE CB THAT CORRESPONDS TO THIS UPS MODULE. (CB11, CB12, CB13 OR CB14).
7. TO SHUTDOWN THE UNIT LOGIC POWER ROTATE 'SR1' TO 'ISOLATED BYPASS' POSITION.
8. TO ISOLATE THE UNIT'S INPUTS, OPEN ALL CBs THAT ARE FEEDING THIS UNIT (INPUT AND BYPASS).

B. TRANSFER TO NORMAL MODE

1. APPLY BYPASS AND INPUT POWER TO THE UNIT (CLOSE BYPASS AND INPUT FEEDER CBs).
2. ROTATE 'SR1' SWITCH TO 'NORMAL' POSITION.
3. IF THE UNIT REQUIRES VALIDATE, PRESS YES TO VALIDATE ON THE FRONT PANEL. THE UPS WILL START THE PFC AND IF IN AUTO START MODE, THE INVERTER WILL TURN ON. (CONNECTING THE INVERTER OUTPUT TO THE OTHER MODULES IN THE PARALLEL SYSTEM).
4. IF THE UPS IS NOT IN AUTO START MODE, PRESS THE GREEN (INVERTER ON) BUTTON ON THE FRONT PANEL, THE INVERTER WILL TURN ON. (CONNECTING THE INVERTER OUTPUT TO THE OTHER MODULES IN THE PARALLEL SYSTEM).
5. IF THE SYSTEM BYPASS CABINET INCLUDES THE INDIVIDUAL OUTPUT ISOLATION CB OPTION, CLOSE THE CB THAT CORRESPONDS TO THIS UPS MODULE. (CB11, CB12, CB13 OR CB14).
6. CLOSE BATTERY BREAKER 'QF1'.
7. VERIFY THE UNIT IS ONLINE.

ATTENTION: THIS PROCEDURE IS FOR PARALLEL UNIT WITH SBC ONLY. FOR OTHER CONFIGURATIONS USE A CORRESPONDING PROCEDURE.

71-171553-00

5.4.2 SR1 Operating Procedure for Parallel System with no SBC (71-171554-00). See page 6—1 for single line.

SR1 OPERATING PROCEDURE FOR PARALLEL MODULE WITH NO SBC

FIRST UPS UNIT

CAUTION: DO NOT ROTATE 'SR1' TO 'TRANSFER' POSITION. MECHANICAL STOPPER WILL PREVENT ROTATING TO 'TRANSFER' POSITION.

A. TRANSFER TO ISOLATED TRANSFER

1. TURN THE INVERTER OFF BY PRESSING THE GRAY INVERTER BUTTON ON THE FRONT PANEL AND THEN CONFIRM THE COMMAND.
2. VERIFY THE INVERTER IS OFF BY ENSURING THAT THE GREEN 'LED' (~ SYMBOL) IS TURNED OFF (NO GREEN LIGHTS ILLUMINATED ON THE FRONT PANEL).
3. OPEN BATTERY BREAKER 'QF1'.
4. ROTATE 'SR1' SWITCH TO 'ISOLATED TRANSFER' POSITION.
5. THE UPS OUTPUT IS ISOLATED FROM THE SYSTEM OUTPUT (UNIT Q5N AND Q3BP ARE OPEN).
6. TO SHUTDOWN THE UNIT LOGIC POWER ROTATE 'SR1' TO 'ISOLATED BYPASS' POSITION.
7. TO ISOLATE THE UNIT'S INPUTS, OPEN ALL CBs THAT ARE FEEDING THIS UNIT (INPUT AND BYPASS).

SECOND UPS UNIT

CAUTION: IF UNIT IS RUNNING ON BATTERIES AND THE INPUT VOLTAGE TO THE STATIC SWITCH IS NOT PRESENT, THEN THIS PROCEDURE WILL CAUSE LOAD LOSS.

A. TRANSFER TO MAINTENANCE BYPASS

1. TURN THE INVERTER OFF BY PRESSING THE GRAY INVERTER BUTTON ON THE FRONT PANEL AND THEN CONFIRM THE COMMAND.
2. VERIFY THE INVERTER IS OFF BY ENSURING THAT THE GREEN 'LED' (~ SYMBOL) IS TURNED OFF (NO GREEN LIGHTS ILLUMINATED ON THE FRONT PANEL).
3. REMOVE STOPPER FROM 'SR1' LEFT SIDE AND INSTALL IT ON THE RIGHT SIDE OF 'SR1'.
4. ROTATE 'SR1' SWITCH TO 'TRANSFER' POSITION. THE LOAD IS ON MAINTENANCE BYPASS.
5. OPEN BATTERY BREAKER 'QF1'.
6. ROTATE 'SR1' SWITCH TO 'BYPASS' POSITION.

SECOND UPS UNIT

B. TRANSFER TO NORMAL MODE

1. ROTATE 'SR1' SWITCH TO 'TRANSFER' POSITION, AND WAIT UNTIL THE UNIT STARTS TO BEEP.
2. WAIT APPROXIMATELY 15 SECONDS AND THEN PRESS THE GRAY INVERTER 'OFF' BUTTON ON THE FRONT PANEL AND CONFIRM THE COMMAND.
3. ENSURE THAT THE GREEN 'LED' (~ SYMBOL) IS TURNED 'OFF'.
4. CLOSE BATTERY BREAKER 'QF1'.
5. ROTATE 'SR1' SWITCH TO 'NORMAL' POSITION.
6. REMOVE STOPPER FROM 'SR1' RIGHT SIDE AND INSTALL IT ON THE LEFT SIDE OF 'SR1'.
7. PRESS THE GREEN (INVERTER ON) BUTTON ON THE FRONT PANEL AND VERIFY THE UNIT IS ONLINE.

FIRST UPS UNIT

B. TRANSFER TO NORMAL MODE

1. APPLY BYPASS AND INPUT POWER TO THE UNIT (CLOSE BYPASS AND INPUT FEEDER CBs).
2. ROTATE 'SR1' SWITCH TO 'NORMAL' POSITION.
3. IF THE UNIT REQUIRES VALIDATE, PRESS YES TO VALIDATE ON THE FRONT PANEL. THE UPS WILL START THE PFC AND IF IN 'AUTO START' MODE, THE INVERTER WILL TURN ON. (CONNECTING THE INVERTER OUTPUT TO THE OTHER MODULES IN THE PARALLEL SYSTEM).
4. IF THE UPS IS NOT IN 'AUTO START' MODE, PRESS THE GREEN (INVERTER ON) BUTTON ON THE FRONT PANEL, THE INVERTER WILL TURN ON. (CONNECTING THE INVERTER OUTPUT TO THE OTHER MODULES IN THE PARALLEL SYSTEM).
5. CLOSE BATTERY BREAKER 'QF1'.
6. VERIFY THE UNIT IS ONLINE.

ATTENTION: THIS PROCEDURE IS FOR PARALLEL UNIT WITH NO SBC ONLY. FOR OTHER CONFIGURATIONS USE A CORRESPONDING PROCEDURE.

71-171554-00

5.4.3 SBC 2CB with Electrical Interlock Operating Instructions (04-45128-05). See page 6—3 for single line.

PARALLEL UPS SYSTEM – SBC 2CB ELECTRICAL INTERLOCK OPERATING INSTRUCTIONS

A. NORMAL OPERATION

1. CB1 (MAINTENANCE BYPASS) IS LOCKED OPEN. NO KEY IS CAPTIVE.
2. CB2 (UPS OUTPUT ISOLATION) IS CLOSED. THE KEY "B" IS CAPTIVE.
3. KEY "A" IS CAPTIVE IN KEY INTERLOCK "KS"
4. THE UPS MODULE IS SUPPLYING POWER TO CRITICAL LOAD.

B. TRANSFER TO MAINTENANCE BYPASS

1. TRANSFER EACH UPS MODULE IN THE PARALLEL SYSTEM TO STATIC BYPASS BY PRESSING THE GRAY BUTTON. SELECT YES AND PRESS ENTER. VERIFY MESSAGE "PARA X LOAD NOT PROTECTED" ON THE FRONT PANEL.
2. DEPRESS THE "TRANSFER INITIATE" SWITCH ON THE SBC. UNLOCK "KS" AND REMOVE KEY "A".
3. INSERT KEY "A" INTO CB1. UNLOCK AND CLOSE CB1.
4. OPEN CB2 AND LOCK OPEN.
5. REMOVE KEY "B" FROM CB2.
6. INSERT KEY "B" INTO KEY INTERLOCK "KS" AND TURN TO LOCK.
7. THE LOAD IS SUPPLIED BY THE MAINTENANCE BYPASS. THE UPS MODULES OUTPUTS ARE ISOLATED FROM THE LOAD BUT NOT FROM EACH OTHER. TO ISOLATE THE UPS MODULES OUTPUTS FROM EACH OTHER, TRANSFER 'SR1' ROTARY SWITCH IN EACH UPS MODULE FROM 'NORMAL' POSITION TO 'ISOLATED TRANSFER' POSITION AND IF THE OPTIONAL INDIVIDUAL OUTPUT ISOLATION CBs ARE INSTALLED - OPEN CB11, CB12, CB13 AND CB14.
8. TURN OFF ALL INPUTS TO THE UPS MODULES. OPEN BATTERY CIRCUIT BREAKER(S) (QF1) OF EACH UPS IN THE SYSTEM. THE UPS MODULES ARE READY FOR MAINTENANCE.

C. RETURNING TO UPS OPERATION

1. APPLY BYPASS AND INPUT POWER TO EACH OF THE UPS MODULES.
2. IN EACH UPS MODULE ROTATE 'SR1' ROTARY SWITCH TO 'NORMAL' POSITION. IF THE UNIT REQUIRES VALIDATE, PRESS YES TO VALIDATE ON THE FRONT PANEL. UPS WILL RESTART.
3. TRANSFER EACH UPS MODULE TO STATIC SWITCH BY PRESSING THE GRAY BUTTON. SELECT YES AND PRESS ENTER. VERIFY THAT EACH UPS MODULE IS IN STATIC BYPASS MODE.
4. CLOSE CB11, CB12, CB13 AND CB14 (IF INSTALLED) TO CONNECT THE UPS MODULES OUTPUTS TO EACH OTHER.
5. DEPRESS THE "TRANSFER INITIATE" SWITCH ON THE SBC. UNLOCK "KS" AND REMOVE KEY "B".
6. INSERT THE KEY "B" INTO CB2. UNLOCK AND CLOSE CB2.
7. OPEN CB1 AND LOCK OPEN. REMOVE KEY "A".
8. INSERT KEY "A" INTO KEY INTERLOCK "KS" AND TURN TO LOCK.
9. CLOSE ALL BATTERY CIRCUIT BREAKER(S) (QF1).
10. IN EACH UPS MODULE, PUSH THE GREEN "INVERTER ON" BUTTON TO START THE INVERTER. VERIFY THAT ALL THE UPS MODULES ARE IN INVERTER MODE AND THAT ALL ERROR CODES ARE CLEARED.

04-45128-05

5.4.4 SBC 2CB with Mechanical Interlock Operating Instructions (04-45128-06). See page 6—3 for single line.

PARALLEL UPS SYSTEM – SBC 2 CB MECHANICAL INTERLOCK OPERATING INSTRUCTIONS

A. NORMAL OPERATION

1. CB1 (MAINTENANCE BYPASS) IS LOCKED OPEN. NO KEY IS CAPTIVE. (KEY "A" IS HELD BY THE SUPERVISOR)
2. CB2 (UPS OUTPUT ISOLATION) IS CLOSED. THE KEY "B" IS CAPTIVE.
3. THE UPS MODULE IS SUPPLYING POWER TO CRITICAL LOAD.

B. TRANSFER TO MAINTENANCE BYPASS

1. TRANSFER EACH UPS MODULE IN THE PARALLEL SYSTEM TO STATIC BYPASS BY PRESSING THE GRAY BUTTON. SELECT YES AND PRESS ENTER. VERIFY MESSAGE "PARA X LOAD NOT PROTECTED" ON THE FRONT PANEL.
2. INSERT KEY "A" INTO CB1. UNLOCK AND CLOSE CB1.
3. OPEN CB2 AND LOCK OPEN.
4. REMOVE KEY "B" FROM CB2.
5. THE LOAD IS SUPPLIED BY THE MAINTENANCE BYPASS. THE UPS MODULES OUTPUTS ARE ISOLATED FROM THE LOAD BUT NOT FROM EACH OTHER. TO ISOLATE THE UPS MODULES OUTPUTS FROM EACH OTHER, TRANSFER 'SR1' ROTARY SWITCH IN EACH UPS MODULE FROM 'NORMAL' POSITION TO 'ISOLATED TRANSFER' POSITION AND IF THE OPTIONAL INDIVIDUAL OUTPUT ISOLATION CBs ARE INSTALLED - OPEN CB11, CB12, CB13 AND CB14.
6. TURN OFF ALL INPUTS TO THE UPS MODULES. OPEN BATTERY CIRCUIT BREAKER (QF1) OF EACH UPS IN THE SYSTEM. THE UPS MODULES ARE READY FOR MAINTENANCE.

C. RETURNING TO UPS OPERATION

1. APPLY BYPASS AND INPUT POWER TO EACH OF THE UPS MODULES.
2. IN EACH UPS MODULE ROTATE 'SR1' ROTARY SWITCH TO 'NORMAL' POSITION. IF THE UNIT REQUIRES VALIDATE, PRESS YES TO VALIDATE ON THE FRONT PANEL. UPS WILL RESTART.
3. TRANSFER EACH UPS MODULE TO STATIC SWITCH BY PRESSING THE GRAY BUTTON. SELECT YES AND PRESS ENTER. VERIFY THAT EACH UPS MODULE IS IN STATIC BYPASS MODE.
4. CLOSE CB11, CB12, CB13 AND CB14 (IF INSTALLED) TO CONNECT THE UPS MODULES OUTPUTS TO EACH OTHER.
5. INSERT THE KEY "B" INTO CB2. UNLOCK AND CLOSE CB2.
6. OPEN CB1 AND LOCK OPEN. REMOVE KEY "A".
7. CLOSE ALL BATTERY CIRCUIT BREAKER(S) (QF1).
8. IN EACH UPS MODULE, PUSH THE GREEN "INVERTER ON" BUTTON TO START THE INVERTER. VERIFY THAT ALL THE UPS MODULES ARE IN INVERTER MODE AND THAT ALL ERROR CODES ARE CLEARED.

04-45128-06

5.4.5 SBC 3CB with Electrical Interlock Operating Instructions (04-45129-05). See page 6—5 for single line.

PARALLEL UPS SYSTEM – SBC 3 CB ELECTRICAL INTERLOCK OPERATING INSTRUCTIONS

A. NORMAL OPERATION

1. CB1 (MAINTENANCE BYPASS) IS LOCKED OPEN. NO KEY IS CAPTIVE.
2. CB2 (UPS OUTPUT ISOLATION) IS CLOSED. THE KEY "B" IS CAPTIVE.
3. CB3 (BYPASS INPUT ISOLATION) IS CLOSED.
3. KEY "A" IS CAPTIVE IN KEY INTERLOCK "KS"
4. THE UPS MODULE IS SUPPLYING POWER TO CRITICAL LOAD.

B. TRANSFER TO MAINTENANCE BYPASS

1. TRANSFER EACH UPS MODULE IN THE PARALLEL SYSTEM TO STATIC BYPASS BY PRESSING THE GRAY BUTTON. SELECT YES AND PRESS ENTER. VERIFY MESSAGE "PARA X LOAD NOT PROTECTED" ON THE FRONT PANEL.
2. DEPRESS THE "TRANSFER INITIATE" SWITCH ON THE SBC. UNLOCK "KS" AND REMOVE KEY "A".
3. INSERT KEY "A" INTO CB1. UNLOCK AND CLOSE CB1.
4. OPEN CB2 AND LOCK OPEN.
5. REMOVE KEY "B" FROM CB2.
6. INSERT KEY "B" INTO KEY INTERLOCK "KS" AND TURN TO LOCK.
7. THE LOAD IS SUPPLIED BY THE MAINTENANCE BYPASS. THE UPS MODULES OUTPUTS ARE ISOLATED FROM THE LOAD BUT NOT FROM EACH OTHER. TO ISOLATE THE UPS MODULES OUTPUTS FROM EACH OTHER, TRANSFER 'SR1' ROTARY SWITCH IN EACH UPS MODULE FROM 'NORMAL' POSITION TO 'ISOLATED TRANSFER' POSITION AND IF THE OPTIONAL INDIVIDUAL OUTPUT ISOLATION CBs ARE INSTALLED – OPEN CB11, CB12, CB13 AND CB14. 8. OPEN CB3 TO DISCONNECT BYPASS FROM ALL THE MODULES IN THE SYSTEM. 9. FOR UPS MODULES WITH DUAL INPUT – TURN OFF THE INPUTS TO ALL UPS MODULES. 10. OPEN BATTERY CIRCUIT BREAKER (QF1) OF EACH UPS IN THE SYSTEM. 11. THE UPS MODULES ARE READY FOR MAINTENANCE.

C. RETURNING TO UPS OPERATION

1. CLOSE CB3 TO APPLY BYPASS TO ALL MODULES IN THE SYSTEM.
2. FOR UPS MODULES WITH DUAL INPUT – APPLY THE INPUTS TO ALL THE UPS MODULES.
3. IN EACH UPS MODULE ROTATE 'SR1' ROTARY SWITCH TO 'NORMAL' POSITION. IF THE UNIT REQUIRES VALIDATE, PRESS YES TO VALIDATE ON THE FRONT PANEL. UPS WILL RESTART.
4. TRANSFER EACH UPS MODULE TO STATIC SWITCH BY PRESSING THE GRAY BUTTON. SELECT YES AND PRESS ENTER. VERIFY THAT EACH UPS MODULE IS IN STATIC BYPASS MODE.
5. CLOSE CB11, CB12, CB13 AND CB14 (IF INSTALLED) TO CONNECT THE UPS MODULES OUTPUTS TO EACH OTHER.
6. DEPRESS THE "TRANSFER INITIATE" SWITCH ON THE SBC. UNLOCK "KS" AND REMOVE KEY "B".
7. INSERT THE KEY "B" INTO CB2. UNLOCK AND CLOSE CB2.
8. OPEN CB1 AND LOCK OPEN. REMOVE KEY "A".
9. INSERT KEY "A" INTO KEY INTERLOCK "KS" AND TURN TO LOCK.
10. CLOSE ALL BATTERY CIRCUIT BREAKER(S) (QF1).
11. IN EACH UPS MODULE, PUSH THE GREEN "INVERTER ON" BUTTON TO START THE INVERTER. VERIFY THAT ALL THE UPS MODULES ARE IN INVERTER MODE AND THAT ALL ERROR CODES ARE CLEARED.

04-45129-05

5.4.6 SBC 3CB with Mechanical Interlock Operating Instructions (04-45129-06). See page 6—5 for single line.

PARALLEL UPS SYSTEM – SBC 3 CB MECHANICAL INTERLOCK OPERATING INSTRUCTIONS

A. NORMAL OPERATION

1. CB1 (MAINTENANCE BYPASS) IS LOCKED OPEN. NO KEY IS CAPTIVE. (KEY "A" IS HELD BY THE SUPERVISOR)
2. CB2 (UPS OUTPUT ISOLATION) IS CLOSED. THE KEY "B" IS CAPTIVE.
3. CB3 (BYPASS INPUT ISOLATION) IS CLOSED.
4. THE UPS MODULE IS SUPPLYING POWER TO CRITICAL LOAD.

B. TRANSFER TO MAINTENANCE BYPASS

1. TRANSFER EACH UPS MODULE IN THE PARALLEL SYSTEM TO STATIC BYPASS BY PRESSING THE GRAY BUTTON. SELECT YES AND PRESS ENTER. VERIFY MESSAGE "PARA X LOAD NOT PROTECTED" ON THE FRONT PANEL.
2. INSERT KEY "A" INTO CB1. UNLOCK AND CLOSE CB1.
3. OPEN CB2 AND LOCK OPEN.
4. REMOVE KEY "B" FROM CB2.
5. THE LOAD IS SUPPLIED BY THE MAINTENANCE BYPASS. THE UPS MODULES OUTPUTS ARE ISOLATED FROM THE LOAD BUT NOT FROM EACH OTHER. TO ISOLATE THE UPS MODULES OUTPUTS FROM EACH OTHER, TRANSFER 'SR1' ROTARY SWITCH IN EACH UPS MODULE FROM 'NORMAL' POSITION TO 'ISOLATED TRANSFER' POSITION AND IF THE OPTIONAL INDIVIDUAL OUTPUT ISOLATION CBs ARE INSTALLED - OPEN CB11, CB12, CB13 AND CB14.
6. OPEN CB3 TO DISCONNECT BYPASS FROM ALL THE MODULES IN THE SYSTEM.
7. FOR UPS MODULES WITH DUAL INPUT - TURN OFF THE INPUTS TO ALL UPS MODULES.
8. OPEN BATTERY CIRCUIT BREAKER (QF1) OF EACH UPS IN THE SYSTEM.
9. THE UPS MODULES ARE READY FOR MAINTENANCE.

C. RETURNING TO UPS OPERATION

1. CLOSE CB3 TO APPLY BYPASS TO ALL MODULES IN THE SYSTEM.
2. FOR UPS MODULES WITH DUAL INPUT - APPLY THE INPUTS TO ALL THE UPS MODULES.
3. IN EACH UPS MODULE ROTATE 'SR1' ROTARY SWITCH TO 'NORMAL' POSITION. IF THE UNIT REQUIRES VALIDATE, PRESS YES TO VALIDATE ON THE FRONT PANEL. UPS WILL RESTART.
4. TRANSFER EACH UPS MODULE TO STATIC SWITCH BY PRESSING THE GRAY BUTTON. SELECT YES AND PRESS ENTER. VERIFY THAT EACH UPS MODULE IS IN STATIC BYPASS MODE.
5. CLOSE CB11, CB12, CB13 AND CB14 (IF INSTALLED) TO CONNECT THE UPS MODULES OUTPUTS TO EACH OTHER.
6. INSERT THE KEY "B" INTO CB2. UNLOCK AND CLOSE CB2.
7. OPEN CB1 AND LOCK OPEN. REMOVE KEY "A".
8. CLOSE ALL BATTERY CIRCUIT BREAKER(S) (QF1).
9. IN EACH UPS MODULE, PUSH THE GREEN "INVERTER ON" BUTTON TO START THE INVERTER. VERIFY THAT ALL THE UPS MODULES ARE IN INVERTER MODE AND THAT ALL ERROR CODES ARE CLEARED.

04-45129-06

5.7 Replacement Parts List for Galaxy 3000

There are no user serviceable parts inside the Galaxy 3000.

Four levels of replacement parts are available for the Galaxy 3000. These levels are designated A, B, C or D. The level that you should keep on hand for your installation will vary depending on the type of maintenance planned on site and the configuration of your Galaxy 3000. Having replacement parts on hand will prevent unacceptable delays due to time involved obtaining spare parts during critical periods, such as system startup. Any items used during startup will be replaced by MGE at no charge. Call MGE UPS SYSTEMS, INC. Customer Care Center 1-800-438-7373 (Hours: 24/7) to arrange for service and specific recommendations.

A description of each level is provided below:

Level Description

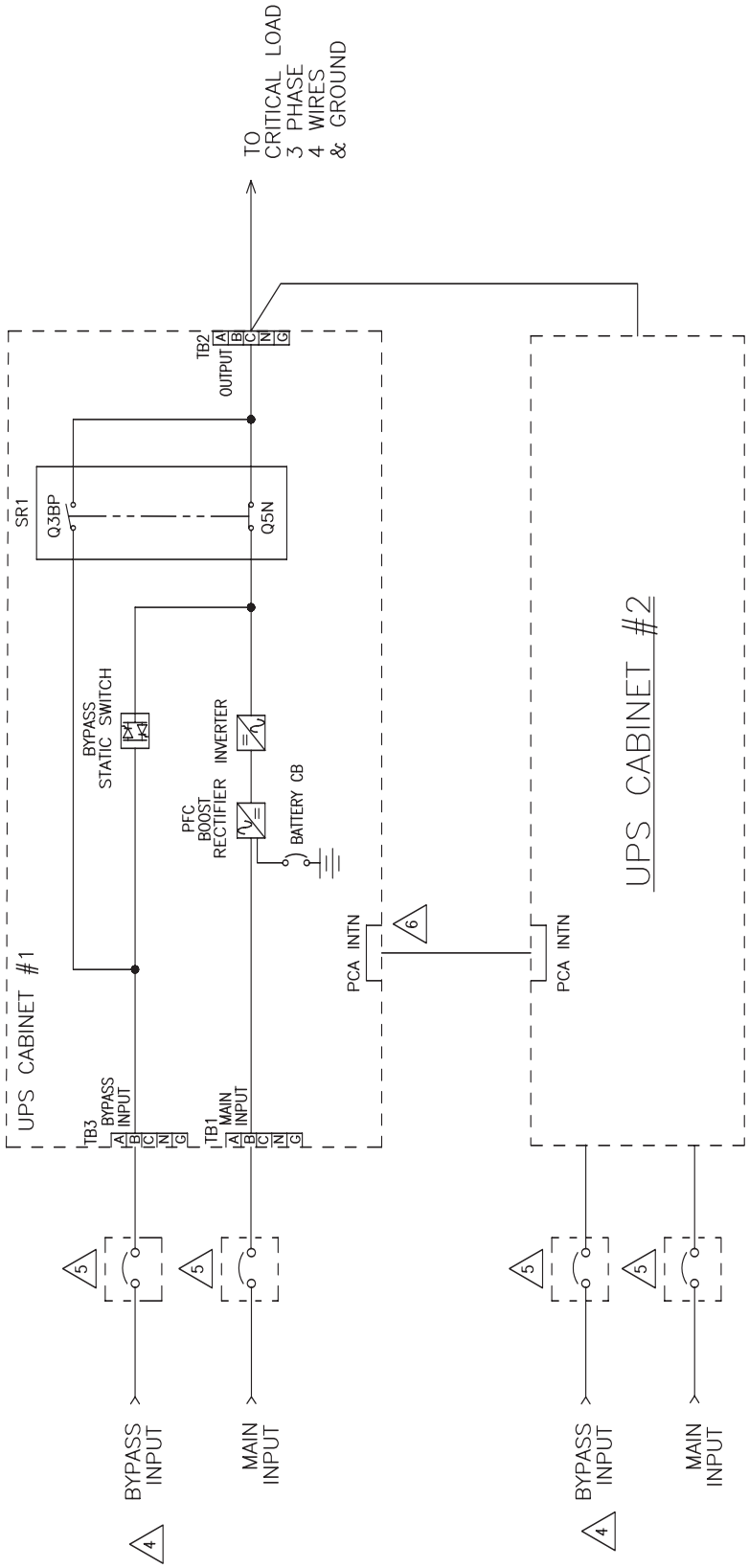
A This level of replacement parts consists of consumable items, specifically power and control fuses. It is recommended to have these items on hand during installation of the system, including startup.

B This level of replacement parts is recommended when the user can tolerate short duration system down-time to obtain replacement parts in the event of a major system failure. This level of replacement parts consists of consumable items, specifically fuses and the most critical printed-circuit assembly (PCA).

C This level of replacement parts is recommended when the user can tolerate only a minimum of down-time in the event of a major system failure. This level of replacement parts consists of consumable items, specifically fuses, and a set of critical printed-circuit assembly (PCA).

D This level of replacement parts is recommended when the user can tolerate only a minimum of down-time in the event of a major system failure. This level of replacement parts consists of consumable items, specifically fuses, and additional printed-circuit assembly (PCA).

Single Line Diagram Two Parallel UPS Modules — Dual Input With No System Bypass Cabinet (90-170831-00) Page 1



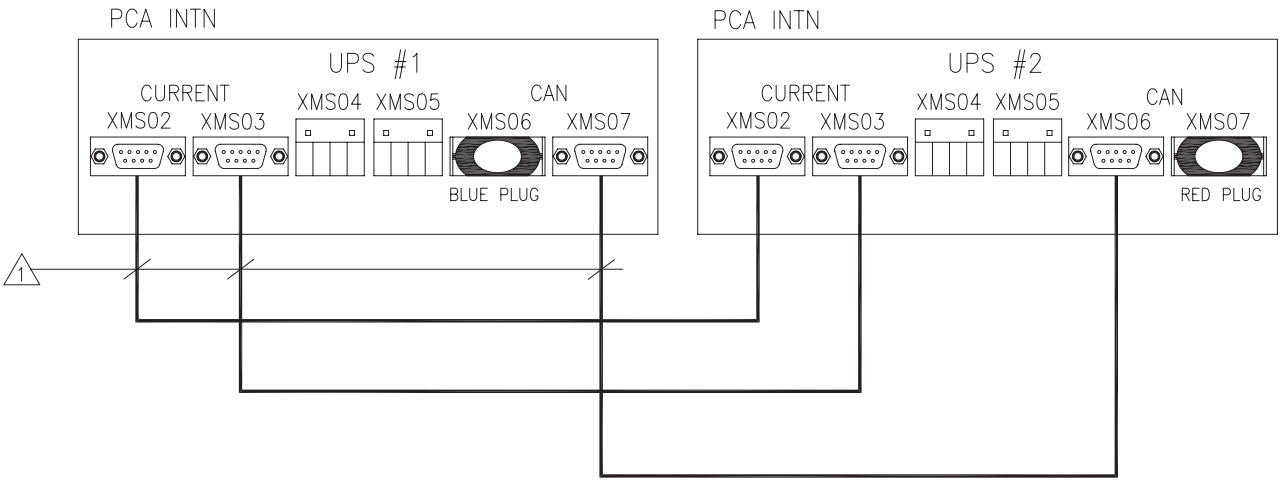
1. FOLLOW ALL APPLICABLE NEC AND LOCAL ELECTRICAL CODES.
2. ALL EXTERNAL WIRING BY OTHERS.
3. POWER AND CONTROL CABLES SHALL BE IN SEPARATE CONDUITS.

4 ALL INPUTS MUST BE FROM THE SAME SOURCE. 3 PHASE, 4 WIRES & GROUND PER UNIT.

5 UPSTREAM PROTECTIVE DEVICE REQUIRED PROVIDED BY OTHERS.

6 REFERENCE SHEET 2.

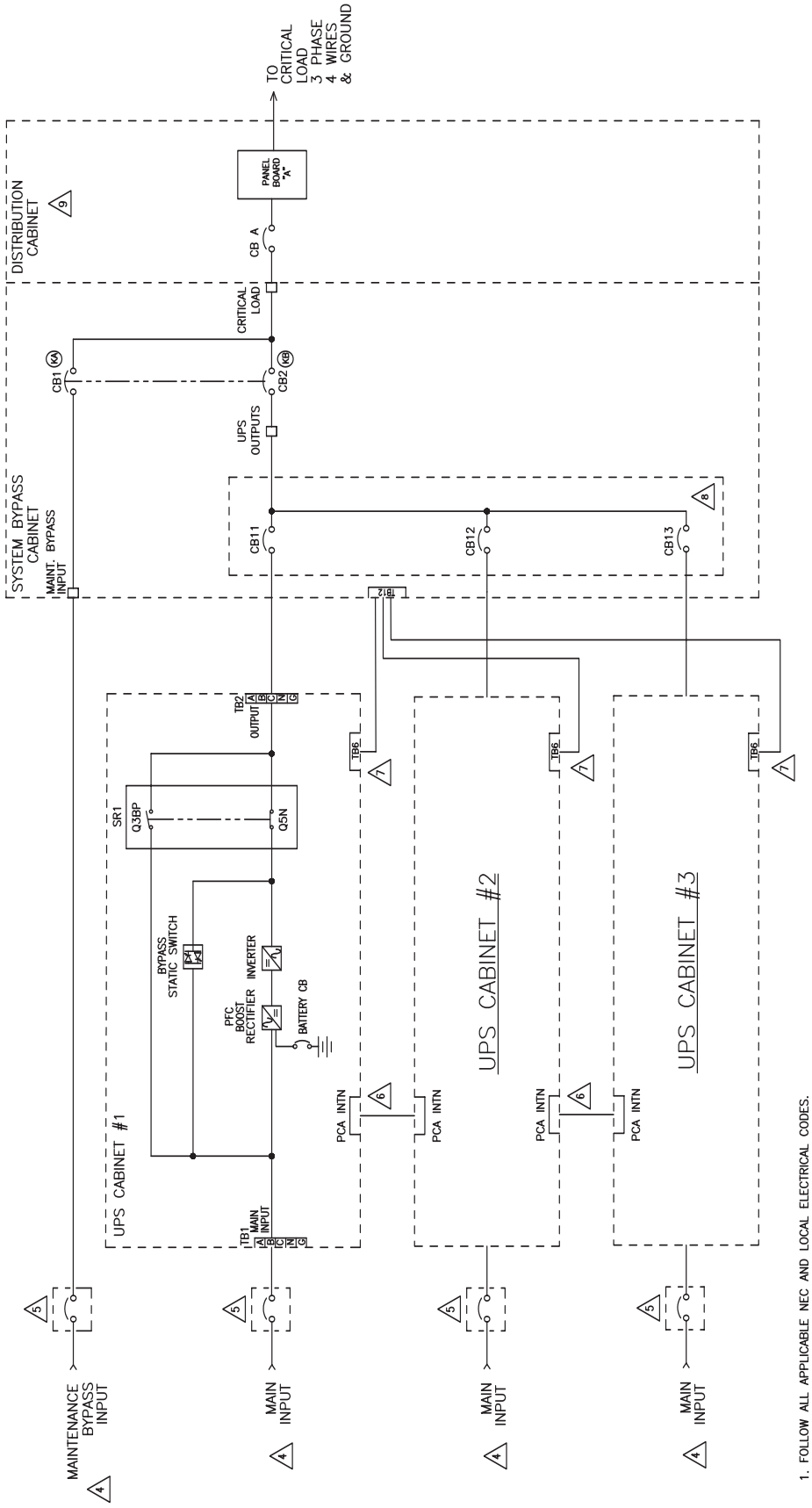
Interconnections Between UPS Units
Exchange Current and CAN BUS
(90-170831-00) Page 2



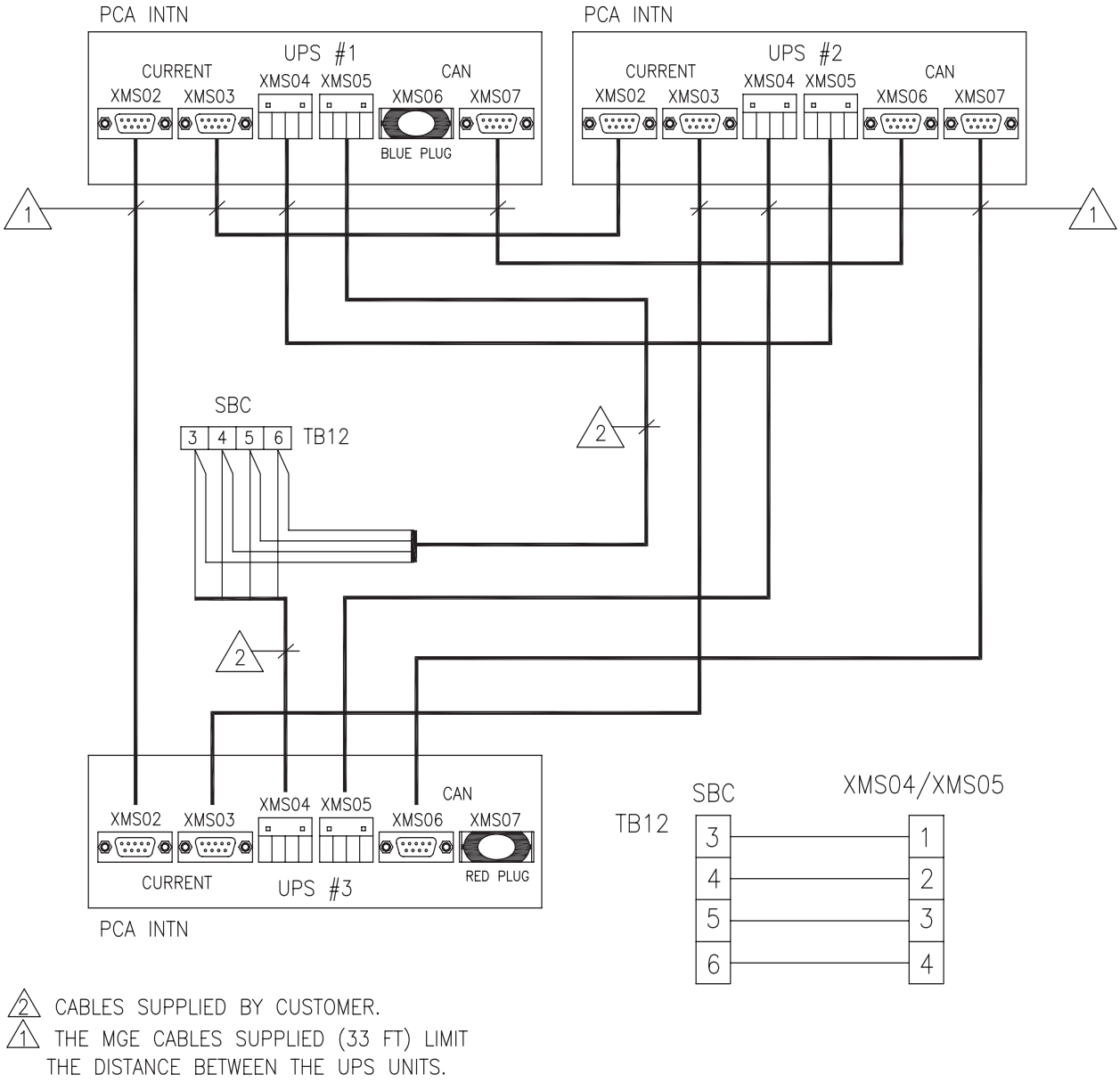
1 THE MGE CABLES SUPPLIED (33 FT) LIMIT THE DISTANCE BETWEEN THE UPS UNITS.

NOTE:

Single Line Diagram Three Parallel UPS Modules — Single Input Via 2CB System Bypass Cabinet (90-170836-00) Page 1

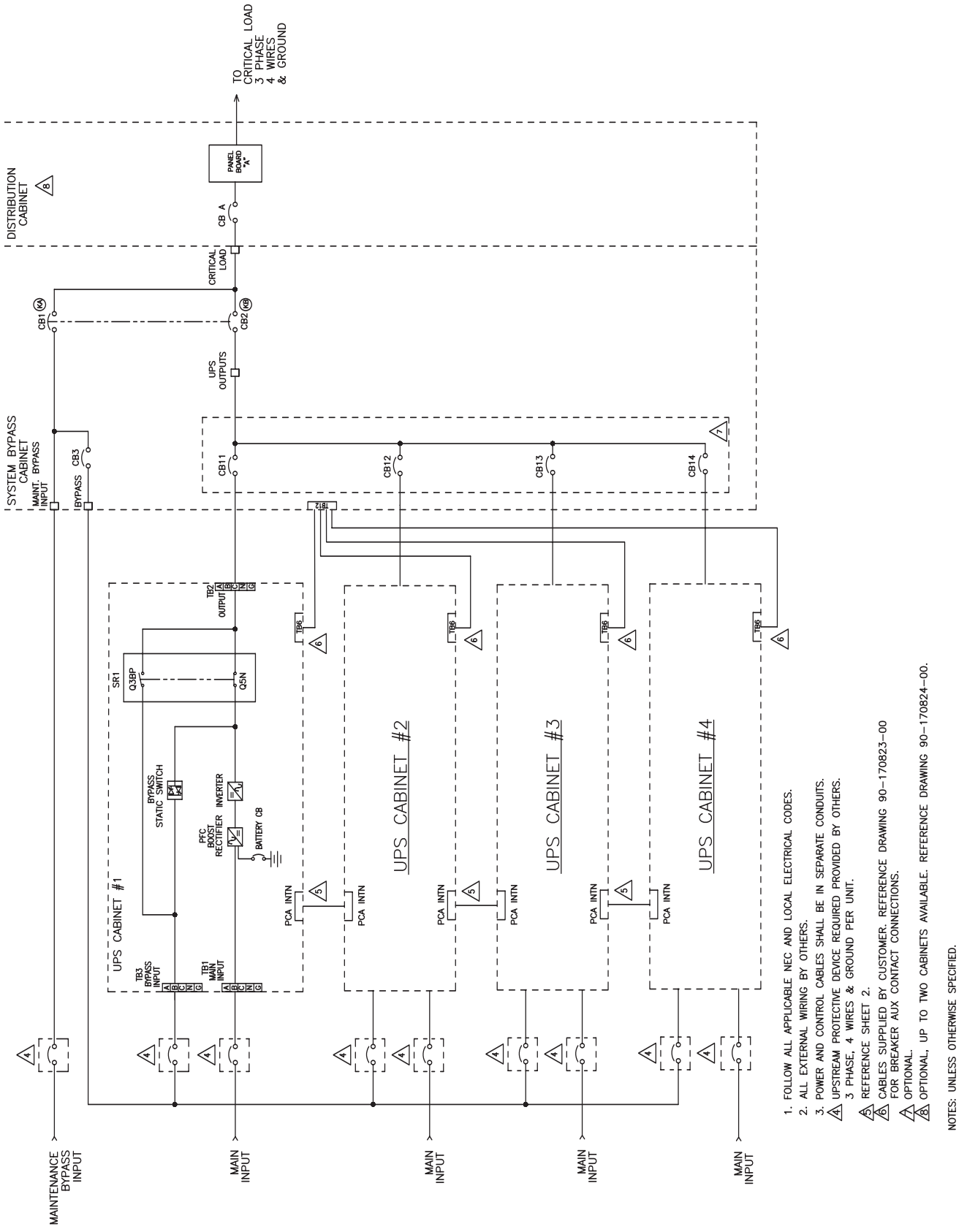


Interconnections Between UPS
Units Exchange Current and CAN BUS
Interconnections Between UPS Units to SBC
(90-170836-00) Page 2



2 CABLES SUPPLIED BY CUSTOMER.
1 THE MGE CABLES SUPPLIED (33 FT) LIMIT THE DISTANCE BETWEEN THE UPS UNITS.

Single Line Diagram Four Parallel UPS Modules — Dual Input Via 3CB System Bypass Cabinet (90-170843-00) Page 1



1. FOLLOW ALL APPLICABLE NEC AND LOCAL ELECTRICAL CODES.
2. ALL EXTERNAL WIRING BY OTHERS.
3. POWER AND CONTROL CABLES SHALL BE IN SEPARATE CONDUITS.

⚠4 UPSTREAM PROTECTIVE DEVICE REQUIRED PROVIDED BY OTHERS. 3 PHASE, 4 WIRES & GROUND PER UNIT.

⚠5 REFERENCE SHEET 2.

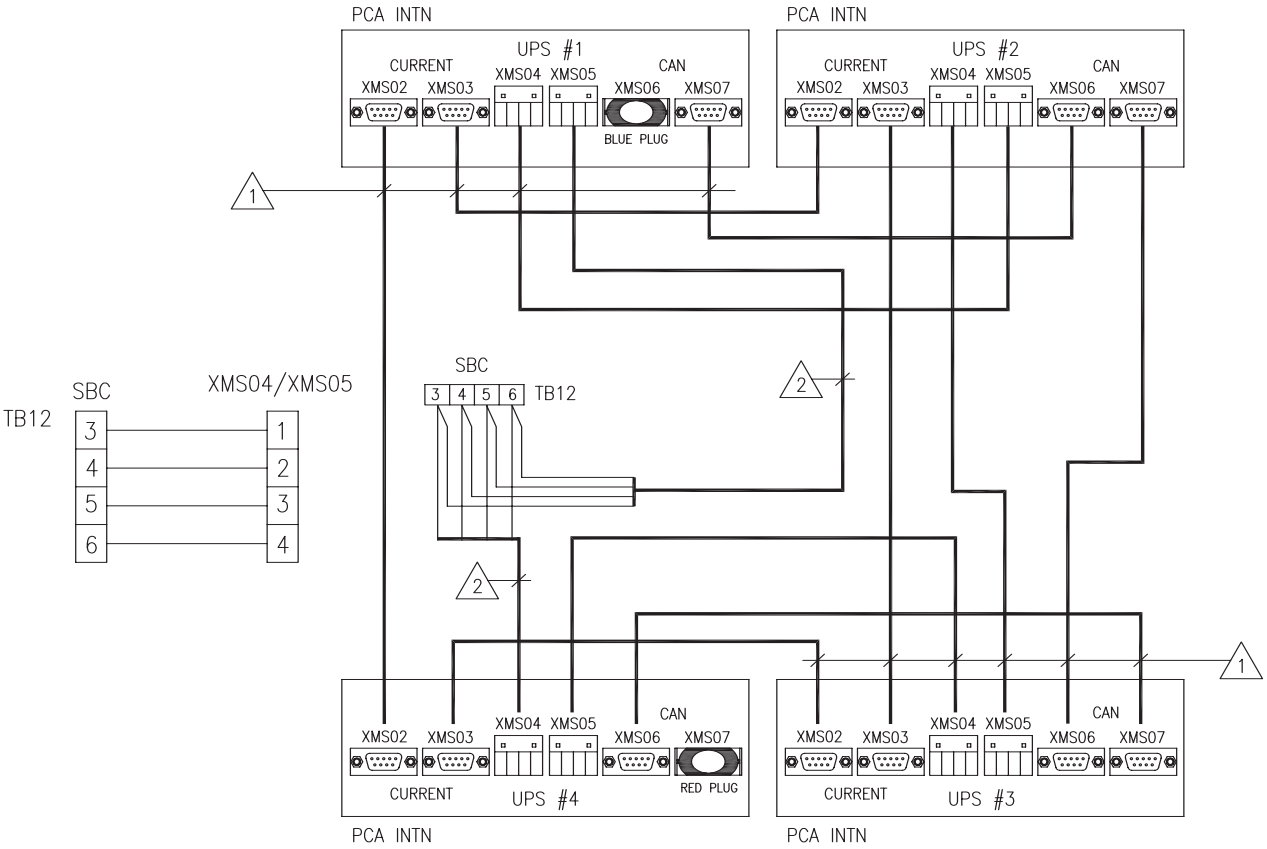
⚠6 CABLES SUPPLIED BY CUSTOMER. REFERENCE DRAWING 90-170823-00 FOR BREAKER AUX CONTACT CONNECTIONS.

⚠7 OPTIONAL.

⚠8 OPTIONAL, UP TO TWO CABINETS AVAILABLE. REFERENCE DRAWING 90-170824-00.

NOTES: UNLESS OTHERWISE SPECIFIED.

Interconnections Between UPS Units
Exchange Current and CAN BUS
Interconnections Between UPS Units to SBC
(90-170843-00) Page 2



2 CABLES SUPPLIED BY CUSTOMER.

1 THE MGE CABLES SUPPLIED (33 FT) LIMIT THE DISTANCE BETWEEN THE UPS UNITS.

NOTES:

MGE Warranty & Proprietary Rights Statement for Three Phase Products

(Applicable within the United States, Canada and Mexico)

MGE Standard Three Phase Warranty

MGE UPS SYSTEMS, INC. ("MGE") warrants three phase products it manufactures to be free from defects in materials and workmanship for a period of three hundred sixty five (365) days counting from the date of purchase by or for the first end user ("Purchaser"), or, if applicable, the date of MGE's completion of initial startup of the subject product, provided however said warranty shall not exceed eighteen (18) months from the date of delivery of the subject product to Purchaser (the "Warranty Period"). MGE's liability hereunder is limited to replacing or repairing at MGE's factory or on the job site, at MGE's option, any part or parts that are defective and reported to MGE during the Warranty Period. MGE shall have the sole right to determine if the parts are to be repaired at the job site or whether they are to be returned to the factory for repair or replacement. All items returned to MGE for repair or replacement must be sent freight prepaid to its factory. Purchaser must obtain MGE's Return Goods Authorization ("RGA") prior to returning items. The conditions stated herein must be met for MGE's warranty to be valid. MGE will not be liable for any damage caused by or resulting from unauthorized repair work, unauthorized replacement parts, from any unintended application of the Three Phase Product, for damage due to accident, abuse, or act of God (such as earthquake, flood, inclement weather, rain or fire), or relating to Purchaser's failure to provide proper environmental conditions for the product.

In no event shall MGE be liable for loss, damage, or expense directly or indirectly arising from the use of or any defects in the subject product, or from any other cause, except as expressly stated in this warranty. EXCEPT AS EXPRESSLY STATED IN THIS WARRANTY, MGE MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY WARRANTY AS TO MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE OR NON-INFRINGEMENT. MGE is not liable for and Purchaser waives any right of action it has or may have against MGE for any consequential or special damages arising out of any breach of warranty, and for any damages Purchaser may claim for damage to any property or injury or death to any person arising out of its purchase or the use, operation or maintenance of the subject product. The warranty stated herein includes parts and labor; however, MGE will not be liable for any labor subcontracted or performed by Purchaser for preparation of the warranted item for return to MGE's factory or for preparation work for field repair or replacement, and MGE will not be responsible to pay any invoice therefore.

This warranty shall be exclusive of any and all other warranties express or implied and may be modified only by a writing signed by an authorized officer of MGE. This warranty shall extend to the Purchaser but to no one else. Accessories supplied by MGE, but manufactured by others, carry any warranty the manufacturers have made to MGE, and which can be passed on to the Purchaser.

MGE makes no warranty with respect to whether the products sold hereunder infringe any patent, U.S. or foreign, and Purchaser represents that any specially ordered products do not infringe any patent. Purchaser agrees to indemnify and hold MGE harmless from any liability by virtue of any patent claims where Purchaser has ordered a product design based on the Purchaser's specifications, or conforming to Purchaser's specific design.

Purchaser has not relied and shall not rely on any oral representation regarding any products sold hereunder and any oral representation shall not bind MGE and shall not be part of this or any other any warranty. There are no warranties which extend beyond the description on the face hereof. In no event shall MGE UPS SYSTEMS, INC. be responsible for consequential damages or for any other damages except as expressly stated herein.

Proprietary Rights Statement

The information in this manual is the property of MGE and represents a proprietary article in which MGE UPS SYSTEMS, INC. retains any and all intellectual property rights, including exclusive rights of use and/or manufacture and/or sale. Possession of this information does not convey any permission to reproduce, print, manufacture or have made the article or articles shown herein. Such permission may be granted only by specific written authorization signed by an authorized Officer of MGE. IBM, PC-AT, ES/9000, and AS/400 are trademarks of International Business Machines Corporation. MGE and MGE UPS SYSTEMS are trademarks of MGE UPS SYSTEMS, INC. Other trademarks that may be used herein are owned by their respective companies and are referred to in an editorial fashion only.

For Three Phase Warranty outside of the United States, Canada and Mexico, refer to Three Phase International Warranty.

February 2006 Rev C01

Warranty and Product Registration

Thank you for choosing MGE UPS SYSTEMS, INC. for your power protection, distribution, and quality requirements. We are pleased to have you join our increasing family of users.

In order to maximize the value you receive from this product, and to ensure that you are kept informed of product or software updates, we recommend that you take a few minutes to register your new purchase.

You may register online at: http://www.mgeups.com/email/warranty/menu.htm. Should you not have Internet access, you may mail or fax this form back (attn: Warranty Registration) as indicated at the bottom of this page.

Please be prepared with the following information to register and validate your product's warranty, keep informed on software and product updates, and register your extension "Warranty+" if purchased with the product. For more information and pricing on "Warranty+1" and "Warranty+3" contracts, contact the factory at (800) 438-7373.

User Information

Last Name: _____

First Name: _____

Company Name: _____

Address: _____

Zip Code: _____

City: _____

State/Province: _____

Country: _____

Tel: _____

Fax: _____

Email: _____

Product Information

Model: _____

Serial Number: _____

Date of Purchase: _____

Warranty Extension (Warranty+)

I have purchased a warranty extension (Warranty+.)

Part #: _____ Contract #: _____

Thank you from all of us at MGE.

Mail or Fax Attention: Warranty Registration

MGE UPS SYSTEMS, INC., 1660 Scenic Avenue, Costa Mesa, CA 92626, USA
Tel: 714-557-1636 Fax: 714-557-9788

5/2007

MGE Customer Care Center – Three Phase Products

Technical Support and Product Services

Technical questions? If you encounter a problem while following the instructions in this manual, or have questions about the operation, repair, or servicing of your equipment, please direct calls to MGE UPS SYSTEMS, INC. Customer Care Center or visit our web site www.mgeups.com for complete service information.

To insure that your questions are correctly answered, please obtain the serial number of the unit and include them in any discussions or correspondence.

Serial number: _____

Who To Contact

Customer Care Center: **1-800-438-7373** (Hours: 24/7)

Customer FAQ
or International calls: **1-714-557-1636**

Commitment: MGE UPS SYSTEMS, INC. is committed to providing easy to access factory trained experts that will provide responses to any questions that you might have.

Scheduling Field Service Engineer Support

Scheduling of the MGE Field Service Engineers typically should be done 7 to 10 days before they are required on-site. If the startup of the product is critical to maintaining your schedule, please call the MGE toll free telephone number at **1-800-438-7373** for assistance.

Return Policy for Repair of Three Phase Products (RGA)

Should you require factory service for your equipment, contact MGE Customer Care Center and obtain a Return Goods Authorization (RGA) prior to shipping your unit. Never ship equipment to MGE without first obtaining an RGA number.

Date: _____
RGA Number: _____
Contact Name: _____

Rev B00 8/2005

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Glossary

Term used	Definition/Meaning
@	At.
/	And/or.
+/-	Plus or Minus.
≤	Equal to or less than.
#	Number.
°C	Degree Celsius.
°F	Degree Fahrenheit.
Ø	Phase angle.
Ω	Ohm; unit of resistance.
®	Trade Mark.
2nd	Second.
AC or ac	Alternating current, also implies root-mean-square (rms).
Ambient noise	Acoustical noise of surrounding environment.
Ambient Temp.	Temperature of surrounding air.
ANSI	American National Standard Institute.
AWG	American Wire Gauge.
BTU or Btu	British thermal unit. Defined as the amount of heat required to raise the temperature of one pound of water by 1°F.
BYPASS	See “Static Transfer switch”.
BYPASS mode	See “off-line mode”.
C	Common.
Carrier	The company or individual responsible for delivering goods from one location to another.
CB	Circuit breaker.
cm	Centimeter.
Conduit	A flexible or rigid tube enclosing electrical conductors.
C.S.S.	Customer Support Service.
Current rating	The maximum current that a conductor or equipment can carry reliably without damage.
dB	Decibels.

DC	Direct current.
dBA	Decibel Adjusted.
dBrnC	Decibel above reference noise.
DC or dc	Direct current, or voltage.
Digital Meter	The LCD display on the front panel of inverter system.
Disconnect	Electrical circuit interrupter.
Earth ground	A ground circuit that has contact with the earth.
Electrician	Refers to an installation electrician qualified to install heavy-duty electrical components in accordance with local codes and regulations. Not necessarily qualified to maintain or repair electrical or electronic equipment.
FET	Field effect transistor.
Freq.	Frequency.
Frequency slew rate	The change in frequency per unit of time. Given in term of Hz per second (Hz/sec.).
GND	Ground (safety).
Hz	Hertz, frequency measurement unit, 1Hz is one cycle per second.
I	Current.
IEC	International Electrotechnical Commission.
IEEE	Institute of Electrical and Electronic Engineers.
IGBT	Insulated gate bipolar transistors.
Input branch circuit	The input circuit from the building power panel to the equipment.
Inverter	An electrical circuit that generates an AC voltage source from a DC voltage source.
Inverter mode	See “on-line” mode.
I/O	Input/Output.
I/T or IT	Information Technology.
KVA	KiloVolt-Ampere; is equal to 1000 Volt-Ampere.
L	Line.
LCD	Liquid-Crystal Display unit.
LED	Light Emitting Diode.
mA	Milliampere.
Mains or Mains 1	Main AC input source.
Mains 2	Bypass AC input source.
MAX.	Maximum.
MCM	Thousand circular mil; standard wire sizes for multiple stranded conductors over 4/0 AWG in diameter. M is from Roman numerical system indicating 1000.
Module	Refers to individual power inverter module.
N	Neutral.
NC	Normally closed.

NEC	National Electrical Code.
NFPA	National Fire Protection Association.
NO	Normally open.
On-line mode	Inverter output power is the primary energy source to load.
Off-line mode	Inverter output is off, and the load connected at the inverter output receives power from utility line via a static transfer switch or maintenance bypass relay.
OSHA	Occupational Safety and Health Agency.
PCA	Printed circuit assembly.
PCB	Printed circuit board.
PN	Part number.
PWM	Pulse Width Modulation.
SCR	Silicon controlled rectifier.
Shipping damage	Any damage done to an article while it is in transit.
SPDT	Single Pole Double Throw.
Static Transfer	An solid state switching mechanism electronically controlled to pass AC power directly from the utility to an output load.
Technician	Refers to an electronic technician qualified to maintain and repair electronic equipment. Not necessarily qualified to install electrical wiring.
Test connector	DB-9 type connector on the LCD panel allowing MGE UPS SYSTEMS Customer Support Service technician to access programmable and diagnostic features of the system.
V	Volts.
VA	Volt amperes.
VA	Volt-amps, unit for apparent power measurement, equal V x I.
VAC or Vac	Voltage of AC type.
VDC or Vdc	Voltage of DC type.
ve	Battery voltage.
Via	By way of.

Reorder Form

1660 Scenic Avenue
Costa Mesa, CA 92626

Use this form to report any errors, omissions, or other problems you have experienced, or to order additional hardcopies of this document. A free copy of this document may be downloaded from the proprietary MGE Rep Web site. Please contact your MGE UPS SYSTEMS, INC. Representative for assistance.

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Galaxy 3000 10-30 KVA

Installation and User Manual

86-172010-00 E00

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CAUTION: Record All Serial Numbers!

RECORD ALL SERIAL NUMBERS FOR THE GALAXY 3000 AND ACCESSORIES.

THESE SERIAL NUMBERS WILL BE REQUIRED IF YOUR SYSTEM NEEDS SERVICE.

KEEP THIS MANUAL IN A PLACE WHERE YOU CAN REFERENCE THE SERIAL NUMBERS IF SERVICE IS REQUIRED!

UPS SERIAL NUMBER: _____

BATTERY SERIAL NUMBER: _____

AUXILIARY SERIAL NUMBER: _____

ADDITIONAL SERIAL NUMBERS:

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

NOTES:

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