



# XM300HP™

HIGH EFFICIENCY **2** CABLE UPS®

XM2-300HP

## Technical Manual

XM2-300HP

XM2-300CE-HP

Effective: August 2020





Alpha Technologies  <sup>®</sup>

# *Power*

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# XM2-300HP Technical Manual

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Effective Date: August 2020

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**NOTE:**

Photographs contained in this manual are for illustrative purposes only. These photographs may not match your installation.



**NOTE:**

Operator is cautioned to review the drawings and illustrations contained in this manual before proceeding. If there are questions regarding the safe operation of this powering system, please contact Alpha Technologies or your nearest Alpha representative.



**NOTE:**

Alpha shall not be held liable for any damage or injury involving its enclosures, power supplies, generators, batteries, or other hardware if used or operated in any manner or subject to any condition not consistent with its intended purpose, or is installed or operated in an unapproved manner, or improperly maintained.

## **Notice of FCC Compliance**

**Per FCC 47 CFR 15.21:**

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**Per FCC 47 CFR 15.105:**

This equipment when installed in an Alpha enclosure has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



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# Safety Notes

Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of the system, contact Alpha Technologies or the nearest Alpha representative. Save this document for future reference.

To reduce the risk of injury or death, and to ensure the continued safe operation of this product, the following symbols have been placed throughout this manual. Where these symbols appear, use extra care and attention.

## ATTENTION:

The use of ATTENTION indicates specific regulatory/code requirements that may affect the placement of equipment and /or installation procedures.



## NOTE:

A NOTE provides additional information to help complete a specific task or procedure.



## CAUTION!

The use of CAUTION indicates safety information intended to PREVENT DAMAGE to material or equipment.



## WARNING!

WARNING presents safety information to PREVENT INJURY OR DEATH to the technician or user.

# Safety Precautions

- Only qualified personnel may service the XM2-300HP CableUPS®.
- Verify the voltage requirements of the equipment to be protected (load), the AC input voltage to the power supply (line), and the output voltage of the system prior to installation.
- Equip the utility service panel with a properly rated circuit breaker for use with this power supply.
- When connecting the load, DO NOT exceed the output rating of the power supply.
- Always use proper lifting techniques whenever handling units, modules or batteries.
- The XM2-300HP Power Supply contains more than one live circuit! Even though AC voltage is not present at the input, voltage may still be present at the output.
- If batteries are being stored prior to installation, recharge per manufacturer's specifications to ensure optimum performance and maximum battery service life.
- Reduce the chance of spark and wear on the connectors; always switch the inverter's battery circuit breaker off before connecting or disconnecting the battery pack
- The battery pack, which provides backup power, contains dangerous voltages. Only qualified personnel should inspect or replace a battery.
- In the event of a short-circuit, batteries present a risk of electrical shock and burns from high current. Observe proper safety precautions.
- Always wear protective clothing, insulated gloves and eye protection (i.e. safety glasses or a face shield) whenever working with batteries.
- Always carry a supply of water, such as a water jug, to wash the eyes or skin in the event of exposure to battery electrolyte.




## Safety Precautions, continued

- Do not allow live battery wires to contact the enclosure chassis. Shorting battery wires can result in a fire or possible explosion.
- Always replace batteries with those of an identical type and rating. Never install old or untested batteries.
- Avoid using uninsulated tools or other conductive materials when handling batteries or working inside the enclosure.
- Remove all rings, watches and other jewelry before servicing batteries.
- Spent or damaged batteries are environmentally unsafe. Always recycle used batteries. Refer to local codes for proper disposition of batteries
- The XM2-300HP has been investigated by regulatory authorities for use in various Alpha enclosures. If you are using a non-Alpha enclosure, it is your responsibility to ensure your combination conforms to your local regulatory requirements, and that the XM2-300HP power supply remains within its environmental specifications.

## Battery Safety Notes

- Always refer to the battery manufacturer's recommendation for selecting correct "FLOAT" and "ACCEPT" charge voltages. Failure to do so can damage the batteries.
- Verify the Power Supply's battery charger "FLOAT" and "ACCEPT" charger voltage settings.
- Batteries are temperature sensitive. During extremely cold conditions, a battery's charge acceptance is reduced and requires a higher charge voltage; during extremely hot conditions, a battery's charge acceptance is increased and requires a lower charge voltage. To compensate for changes in temperature, the battery charger used in the power supply is temperature compensating.
- If the batteries appear to be overcharged or undercharged, first check for defective batteries and then verify the correct charger voltage settings.
- To ensure optimum performance, inspect batteries every three to six months for signs of cracking, leaking or unusual swelling (note that some swelling is normal).
- Check battery terminals and connecting wires. Clean battery terminal connectors periodically and retighten to approximately 110 inch-pounds (or to manufacturer's specifications if not AlphaCell). Spray the terminals with an approved battery terminal coating such as NCP-2.
- Check battery voltages UNDER LOAD. Use a load tester if available.
- Refer to the battery manufacturer's recommendation for correct charger voltages and the power supply operation manual for corresponding charger settings.
- Establish and maintain a battery maintenance log.

 **NOTE:**  
Always verify proper polarity of cables before connecting the batteries to the power module. The batteries are clearly marked for polarity. If the cables become interchanged at the battery the power supply will not operate in inverter mode.



# Utility Power Connection Notes

## ATTENTION:

Connecting to the utility should be performed only by qualified service personnel and in compliance with local electrical codes. Connection to utility power must be approved by the local utility before installing the power supply.

UL and NEC require that a service disconnect switch (UL listed) be provided by the installer and be connected between the power source and the ALPHA power supply. Connection to the power supply must include an appropriate service entrance weather head.



## NOTE:

In order to accommodate the high-inrush currents normally associated with the start-up of active load transformers (400 Amp, no-trip, first-half cycle), either a “high-magnetic” or an HACR (Heating, Air Conditioning, Refrigeration) trip breaker must be used. Do not replace these breakers with a conventional service entrance breaker. Alpha recommends ONLY Square D breakers because of the increased reliability required in this powering application. High-magnetic Square D circuit breakers and a BBX option (UL Listed service entrance) are available from Alpha Technologies.

Description	Alpha Part Number	Square D Part Number
120V Installation - High-magnetic (20A)	470-017-10	QO120HM
BBX - External Service Disconnect	020-085-10	QO2 -4L70RB
BBX - External Service Disconnect	020-141-10	QO8-16L100RB

## ATTENTION:

In most cases, the following configurations qualify for service entrance use when wiring a duplex receptacle to a service disconnect. Other codes may also apply. Always contact your local utility to verify that the wiring conforms to applicable codes.

## XM2-300HP Connections

### Proper 120Vac 20A service requires the installation site be:

- Equipped with a 120Vac duplex receptacle which provides power to the power supply and peripheral equipment.
- Have a NEMA 5-20R receptacle is protected by a single-pole, 20 Amp High Magnetic (HM) circuit breaker inside the service entrance.
- Checked NEC CODE to verify proper wire AWG (suggested wire gauge is 12AWG).
- Equipped with a grounding clamp, on the enclosure, to facilitate dedicated grounding.



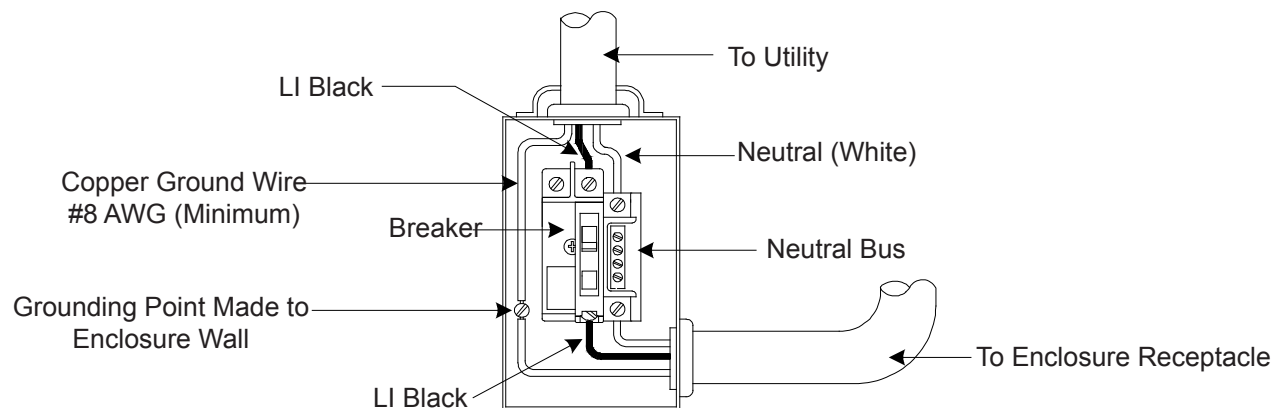
## NOTE:

When bonding the box to a neutral plate is required, use the long green bonding screw provided (Alpha P/N 523-011-10, Square D P/N 40283-371-50).

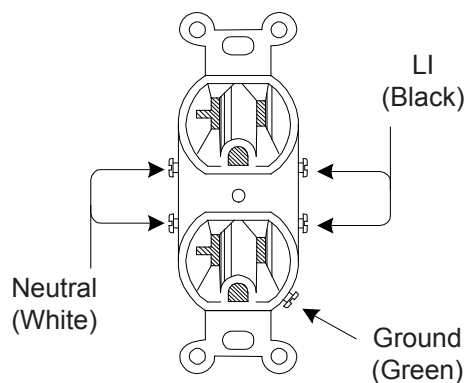


## Utility Connection Notes, continued

Typical 120Vac Service Entrance Wiring



Typical 120Vac 20A Receptacle Wiring, 5-20R



(P/N 531-006-10)



### NOTE:

When bonding the box to a neutral plate is required, use the long green bonding screw provided (Alpha P/N 523-011-10, Square D P/N 40283-371-50).



# Grounding and Earth Connection Notes

In order to provide a ready, reliable source of backup power it is necessary to connect the power supply to an effective grounding and Earthing system that not only provides for the safety of the service personnel responsible for its operation and maintenance, but also facilitates the proper operation and protection of the equipment within the network. Such a grounding system provides protection with respect to operator safety, system communication and equipment protection.

Lightning strikes, grid switching or other aberrations on the power line and/or communications cable have the potential to cause high-energy transients that can damage the powering or communications systems. The most viable method available to protect the system from damage is to divert these unwanted high-energy transients along a low-impedance path to Earth. A low-impedance path to Earth prevents these currents from reaching high voltage levels and posing a threat to equipment.

The key to the success of lightning protection is single-point grounding so the components of the grounding system appear as a single point of uniform impedance. Two places recommended by Alpha for single-point grounding are connections in the enclosure and connections to Earth. Single-point grounding in the enclosure is achieved by bonding all electrical connections to the enclosure, including the connection to Earth, as close together on the enclosure as possible. Single-point grounding for the connection to Earth is achieved, for example, by the proper bonding of the ground rods.

## Safety Ground and Earth Connection

The safety ground and Earth is a two-part system, comprised of the utility service and the Alpha system.

### 1. First, utility service;

As a minimum requirement for the protection of Alpha equipment, the local utility service must provide a low-impedance path for fault current return. In addition, there must be a low impedance bonded path between the Alpha Power Supply power plug Ground Pin and the Enclosure.

### 2. Second, the Alpha grounding system;

The Alpha grounding system consists of a low-impedance connection between the enclosure and an Earth Ground (located at least 6' away from the Utility Earth connection).

This impedance between the enclosure and Earth must be 25 Ohms or less at 60 Hertz as measured by AMPROBE Model DGC-1000 or equivalent. The measurement should be made on the wire or ground rod after it exits the enclosure.

Local soil conditions will determine the complexity of the grounding system required to meet the 25 Ohm (maximum) resistance specified above. For example, a single 8' ground rod may be sufficient to meet the requirement. In some cases, a more elaborate system may be required such as multiple ground rods connected by a #6AWG solid copper cable buried 8-12" below the surface. Where this is not possible, contact a local grounding system expert for alternate methods that will meet the 25 Ohm (maximum) specification.

**All ground rod connections must be made by means of a listed grounding clamp suitable for direct burial or exothermic welding.**

## Power Output Return

For proper operation, the Service Power Inserter (SPI) must be securely bonded to the enclosure.

## Communications Grounding

For an external status monitoring transponder, the transponder chassis is typically bonded via a separate ground wire to the enclosure. For systems using an embedded transponder, the grounding connection is typically made either through a separate chassis ground block bonded to the enclosure, or by means of the internal mounting hardware which bonds the transponder through the XM2-300HP. Please refer to the appropriate Communications product manual for installation procedures.

Alpha strongly recommends on communication cables the use of a surge arresting device electrically bonded to the Alpha Enclosure.



### WARNING!

Low impedance grounding is **mandatory for personnel safety** and critical for the proper operation of the cable system.



# 1.0 Introduction to the XM2-300HP

The XM2-300HP powers signal processing equipment in cable television and broadband LAN distribution systems. The XM2-300HP provides a critical load with current-limited, regulated AC power that is free of spikes, surges, sags and noise.

During AC line operation, AC power entering the power supply is regulated by a multi-tap transformer at the required output voltage. The regulated voltage is connected to the load via the output connectors, and some power is directed to the battery charger to maintain a float charge on the batteries.

When the incoming AC line voltage significantly deviates from normal, the XM2-300HP inverter module automatically switches to standby operation and maintains power to the load. In standby mode, the XM2-300HP powers the load until the battery voltage reaches a low-battery cutoff point.

When utility power returns, the XM2-300HP transformer module waits a short time (approximately 20 to 40 seconds) for the utility voltage and frequency to stabilize and then initiates a smooth, in-phase transfer back to AC line power. Once the transfer is complete, the battery charger recharges the batteries in preparation for the next event.



## NOTE:

The duration of battery-backed standby operation depends upon the type and number of batteries and the load on the power supply.

The XM2-300HP contains an impressive list of features, including:

- Smart Display
- Built-in self test (with inverter diagnostics)
- Battery test (advanced battery diagnostics)
- Protective Interface Module (PIM) (factory installed option)
- A high efficiency transformer
- Improved Status menus
- Communications menu with DOCSIS® parameters

Using the Smart Display, the operator can view all of the power supply's operating parameters. Automatic scrolling (AUTO-SCROLL) is always active so there is no need to press any buttons to view the power supply's status or system parameters. In place of operating parameters, active alarms automatically indicate in the Smart Display so the operator can immediately see what fault is being detected. Troubleshooting tips automatically display in the **Alarm** menu screen.

The built-in metering circuits measure voltage and current, without the need for external test equipment.

The Protective Interface Module (PIM) option allows the XM2-300HP CableUPS to provide programmable current limits for two output channels.



## 1.0 Introduction to the XM2-300HP, continued

### 1.1 Theory of Operation

The modular XM2-300HP is composed of the:

- Chassis, which contains a transformer and transfer isolation relay.
- Inverter module, which is required for standby operations and contains circuitry needed for the three-stage temperature-compensated battery charger, DC to AC converter (inverter), AC line detectors and Smart Display.
- Optional communications module (DPM), used to provide external status monitoring and communications.



Fig. 1-1, XM2-300HP

#### 1.1.1 AC (Line) Operation

During AC Line operation, utility power is routed into the primary winding of the transformer through the contacts of the line isolation relay and voltage selection relays. Simultaneously, in the inverter, power is directed to the rectifier circuitry providing power for the control circuitry. The bidirectional inverter also serves as a battery charger during line operation. The transformer and automatic tap relays provide output voltage regulation.



## 1.1 Theory of Operation, continued

### 1.1.2 Standby Operation

When the incoming AC line voltage drops or rises significantly, or a complete power outage occurs, the control logic's line monitor activates standby operation. During the transfer from AC line to standby operation, the battery powered inverter comes online as the isolation relay switches to prevent AC power from back-feeding to the utility. The following changes also occur within the XM2-300HP:

- The isolation relay opens to disconnect the AC line from the primary winding of the transformer.
- The control logic drives the inverter FETs on and off at line frequency. This switching action converts the DC battery current into AC current in the inverter windings of the transformer, providing regulated power to the load.
- The control logic, which includes a microprocessor and other circuits to protect the inverter FETs from overcurrent damage, monitors the condition of the battery and the inverter during standby operation. Since a prolonged AC line outage would severely discharge the battery, resulting in permanent damage, the control logic disables the inverter when the battery drops to approximately 10.5Vdc.

When acceptable AC line voltage returns, the power supply returns to AC line operation after a 20 to 40 second lag. This delay lets the AC line voltage and frequency stabilize before the control logic phase-locks the inverter's output to the utility input. The control logic then de-energizes the isolation relay, reconnects the AC line to the primary of the transformer and disables (turns off) the inverter. This results in a smooth, in-phase transfer back to utility power without interruption of service to the load. The battery charging circuit then activates to recharge the battery in preparation for the next power outage.

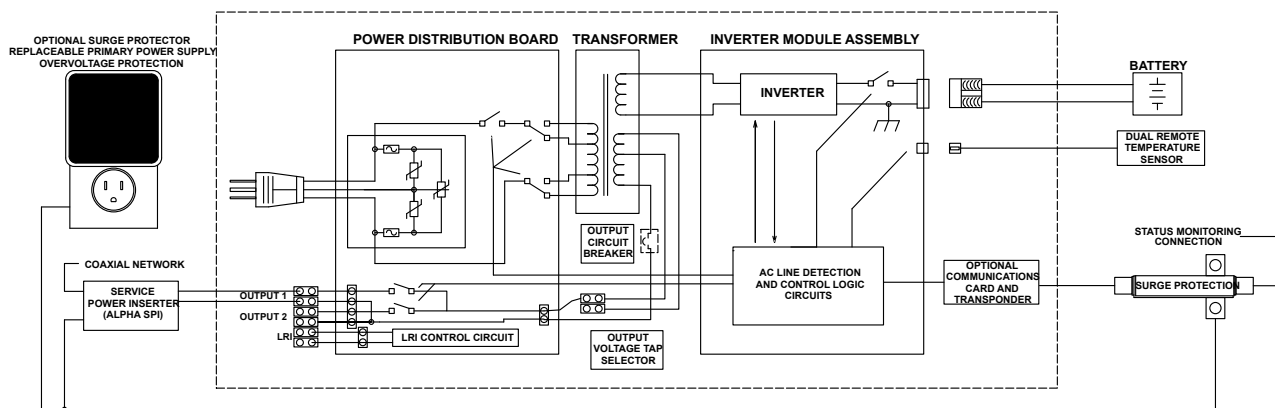


Fig. 1-2, Simplified Block Diagram



## 1.1 Theory of Operation, continued

### 1.1.3 Charger Operation

The XM2-300HP uses a three-stage, temperature-compensated battery charger. During AC line operation, the inverter winding on the transformer feeds the charger circuit which provides BULK, ACCEPT and FLOAT charge voltages to the battery.

#### Charger Modes

**BULK** charge is a “Constant Current” charge. The maximum current is 10A. As the charge is returned to the batteries, their voltage increases to a specific threshold (2.27Vdc per cell). The charger then switches to ACCEPT mode. The BULK charger mode generally returns the battery charge state to 80 percent of rated battery capacity.

**ACCEPT** charge is a “Constant Voltage” charge. This voltage, 2.40Vdc (adjustable) per cell, is temperature-compensated to ensure longer battery life and proper completion of the charge cycle. This cycle is complete when the charging current into the battery becomes less than 0.5A, or approximately six hours elapses from the time ACCEPT mode was entered. When the batteries are fully recharged the charger switches to the FLOAT mode of operation.

**FLOAT** charge is a temperature-compensated “pulsed voltage” charge, averaging about 2.27Vdc (adjustable) per cell. During FLOAT mode, the battery is fully charged and ready to provide backup power. The charger provides a small maintenance charge to overcome the battery self-discharge characteristics and other minor DC loads within the power supply. As the battery voltage reaches the “full charge” level the time delay between pulses increases.

During ACCEPT and FLOAT modes, the cell voltage is temperature-compensated at -0.005Vdc per cell per degree C (adjustable) to ensure a safe battery cell voltage and to maximize battery life.



#### NOTE:

When AlphaCell is the selected battery type, ACCEPT and FLOAT are pre-set and are not manually selectable.

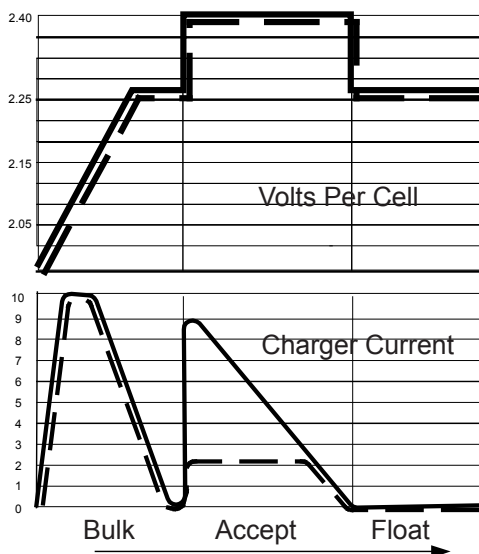


Fig. 1-3, Charger Modes



## 1.2 XM2-300HP Layout

### 1.2.1 Transformer Module Overview

**AC Output Circuit Protection:** XM2-300HP power supplies use an 8A circuit breaker. To provide increased durability, an integrated sheet metal guard protects the line cord and circuit breaker.

**LRI (Local/Remote Indicator):** The LRI lamp option is used in conjunction with the automatic performance feature and plugs directly into the LRI connector. The LRI circuit is rated at 12Vdc, 250mA. This option duplicates the function of the red ALARM LED by illuminating an externally mounted red lamp for standby operation.

**Output 1 (White = Neutral, Black = Line):** The AC output connector is clearly marked for easy identification. The service power inserter (SPI) connects directly into the Output 1 connector.

**Output 2 (Optional) [White = Neutral, Black = Line]:** The AC output connector is clearly marked for easy identification. The SPI, which couples power to the load, connects directly into the Output 2 connector. This feature is part of the factory-installed PIM option.



Fig. 1-4, Transformer Module Connections



Fig. 1-5, AC Input Connections and Product Label



## 1.2 XM2-300HP Layout, continued

### 1.2.2 Inverter Module Overview

The removable inverter module provides uninterrupted power to the transformer (via the batteries) during line failures. During line operation, the inverter charges the battery using a three-stage (BULK, ACCEPT, and FLOAT) charger.

**Smart Display:** All operational functions, system testing, setup items, and alarms are available via the Smart Display panel on the front of the XM2-300HP (the Smart Display is covered in detail in Section 4.2). Display functions are accessible by pressing any of the four keys: ESCAPE, UP, DOWN or ENTER. Backlighting is activated when any of the four keys are pressed, and stays lit for a period of one hour. There are four levels of menu items: Operation Normal, Communication Information, Setup and Alarms. Pressing ENTER will sequence the display one level lower, and pressing ESCAPE will sequence the display one level higher.



Fig. 1-6, Smart Display



## 1.2 XM2-300HP Layout, continued

### 1.2.2 Inverter Module Overview, continued

**Battery Switch:** The battery switch disconnects the battery from the inverter module's DC circuit. With the battery switch turned off, the XM2-300HP power supply does not transfer to standby mode, the inverter is disabled, and the battery charger cannot charge the battery.

**Battery Input Connector** The battery plugs directly into the inverter module's battery connector. The connector is polarized and fits in one direction only.

**Temp Probe Connector:** The Dual Remote Temperature Sensor (DRTS) plugs directly into the temperature probe (RJ-11C type) connector. One sensor clips onto the front edge of the power supply shelf and monitors the ambient air temperature within the enclosure. The second sensor attaches to the negative terminal of the battery and monitors battery temperature. To install, connect the ring terminal onto the negative battery terminal as shown below.

#### ✓ NOTE:

Always verify proper polarity of cables before connecting the battery to the power module. Polarity is clearly marked for easy identification. Reversing the polarity prevents the battery from being active in the system.



Fig. 1-7, Inverter Module Connections



Fig. 1-8, Temperature Probe Locations



## 1.2 XM2-300HP Layout, continued

### 1.2.3 Optional Status Monitoring Module

The XM2-300HP supports the Alpha Technologies DPM communication module. The module may be ordered factory-installed or as a user-installed field upgrade.



#### NOTE:

If communications options are installed, Alpha highly recommends adding a coaxial surge arrester for the transponder (See Section 1.3, Optional Features).



#### CAUTION!

Handle these modules with extreme care. Circuit boards and logic upgrades are static-sensitive and susceptible to damage.

#### DOCSIS® Status Module

Network-enable your power supply and access powerful diagnostic tools using the DPM embedded WEB interface and standard SNMP. Poll power supply and battery data in realtime, and receive alerts when power system alarms indicate noteworthy events. The DPM is completely configurable from the standard cable modem configuration file and can be provisioned using default cable modem settings. Customize your monitored information with configurable CM settings that are used to set alarm thresholds and power supply operating parameters.

ADPM installed in an XM2-300HP supports communication and system control for multiple XM2-300HP power supplies. See the AlphaNet DSM Series 3 Technical Manual (745-814-B8) for detailed information ([www.alpha.com](http://www.alpha.com) or [www.alpha-outback-energy.com](http://www.alpha-outback-energy.com) ).



Fig. 1-9, DPM



## 1.3 Recommended Enclosure System Options

These options can be factory installed or upgraded in the field by the user:

### **Protective Interface Module (PIM) (factory installed only)**

The PIM protects system components by shutting down the load during overcurrent and short circuit conditions. The PIM has an operator programmable overcurrent threshold (1A-6A) and a programmable overcurrent tolerance period, which specifies the time (1-10 seconds) an overcurrent condition is permitted before the output shuts down.

Using the programmable retry limit, the operator can select how many times (0-40) after a programmable delay (5-301 seconds) the PIM will attempt to reconnect an output that has been shut down. Once the limit is reached, the XM2-300HP automatically retries once every 30 minutes until the fault clears.

### **Local and Remote Indicator (LRI)**

The LRI (red) lamp is located on the outside of pole-mount enclosures. Using this simple form of status monitoring operators can check the operational status of the power supply without having to climb the pole and open the enclosure. During normal AC line operation, the LRI remains off. The LRI comes on only when the power supply is running in standby mode. Whenever a fault is detected during self-test, the LRI flashes to indicate that service is required.

### **AC Indicator (ACI)**

The AC Indicator (green lamp) is located next to the LRI on the outside of pole-mount enclosures and also acts as a simple form of status monitoring so cable technicians can check the output status of the power supply without having to climb the pole and open the enclosure. As long as there is voltage present at the output, the ACI remains on. To provide much longer life than the original light bulb design, use the ACI-LL (long life LED). Models for 60V and 90V are available. Do not use ACIs for ground mount enclosures.

### **LA-P+ 120V (Lightning Arrestor)**

The LA-P+ plugs directly into the enclosure's convenience outlet and provides additional protection from voltage spikes caused by lightning and other power disturbances. It eliminates the need for hard-wired MOVs. No additional wiring is necessary.

### **LA-P+ With Status Monitoring**

Incorporates the same features as the LA-P+, with the additional benefit of Status Monitoring capability.

### **Coaxial surge protector**

Alpha recommends using coaxial surge suppression for enclosure protection. The Coax Surge Protector (Alpha P/N 162-028-10) includes 75 ohm surge protector and mounting hardware.

### **APP90S /APP9022S (Service Power Supply)**

The APP90S/APP9022S is a portable, non-standby power supply that provides conditioned AC power to the load when the main power module is out of service. An internal tap lets the APP90S/APP9022S be set for 90/75/60Vac applications. Use a 15A or 25A SPI (Service Power Inserter) to transfer power from the APP9015S/APP9022S to the load.



## 2.0 Installation



### CAUTION!

Read the Safety Precautions, Utility Power Connection Notes, and Grounding Connection Notes (pages 8-13) before you install the power supply.

#### Pre-installation Inspection

1. Remove the XM2-300HP from the shipping container. Confirm that the power supply, including the Remote Temperature Sensor, and all other ordered options are included.
2. During shipping, components might shift. Carefully inspect the power supply and other contents for possible shipping-related failures, such as loosened or damaged connectors. If any items are damaged or missing, contact Alpha Technologies or the shipping company immediately. Most shipping companies have a short claim period.
3. Do not attempt to install a damaged power supply without first passing a complete pre-installation inspection and start-up test.



### NOTE:

See the “CableUPS Quick Start Guide” (Alpha P/N 017-877-B0) that accompanies each power supply. **SAVE THE ORIGINAL SHIPPING CONTAINER.**

Use the original shipping container if the XM2-300HP needs to be returned for service. If the original container is not available, make sure the unit is well packed with at least three inches of shock-absorbing material to prevent shipping damage.



### CAUTION!

Do not use popcorn-type material. Alpha Technologies is not responsible for damage caused by improper packaging of returned units.



## 2.0 Installation, continued

### 2.1 Installation Procedure

The XM2-300HP can be shelf-mounted in a variety of Alpha enclosures. Complete the pre-installation instructions in Section 2.0, and the preliminary inspection and self-test procedure, before you install the power supply.



#### NOTE:

Alpha enclosures are engineered to properly vent the XM2-300HP. The XM2-300HP series has been investigated by regulatory authorities for use in various Alpha enclosures. If you are using a non-Alpha enclosure, it is your responsibility to ensure your combination conforms to your local regulatory requirements, and that the XM2-300HP remains within its environmental specifications.



#### CAUTION!

The battery is an important part of the XM2-300HP. Properly install and test all batteries, battery connections and battery cables before you connect them to the power supply.

1. Verify the Inverter Module's battery switch is OFF.
2. Connect battery cables to battery input connector.
3. Insert temperature probe cable
4. Insert Local/Remote Indicator (LRI) cable. (Optional)
5. Connect status monitoring connectors, including tamper switch (if installed).
6. Verify SPI switch is in "ALT" position.
7. Connect the SPI (network load) to the Output 1 connector.
8. Connect an auxiliary load to the Output 2 connector. (If optional factory-installed PIM has been installed).
9. Turn on AC breaker (located on enclosure) and verify correct (per unit's nameplate voltage) utility voltage at outlet; if correct, plug in XM2-300HP line cord to the utility outlet.
10. Switch the Inverter Module's battery switch ON.
11. Verify no alarms are present (it may take up to 60 seconds for alarms to clear).
12. Perform self-test. If the unit is operating from batteries, the self-test must be manually initiated by simultaneously pressing the DOWN arrow key and ENTER key. Wait for Self-test completion before proceeding.
13. Perform this live inverter test procedure:
  - a.) Turn AC input breaker OFF.
  - b.) Verify XM2-300HP transfers to "Inverter" mode.
  - c.) Turn AC input breaker ON.
  - d.) Verify XM2-300HP transfers back to utility.
14. Verify Service Power Inserter (SPI) toggle switch is in ON position (not ALT).



## 2.0 Installation, continued

### 2.2 Installing the Optional AC Indicator (ACI) Lamp

#### ACI Option

The AC indicator (green lamp) is located on the outside of the enclosure. When lit, it indicates AC power is available at the power supply output and enables service personnel to determine the status of the power supply without having to climb the pole.

#### Installation Procedure:

1. Remove the rear-most knockout (see Fig. 2-3).
2. Feed ACI wires through the hole.
3. Slide locking nut over the wires and thread onto lamp body (see Fig. 2-1).
4. Insert the crimped contacts into the plastic connectors. The BLACK wire must always go into the BLACK housing. Insert the remaining wire (*this may be white, yellow, or blue*) into the WHITE housing (see Fig. 2-2).
5. Connect the shorter BLACK/WHITE set of wires to the BLACK/WHITE wires leading from the SPI. The remaining set of longer wires connects to the Output 1 connector on the front of the XM2-300HP (Fig. 2-3).

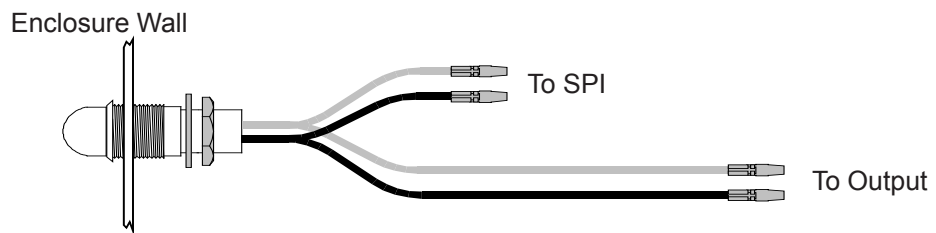


Fig. 2-1, AC Indicator



#### CAUTION!

Secure the contact. If you do not properly position the contact, overheating and cable assembly failure can result.



#### NOTE:

To remove the wire from the plastic connector, use a small screwdriver to depress the metal retainer and slide out the wire.

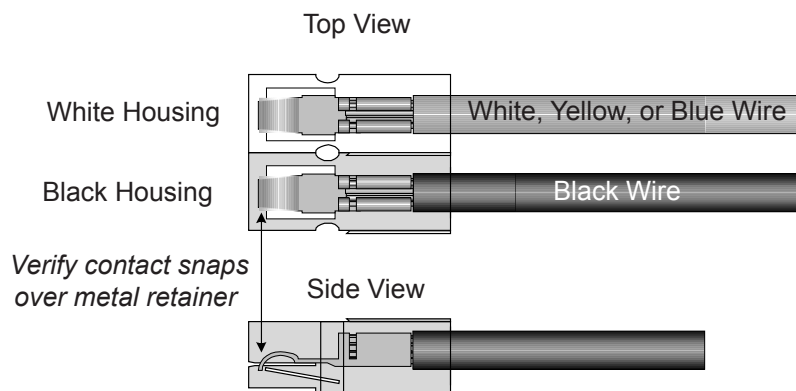


Fig. 2-2, Wire/Housing Assembly



## 2.0 Installation, continued

### 2.2 Installing the optional AC Indicator (ACI) Lamp, continued

Installation is complete. Go to Start-up Test (Section 4.1, Start-up and Test).

#### **ATTENTION:**

See Section 5.6, Check Output Connection, for inspection guidelines.

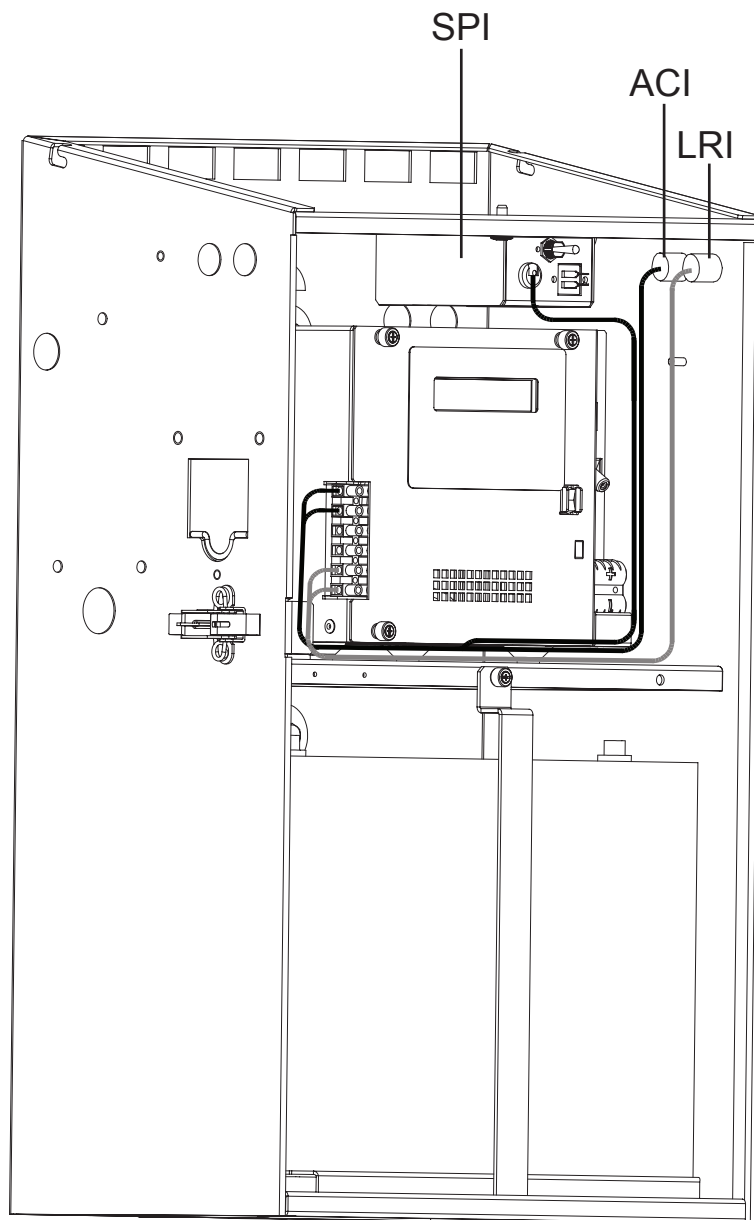


Fig. 2-3, ACI/LRI Connection



## 2.0 Installation, continued

### 2.3 Inverter Module Removal and Installation

The XM2-300HP power module comes with a field-replaceable inverter module assembly containing the inverter and control logic. The inverter module accepts optional communications modules to facilitate remote status monitoring. The removable module is located on the front of the XM2-300HP power supply.



#### CAUTION!

- ALWAYS switch the battery switch off before removing or installing the inverter module assembly.
- Handle the inverter module with extreme care. Circuit boards and logic upgrades are static-sensitive and susceptible to damage.



#### NOTE:

You can remove the inverter module assembly while the power supply is running on line power. The XM2-300HP will continue to operate as a non-voltage regulated, standby power supply.

#### Removal Procedure:

1. Turn the battery switch OFF.
2. Disconnect the battery input and temperature probe cables from the inverter module, and the TMPR and XPDR cables from the communication module.
3. Loosen the thumbscrews.
4. Grasp the handle on the lower right corner of the inverter module. Pull firmly to release the module from the inverter connector. Gently slide the module assembly straight out until the inverter module is clear of the chassis.

#### Installation Procedure:

1. To re-seat the inverter module assembly, align the inverter board in the card guides and slide the inverter module back onto the connector. It is important that the PCB is properly seated in the card guides and fully inserted into the housing.
2. Tighten the thumbscrews.
3. Verify that the battery switch is off. Reconnect the battery input, temperature probe cables, TMPR and XPDR cables. Turn the battery switch on.



## 2.0 Installation, continued

### 2.4 Protective Interface Module Installation *(factory installed option)*

The optional Protective Interface Module (PIM) adds a second independent output. It provides programmable current limits for two output channels.

The PIM option protects system components by shutting down the load during overcurrent and short circuit conditions. The PIM has a programmable overcurrent threshold (3-6A) and overcurrent tolerance period that specifies the time (1-10 secs) an overcurrent condition is permitted before shutting down.

You can use the programmable retry limit to select how many times (0-10) after a programmable delay (60-600 seconds) the PIM will attempt to reconnect an output once it has been shut down. When the limit is reached, the XM2-300HP power supply automatically retries once every 30 minutes until the fault clears.

Adding the PIM to the XM2-300HP provides these advantages:

- **A second protected output:** The main purpose of the PIM is to limit the impact of a fault condition in one output channel. If a fault condition occurs in an XM2-300HP (without the optional PIM installed) the entire customer network can be affected. The PIM option affords protection to one output should a fault condition exist on the other. This gives you flexibility to isolate Output 1 from Output 2.
- **A current for critical loads:** With the PIM option, you can designate one output as the primary connection, and the other output as the secondary connection. Commonly, critical loads are connected to Output 1 as the primary feeder. Using the overcurrent limit settings, you can ensure that the primary output always provides the necessary power. For example, on a 60 volt unit, if a customer needs 3 Amps available on Output 1, the overcurrent limit for Output 2 is set at 2 Amps, so regardless of Output 2, 3 Amps will remain available for the primary Output 1.
- **Additional current protection:** The standard XM2-300HP current limit protection is provided by the output circuit breaker. The 160% current limit may exceed the ratings of active devices in the cable network and cause failures. You can lower the maximum current provided at each output by lowering the overcurrent limit of each respective output. Therefore, to minimize failures due to excess current supply, set the overcurrent limit to a value below the maximum current the active components can tolerate.

XM2-300HP Load	Permitted Duration of Load
>150%	10 seconds
125% to 150%	10 minutes
115% to 125%	30 minutes
<115%	Many months

For example, on a 5A power supply, where both outputs are programmed to 4A maximum, and both outputs are supplying 3A, neither output is “in violation” but the total system at 6A is operating at 120% of its rated output. In this example, after 30 minutes, the power supply will begin a “load shedding” algorithm. The first action is to disconnect Output 2. If this does not correct the system overload, the next action is to disconnect Output 1.



## 2.0 Installation, continued

### 2.5 Programming the PIM

Programmable parameters (with PIM option) are:

**Channel 1 Overcurrent Limit:** The RMS current level that causes the Output 1 protection relay to trip after a specified delay (overcurrent tolerance period).

**Channel 2 Overcurrent Limit:** The RMS current level that causes the Output 2 protection relay to trip after a specified delay (overcurrent tolerance period).

**Retry Delay:** The time between each attempt to restart an output in the event of an overcurrent event.

**Retry Limit:** The number of times the XM2-300HP will attempt to restart an output connection. Once the RETRY LIMIT is exceeded, the XM2-300HP will attempt to restart the output connection every 30 minutes. Set this parameter to “zero” to disable the “automatic retry” function.

**Overcurrent Tolerance Period (1-10 seconds):** In the event of an overcurrent episode, the amount of time an output overcurrent condition is permitted on either output connection. Once this time expires, the output protection relay disables its output feeder.

**Reset Output 1/Reset Output 2:** Once fault condition has been corrected, this manually resets tripped output.



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**NOTE:**

Programming any of the above parameters will reset the “trip/retry” counters.



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**NOTE:**

If the optional PIM is not installed, the values shown on the “PIM PARAMETERS” line of the Smart Display are “read only”.



## 2.0 Installation, continued

### 2.5 Programming the PIM, continued

#### 2.5.1 The Setup Menu

Press the Enter key to access the Setup Menu.

Use the Setup menu to view or change the programmable operating parameters of the power supply or the optional PIM. Navigation is similar to the Operation Normal menu. Press UP or DOWN to access the Single Step mode where you can individually select sub-menu items.

To select and change a value in the Setup Menu:

1. Press either UP or DOWN to put the display in the Manual Scroll Mode.
2. Continue pressing UP or DOWN until the desired item is displayed.
3. Press ENTER to select the item to edit.
4. Press UP to increase the displayed value, or DOWN to decrease the value. To change the displayed values more rapidly, in Edit mode, press either UP or DOWN and hold for more than two seconds.
5. Press ENTER when the desired value is displayed. Press ENTER again to accept and save the new value. To leave programming mode without saving the new value, press ESCAPE.

If an incorrect value is accidentally entered, repeat the above process and enter the proper value, or select the SET DEFAULTS menu selection of the Setup Menu and press ENTER twice to reset all parameters to their factory default values.

6. To return to the Operation Normal menu, press ESCAPE three times.

You can also access ON or OFF and YES or NO selections as described above. The CODE VER, and Total Run Time selections are for informational display only and cannot be edited.



---

**NOTE:**

The SET DEFAULTS menu selection does not reset STANDBY TIME, STANDBY EVENTS, or DEVICE ADDRESS. Manually reset these options.



## 2.0 Installation, continued

### 2.6 Service Power Inserter (SPI-LPE)

#### To connect the coaxial cable

1. Before you remove the cover, unplug the SPI-LPE from the XM2-300HP.
2. Remove the two screws holding the cover to the SPI-LPE chassis.
3. Remove the SPI-LPE cover to expose the circuit board and seizure screw assembly.
4. Insert the coaxial termination into the output port on the bottom of the SPI-LPE.
5. Tighten the seizure screw to 35 inch-pounds.

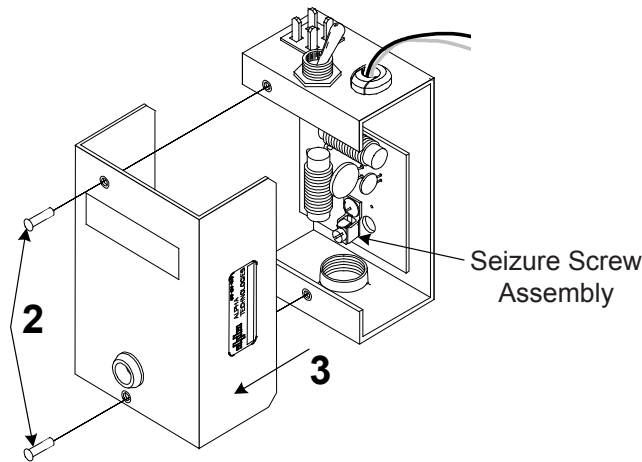


Fig. 2-4, Removing the Cover

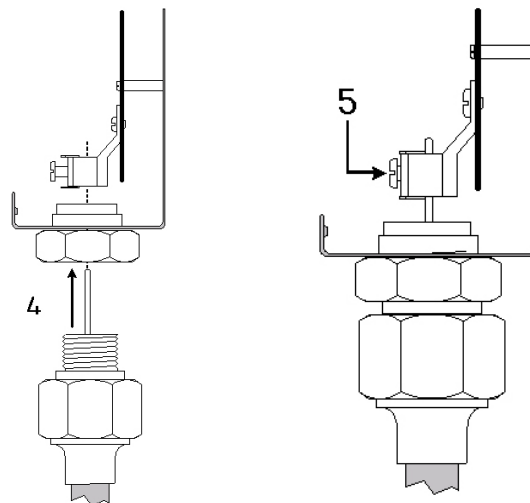


Fig. 2-5, Coaxial Cable Insertion and Securing



#### CAUTION!

To prevent arcing, make certain the center conductor (stinger) of the coaxial termination is fully seated inside the seizure screw assembly (5). Tighten to 35 inch-pounds.



## 2.0 Installation, continued

### 2.6 Service Power Inserter (SPI)-LPE, continued

6. Replace the SPI-LPE cover and reinstall the screws.
7. Using the switch on the top of the SPI-LPE, turn the unit ON to select the standby XM2-300HP as the power source to the cable plant.

The switch should only be in the ALT position when the service XM2-300HP is connected to the cable. When in ALT, the standby XM2-300HP is bypassed for service or removal.

8. Verify the SPI-LPE is properly grounded.

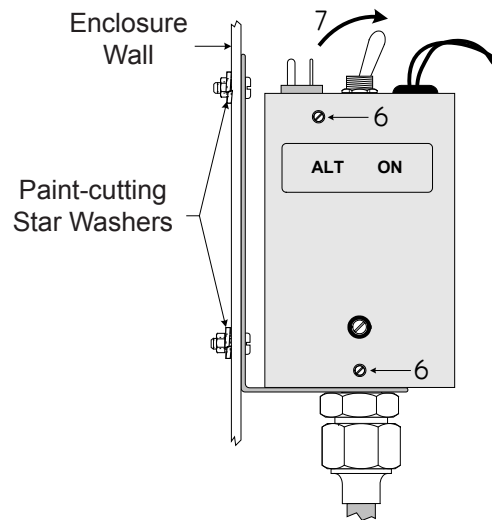


Fig. 2-6, Cover Replaced,  
SPI-LPE Switched On



## 3.0 Configuration

### 3.1 AC Input Voltage Configuration

The input voltage on many models is factory set. Ensure proper name plate rating prior to installation.

### 3.2 AC Output Voltage Reconfiguration

The output voltage of the XM2-300HP can be reconfigured by moving the Output Tap jumper per the procedure below.

**NOTE:**

XM2-300HP CE models have only a 63Vac output and are not reconfigurable.

**ATTENTION:**

Only authorized personnel should reconfigure output voltage on the XM2-300HP.

**WARNING!**

Before proceeding, remove *all* power from the power supply. Unplug the power supply from the AC power source, remove all front panel connections and disconnect the battery connector. Failure to do so can expose the technician to potentially lethal voltages.

**Tools Required:**

- Small flat-blade screwdriver

**Output Voltage Reconfiguration Procedure:**

1. Shut down the XM2-300HP, verify all power is removed, utility power is off and battery power is safely secured (or not installed) in the enclosure assembly. Remove all connections and cables from the XM2-300HP.
2. Remove the inverter module from the chassis.
3. Locate the transformer output terminal block between the transformer and front of chassis. Move the single black wire to the desired output voltage connector. Connectors are labeled for easy identification: 87 or 60Vac.
4. Replace the inverter module.
5. Install the unit into the enclosure as outlined in Section 2.1 (Installation Procedure).



Fig. 3-1, Removing the Inverter Module



Fig. 3-2, Inside of XM2-300HP

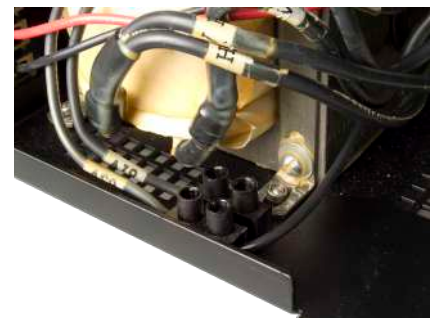


Fig. 3-3, Terminal Block Detail



## 4.0 Operation

### 4.1 Start-up and Test

#### 4.1.1 AC Line Operation

1. Before making power supply connections, verify the correct voltage, polarity and frequency are available from both the AC utility power source and the DC battery system.
2. Verify the AC circuit breaker (on the customer supplied service disconnect) and the battery switch on the XM2-300HP are off.
3. Plug the XM2-300HP power cord into the convenience outlet and connect the battery cable to the CableUPS. Plug the RTS into the temp probe connection and attach it to the negative terminal of the battery. Refer to Fig. 1-8. Plug the LRI cables into the front panel, if applicable.
4. Switch the AC (service disconnect) circuit breaker on to start initial power up. During this stage the power supply performs a “display test” and verifies configuration for the power supply. After the initial display test, a “No Batteries” alarm message appears in the Smart Display because the battery switch is off. The green output LED remains off and the red alarm LED continues to flash while in this alarm state (see Section 4.5).



Fig. 4-1, Example Configuration Screen



**NOTE:**

Access the configuration screen any time by simultaneously pressing UP and ENTER.



## 4.1 Start-up and Test, continued

### 4.1.1 AC Line Operation, continued

5. Use the Smart Display to verify XM2-300HP operations. If desired, the No Battery alarm can be disabled by changing Battery Capacity to “0” in the setup menu.
6. Use the Smart Display to verify AC output ( $\pm 5\%$ ).

Setting	Low (-5%)	High (+5%)
87Vac (Domestic models)	82.65Vac	91.35Vac
60Vac (Domestic models)	57.0Vac	63.0Vac
63Vac (CE models)	59.85Vac	66.15Vac

Table 4-1, AC Output

7. Switch on the battery switch. Within one minute the flashing red alarm LED turns off, the green output LED turns on, the No Battery alarm clears and the power supply displays Operations Normal. Use the Smart Display to verify operations and setup as needed.

### 4.1.2 Self Test Operation

1. The XM2-300HP should be operating correctly with no alarms present. Use the Smart Display to verify Normal and/or Additional Information (Communication Information available only when DPM is installed). Verify test duration in the Setup Menu as needed.
2. Press and hold DOWN and ENTER simultaneously to start Self Test. The test will run for a preset time (5-180 minutes, set in the Setup Menu). Self Test can also be entered by setting Self Test to ON in the Setup Menu.
3. While in self test mode, use the Smart Display or a true RMS voltmeter to verify output at the module's AC Output. Output voltages should appear within  $\pm 5\%$  of: 87Vac for 90V units, 63Vac for CE units, and 60Vac for 60V units at nominal line input voltage.
4. To cancel a self test in progress, push and hold DOWN and ENTER a second time, or change Self Test to OFF in the Setup Menu.



## 4.1 Start-up and Test, continued

### 4.1.3 Standby Operation

Perform the following procedure after successful completion of a self test with the XM2-300HP operating normally in AC line mode.

1. Momentarily fail the AC utility input power by switching the AC (service disconnect) circuit breaker to OFF.
2. The XM2-300HP starts operating in the inverter mode. Use the Smart Display or a true RMS voltmeter to verify output. Output voltages should appear within  $\pm 5\%$  of: 87Vac for 90V units, 63Vac for CE units, and 60Vac for 60V units at nominal line input voltage.
3. Return the XM2-300HP to AC Line mode by switching the AC (service disconnect) circuit breaker to ON. The transfer back to utility power may take 10 to 50 seconds for the utility voltage and frequency to stabilize, and the module's phase-lock circuitry to activate. The module then synchronizes the inverter waveform and inverter before initiating a smooth, in-phase transfer back to utility power. Once the transfer is complete, the Smart Display reports: OPER MODE = LINE.

The XM2-300HP is now fully operational.



## 4.0 Operation, continued

### 4.2 Using the Smart Display

All operational functions, system testing, setup menus, and alarms are available via the illuminated display panel on the front of the XM2-300HP. Display functions are accessible by pressing any of the four keys: ESCAPE, UP, DOWN, and ENTER.

Descriptions of the key functions are:

**ESCAPE:** ⤴

- Move up one level in the menu tree.
- Leave the EDIT mode without saving the changes made to the selected menu item.

**UP:** ⬆

- Scroll up in a branch of the menu tree.
- Increase a parameter (or value) while in the EDIT mode.

**DOWN:** ⬇

- Scroll down in a branch of the menu tree.
- Decrease a parameter (or value) while in the EDIT mode.

**ENTER:** ⬅

- Displays the next lower level in the menu tree.
- In the EDIT mode, ENTER accepts the new value into memory.
- Depressing ENTER for two seconds or longer initiates Display Test mode. Display Test mode switches all LED and LCD pixels (dots) on for several seconds.

**SELF TEST:** ⬇ + ⬅

- Press DOWN and ENTER simultaneously to manually enter a self test mode. A self test will be initiated and run between 5-180 minutes (set in the setup menu).
- To cancel a self test in progress, simultaneously press DOWN and ENTER.



Fig. 4-2, Smart Display Navigation



## 4.0 Operation, continued

### 4.2 Using the Smart Display, continued

#### Display Backlighting

The display is normally unlit. Press any key once to activate backlighting and illuminate the display without deactivating Auto Scroll.

#### Auto Scroll

The display is normally in Auto Scroll mode, continually cycling through the sub-menu items at a two-second interval. In Auto Scroll mode you can quickly view menu items without the need to press any keys.

#### Single Step







Pressing either arrow key activates Single Step mode in which you can step through individual menu items one at a time. Each press of the arrow key steps up or down through the sub-menu items. Press ESC to return to Auto Scroll mode.



Fig. 4-3, Smart Display Panel

#### Direction Indicator Symbols

The rightmost character of the display (may appear on either line) indicates the proper key function when manually scrolling. Where more than one choice is available multiple characters display. Possible characters or text are:

-  Access more menu items by pressing either the UP or DOWN arrow keys.
-  Use the ENTER key to select this function.
-  Use the ESCAPE key to leave the selected function without altering any values or to go to back to the previous menu in the display.
-  Press UP or DOWN arrows to change a display value or mode. Press ESCAPE to leave this menu item without making any changes (and go back to the previous menu). Press ENTER to save the change into memory. This type of multiple display choice is normally available in the programming mode.
- 
- 



## 4.0 Operation, continued

### 4.3 Smart Display modes for XM2-300HP

#### 4.3.1 Operation Normal

If no alarms are present, the XM2-300HP power supply operates in Operation Normal display mode. In this mode you can view the primary operating parameters of the power supply while the display auto scrolls through the available menu items at two-second intervals. In Operation Normal mode the displayed items are all “metered” items and are for informational purposes only (not programmable) with respect to the operational status of the power supply.

The Operation Normal menu contains the following items:

<b>OPERATION NORMAL</b>		↕	←	Top line
<b>OPER MODE =</b>		<b>LINE</b>	←	Second line
<b>BATT STATUS</b>	<b>OK</b>			
<b>INV STATUS</b>	<b>OK</b>			
<b>DPM STATUS</b>	<b>OK</b>			
<b>INPUT VOLTAGE</b>	<b>120</b>			
<b>INPUT FREQ</b>	<b>60HZ</b>	*		
<b>INPUT CURRENT</b>	<b>23.0A</b>			
<b>INPUT WATTS</b>	<b>140</b>			
<b>OUTPUT VOLTAGE</b>	<b>60</b>			
<b>OUTPUT 1 CURR</b>	<b>1.0A</b>			
<b>OUTPUT 2 CURR</b>	<b>1.0A</b>			
<b>OUTPUT CURRENT</b>	<b>2.0A</b>			
<b>OUTPUT WATTS</b>	<b>120 W</b>	*		
<b>OUTPUT VA</b>	<b>120 VA</b>			
<b>PERCENT LOAD</b>	<b>33%</b>			
<b>CHARGER MODE =</b>	<b>ACCEPT</b>			
<b>BATT VOLTAGE</b>	<b>14.4V</b>			
<b>BATTERY TEMP</b>	<b>26.5C</b>			
<b>ENCLOSURE TEMP</b>	<b>26.5C</b>	*		
<b>CHARGER CURR</b>	<b>5.0A</b>			
<b>EST. BATT RUN &lt;</b>	<b>60 MIN</b>			
<b>1 EVENTS</b>	<b>84 MIN</b>			

\*Only visible in single-step mode

Fig. 4-4, Operation Normal Display  
(Examples are given for values in the display)

The top line indicates the current screen and provides additional instructions. Use the arrows to manually scroll.

The second line cycles through the parameters listed above.



## 4.0 Operation, continued

### 4.3 Smart Display modes for XM2-300HP, continued

#### 4.3.2 Comms Information Display (with DPM)

Pressing ENTER while in the Operation Normal screen will open the Comms Information display (only displayed when paired with DPM, otherwise display will read "NO DATA"). This mode operates in a similar fashion as the Operation Normal display. When you first access the information display, information displays in Auto Scroll mode. Press UP or DOWN to access information one step at a time. Press ENTER to access the Setup Menu (discussed in Section 4.3.3, Setup Menu). Press ESCAPE to reactivate Auto Scroll mode. Press ESCAPE a second time to reactivate Operation Normal mode (up one level).

The Comms Information display contains the following items:

COMMS INFO		↕	← Top line
CM	00:90:EA:12:34:56		← Second line
CPE	00:90:EA:12:34:57	*	
CM	192.168.123.123		
CPE	192.168.123.124	*	
CM RX PWR	-12.9 DBMV		
CM TX PWR	34.5 DBMV		
DN FREQ	300.000 MHZ		
UP FREQ	15.000 MHZ		
MODEL	DPM		
SW	XX.XX.XX.XX		← DPM Firmware Version; change location in menu

**\*Only visible in dual-IP configurations**

Fig. 4-5, Comms Info Display  
(Examples are given for values in the display)

The top line provides additional instructions. Use the arrows to manually scroll.

The second line cycles through the parameters listed above.



## 4.0 Operation, continued

### 4.3 Smart Display modes for XM2-300HP, continued

#### 4.3.3 Setup Menu

Pressing ENTER while in the Comms Status display opens the Setup Menu, one level below the Comms Status display. Using the Setup menu you can view and change the programmable operating parameters of the power supply or the optional PIM. Setup Menu navigation is similar to the Operation Normal menu. Press UP or DOWN to access the Single Step mode where sub-menu items are individually selected.

To select and change a value in the Setup Menu:

1. Press either UP or DOWN to put the display in the Manual Scroll mode.
2. Continue to press UP or DOWN until the desired item is displayed.
3. Press ENTER to select the item for editing.
4. Use UP to increase the displayed value, or DOWN to decrease the value. To change the displayed value more rapidly, press and hold either UP or DOWN for more than two seconds while in edit mode.



---

**NOTE:**

When in EDIT mode, press the ENTER key twice for the change in the parameter to take effect.

5. Press ENTER when the desired value displays. This accesses an additional display where you can either ESCAPE from programming mode and not save the new value, or press ENTER to accept and save the new value.
6. After the value is saved, the display returns to the Setup Menu. You may now check and view the new value or select additional parameters to modify.

If an incorrect value is entered, repeat the above process and enter the proper value; or select the Set Defaults menu selection on the Setup Menu and press ENTER twice to reset all parameters to their factory default values.

In addition to using UP and DOWN to increase or decrease numerical values, you can select ON or OFF and YES or NO in the same manner as described. The CODE VER, XM\_CLASS VER, and Total Run Time selections are for informational display only and cannot be edited. To return to the "Operation Normal" menu from the Setup Menu, press ESCAPE three times.



---

**NOTE:**

The Set Defaults menu selection does not reset Standby Time, Standby Events or Device Address; you must manually reset these settings.



## 4.0 Operation, continued

### 4.3 Smart Display modes for XM2-300HP, continued

#### 4.3.3 Setup Menu, continued

The Setup Menu contains the following items:

Top Line (provides additional information)

- SET UP MENU
- ↕ TO MANUAL SCROLL
- <ESC> TO COMMS INFO

Second Line (cycles through the following parameters):

	Default	Minimum	Maximum
Other Battery Types	Other	If AlphaCell™ is selected then user selects between a range of Alpha cells	
Device Address	1	0	7
Battery 1 Life	5	0	10
MHO's Minor Level	80%	10	60
MHO's Major Level	60%	20	100
Float V/C	2.27 V/C	2.10 V/C	2.35 V/C
Accept V/C	2.40 V/C	2.20 V/C	2.45 V/C
Temp Comp	5.0 mV	0.0 mV	5.0 mV
Batt. Capacity*	100 AH	0	1000 AH
Battery 1** Date	01/10	01/10	01/10
Battery 1 MHOS	1050 S	0 S	9999 S
MHO 1 Date	01/10	01/00	12/30
Battery 1 Life	5 Y	0 Y	10 Y
Battery 1 Age	0	0 (Read Only)	0 (Read Only)
MHO's Minor Level	80%	20%	80%
MHO's Major Level	60%	20%	80%
Standby Time	0	0	65335
Standby Events	0	0	65335
Total Runtime	0	0	65335
Self Test	Off	Off	Yes
Test Interval	30 Days	0 Days	360 Days
Test Inhibit	—	7 Days	7 Days
Discharge %	00%	00%	50%
Test Duration	10 Min	5 Min	180 Min
Test Countdown	30 Days	0 Days	360 Days
Freq. Range	3.0Hz	1.0Hz	6.0Hz
PIM Option	Yes	No (Read Only)	Yes (Read Only)
Reset Output 1	—	No	Yes
Reset Output 2	—	No	Yes
Over Curr1	5.0 A	3.0 A	6.0 A
Over Curr2	5.0 A	3.0 A	6.0 A
Retry Delay	300 Sec	60 Sec	600 Sec
Retry Limit	10	0	10
Over Curr Tol	60s	0s	255s
System Fan	No	No	Yes
PS Priority	High	Normal	Critical
Technician ID	123	000	999
Input I Limit	6.0 A	1.0 A	6.0 A
Set Defaults	—	No	Yes
Language	English	Spanish/French/Portuguese/German	

These items appear in the setup menu only if battery type **Other** is selected. They are preset (but not displayed) if AlphaCell™ is selected.

These items appear in the setup menu only if the optional PIM is installed.

\* Per battery

\*\* Battery Data will change as a function of changes to the number of battery strings in the system.

#### NOTE:

See Section 4.7 Smart Display Glossary for descriptions of setup menu parameters.



## 4.0 Operation, continued

### 4.3 Smart Display modes for XM2-300HP, continued

#### 4.3.3 Setup Menu, continued

SETUP MENU	↑↓	
CODE VER	7.01.0	
DEVICE ADDRESS	1	
ALPHACELL	OTHER	
FLOAT V/C	2.27	
ACCEPT V/C	2.40	
TEMP COMP	5mV	
BATT CAPACITY	100Ah	
# BATT STRINGS*	1	
BATT 1 DATE M/Y*	01/10	
BATT 2 DATE M/Y**	01/10	
BATT 1 MHOS*	1050	
BATT 2 MHOS**	1050	
MHO 1 DATE M/Y*	01/10	
MHO 2 DATE M/Y**	01/10	
BATTERY 1 LIFE*	5Y	
BATTERY 1 AGE*	5Y	
BATTERY 2 LIFE**	0 MO	
BATTERY 2 AGE**	0 MO	
MHOS MIN LEVEL*	80%	
MHOS MAJ LVL*	60%	
STANDBY TIME	65 M	
STANDBY EVENTS	12	* Visible in Single Step Mode
TOTAL RUN TIME	365D	
SELF TEST	OFF	**Visible when "Number of Battery Strings" is set to 2.
TEST INTERVAL	30D	
TEST INHIBIT	—	
% DISCHARGE	00%	
TEST DURATION	10 M	
TEST COUNTDOWN	30D	
FREQ RANGE	3.0HZ	
PIM OPTION	YES	
RESET OUTPUT 1	—	
RESET OUTPUT 2	—	
OVER CURR 1	15.0A	
OVER CURR 2	15.0A	
RETRY DELAY	60S	
RETRY LIMIT	20	
OVER CURR TOL	3000ms	
SYSTEM FAN	NO	
HEATER MAT	NO	
PS PRIORITY	NORMAL	
TECHNICIAN ID	123	
INPUT LIMIT	6.0	
SET DEFAULTS	NO	
SELECT LANGUAGE	ENGLISH	

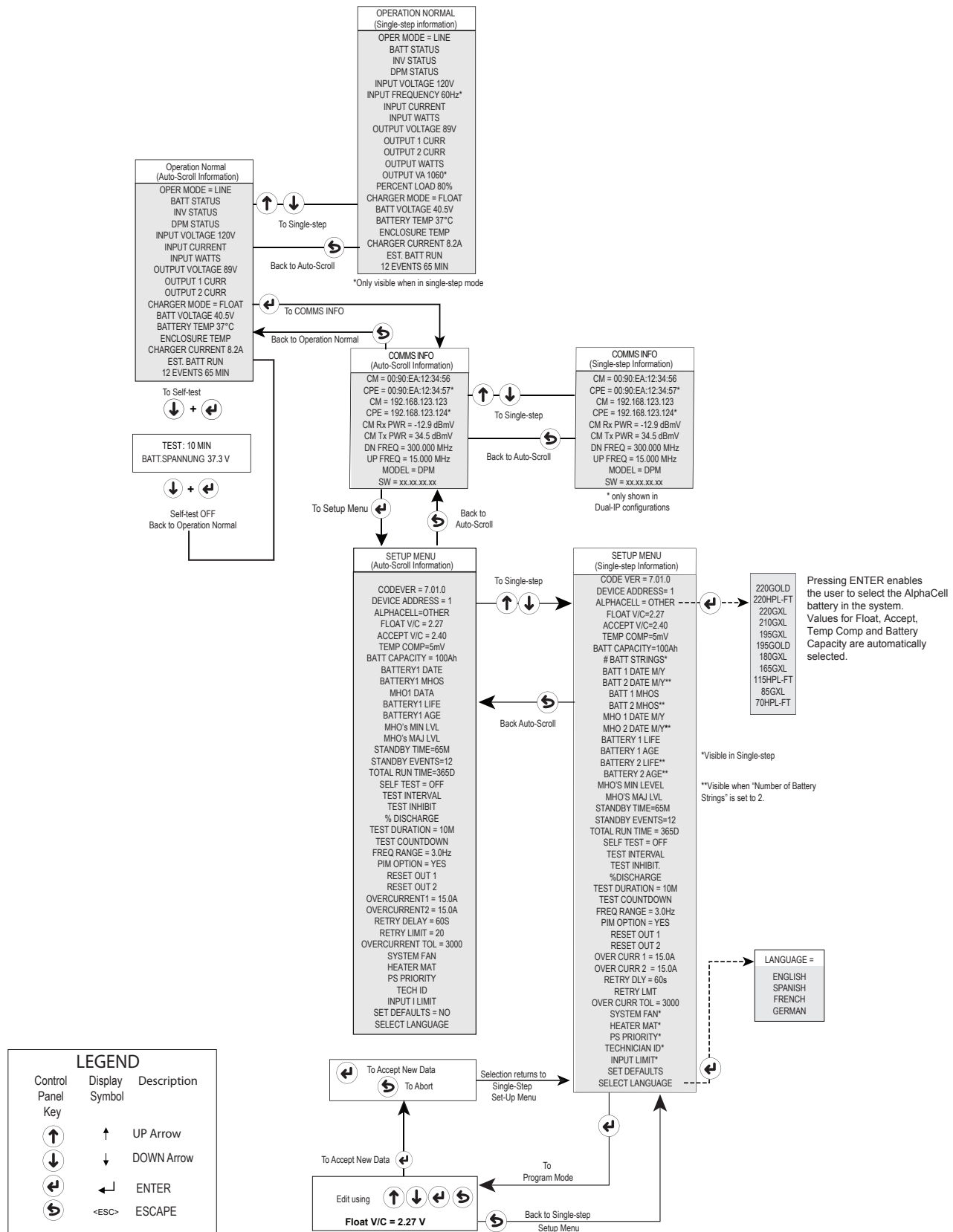
Fig. 4-6, Setup Menu Display  
(Examples are given for values in the display)



## 4.0 Operation, continued

### 4.3 Smart Display modes for XM2-300HP, continued

#### 4.3.4 Menu Structure and Navigation (from Operation Normal screen)

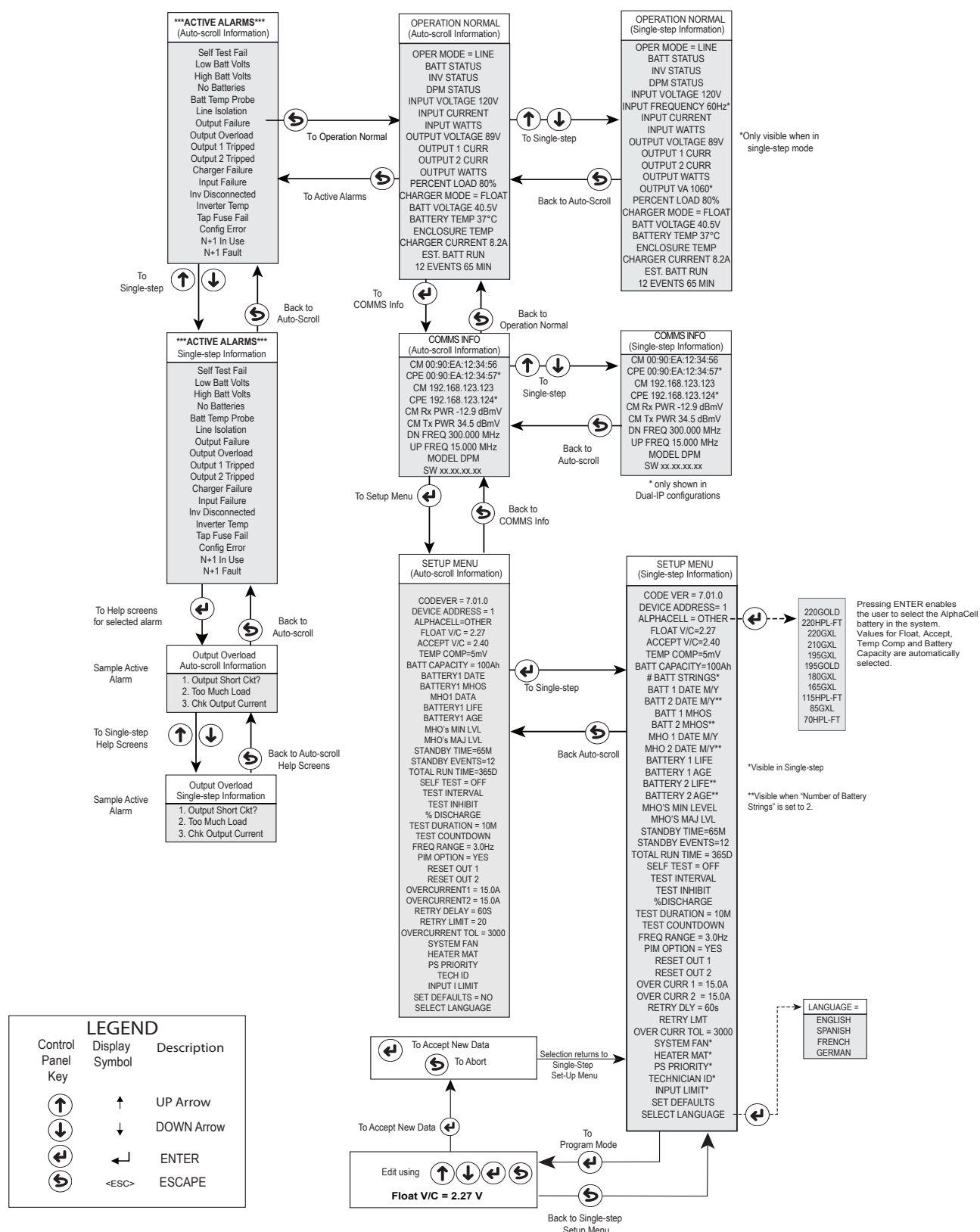




#### 4.0 Operation, continued

### 4.3 Smart Display modes for XM2-300HP, continued

#### 4.3.5 Menu Structure and Navigation (from Active Alarms screen)





## 4.0 Operation, continued

### 4.4 Alarm Indications

In the event of a failure, the Active Alarm displays which alarms are active and how to correct the alarm condition. Major alarms cause the red LED to flash (See Section 4.5).

- Press UP or DOWN to stop Auto Scroll. Arrows on the right-hand side of the display text indicate which keys to press to display the next menu item.
- Press UP or DOWN to select the alarm of interest.
- Press ENTER to select the alarm and display diagnostic information. Press ESCAPE to return to the alarm list.



---

**NOTE:**

If only one alarm is active, the alarm list is bypassed and diagnostic information for the single active alarm displays.

A Help sub-menu provides possible remedies relating to the active alarm. To access the Active Alarm Help sub-menu, scroll to the alarm of interest and press ENTER. The diagnostic information initially auto scrolls. To enter manual scroll mode, press either UP or DOWN. Press DOWN to scroll through the list of remedies.

Alarms are classified in two categories:

**MAJOR Alarms** are indications of a serious failure within the XM2-300HP , such as a loss of output voltage or a failed battery charger. Any situation that causes output failure is considered a Major Alarm. Major alarms require immediate action to correct the failure. To correct major alarms, follow the Smart Display on-screen instructions.

**MINOR Alarms** indicate a less serious failure, such as defective dual RTS or loss of utility power. Corrective action can be delayed for a short time. To correct, follow the Smart Display on-screen instructions.

The alarm matrices on the following pages indicate the MAJOR/MINOR active alarms, the probable cause, and troubleshooting items to check to correct the alarm condition.



## 4.0 Operation, continued

### 4.4 Alarm Indications, continued

Major Alarms		
Active Alarm	Probable Cause of Alarm	Corrective Action
SELF TEST STATUS	Output voltage failed or batteries less than 1.85V/cell during Selt Test.	1. CHECK BATTERIES 2. CHECK INVERTER Refer to Notes below for additional information.
INVERTER STATUS	Predicted overall health of the inverter calculated by the power supply's proprietary algorithm.	1. CHECK INVERTER 2. REPLACE INVERTER
OUTPUT OVERLOAD	The output is overloaded or shorted.	1. REMOVE SHORT CIRCUIT 2. REDUCE OUTPUT LOAD 3. REPLACE POWR SPLY
OUTPUT 1 TRIPPED	Output 1 PIM hardware protection mode engaged and is overloaded.	1. REDUCE OUTPUT LOAD 2. CHECK PIM SETTINGS
CHARGER FAILURE	Charger has failed or shutdown, possible battery over-temperature.	1. RESEAT INVERTER 2. PERFORM SELF TEST 3. REPLACE INVERTER
INVERTER TEMP	Inverter heat sink has exceeded set temperature (Stand-by operations suspended until temp drops to safe level).	1. CHECK VENTILATION 2. REPLACE INVERTER
CONFIG ERROR	The power supply is improperly configured and operation is suspended until error is corrected.	1. CHECK INVERTER MODULE
BATTERY STATUS	Predicted overall health of the batteries calculated by the power supply's proprietary algorithm.	1. CHECK BATTERIES 2. REPLACE BATTERIES
LOW BATT WARNING	Batteries dropped below 1.85 V/cell.	1. SHUTDOWN IMMINENT 2. CHECK AC INPUT 3. CONNECT GENERATOR
HIGH BATT WARNING	Batteries raised above 2.50 V/cell.	1. CHECK CHGR SETTINGS 2. REPLACE INVERTER
BATT DELTA MHO'S VERY LOW	Conductance delta major alarm threshold has been exceeded.	1. CHECK ALARM THRESH 2. REPLACE BATTERY
OUTPUT FAIL	Power Supply output has failed.	1. CHECK OUTPUT TYPE 2. OUTPUT OVERLOADED? 3. CHECK INVERTER
LINE ISOLATION	AC plug is connected to the inverter. The potential for backfeed exists.	1. REPLACE POWER SUPPLY

Table 4-2, Major Alarms



**NOTE:**

Note 1: To clear a Latched Self-Test Fail Alarm, initiate and complete a successful self-test.

Note 2: Remove and replace XM2-300HP. **Do not try to clear alarm or while in service.**



## 4.0 Operation, continued

### 4.4 Alarm Indications, continued

Minor Alarms		
Active Alarm	Probable Cause of Alarm	Corrective Action
INPUT FAILURE	Utility AC Input has failed	1. CHECK AC INPUT 2. RESTORE AC INPUT 3. CONNECT GENERATOR
INPUT CURRENT LIMIT	AC Input current exceeds threshold setting.	1. REDUCE OUTPUT LOAD 2. CHECK INPUT CURRENT LIMIT SETTING
BATT DELTA MHO'S LOW	Conductance delta minor alarm threshold has been exceeded.	1. CHECK ALARM THRESHOLD 2. REPLACE BATTERY
BATT TEMP PROBE	Remote Temp Sensor (RTS) failed or is not connected.	1. CHECK CONNECTION 2. REPLACE SENSOR
BATTERY AGING ALARM	The battery is nearing the expected end of life.	1. VERIFY BATTERY DATE 2. CHECK DATE/TIME

Table 4-3, Minor Alarms



## 4.0 Operation, continued

### 4.5 Control Panel LEDs

Two front panel LEDs indicate the condition and status of the XM2-300HP.

The green Output LED, when lit, indicates the power supply is functioning normally and supplying output AC to the load. A flashing output LED indicates a minor alarm has been detected. If the Output LED is off, a major alarm has been detected.

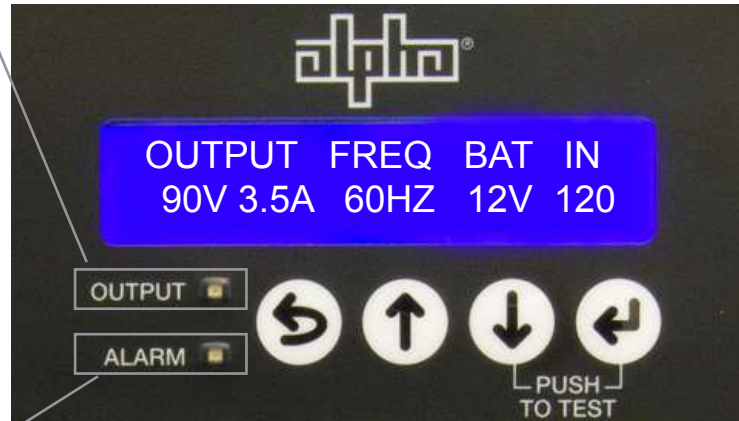
The red Alarm LED flashes to indicate a major alarm has been detected. This state clears when the alarm is no longer present. Under typical operating situations, the red Alarm LED is off. This indicates normal power supply operation.

#### OUTPUT LED (green)

SOLID = Operation Normal

FLASHING = Minor Alarm

OFF = Major Alarm



#### ALARM LED (red)

FLASHING = Major Alarm

OFF = Minor Alarm

OFF = Operation Normal

Fig. 4-7, Smart Display LEDs



## 4.0 Operation, continued

### 4.6 Smart Display Glossary

**Battery Capacity:** The capacity of the battery strings attached to a particular XM2-300HP. When batteries are not attached, the setting must be programmed to “0.” This disables standby operations, including test mode, and disables the No Batteries Alarm. If batteries are attached, then this setting should be programmed to the total rating of all the battery strings.

**Battery Conductance (MHO's) Reading:** The battery conductance is measured in Siemens and can be determined using a battery analyzer. This measurement is related to the internal resistance of the battery and is useful in evaluating and maintaining the battery.

**Battery Date Code:** This is the battery's date of manufacture and is used to determine the age of the battery.

**Battery Life Expectancy:** The Manufacturer's expected service life of the battery.

**Battery Type:** The AlphaCell battery type can be specified in the smart display (if not AlphaCell, leave as default battery type, Other). If AlphaCell is selected, Accept, Float, Temp, Comp and Battery Capacity is automatically selected. If Other, these parameters will need to be manually set to the manufacturer's recommended rating.



#### NOTE:

If AlphaCell is selected, Accept, Float, Temperature Compensation, and Battery Capacity are not displayed.

**Charger Accept Voltage:** Battery Accept charge voltage control in volts per cell. This voltage, 2.40Vdc (adjustable) per cell, is temperature compensated to ensure longer battery life. It properly completes the charge cycle and is factory set for AlphaCell batteries. If another manufacturer's batteries are used, consult the battery manufacturer for Accept voltage levels.

**Charger Float Voltage:** Battery Float charge voltage control in volts per cell. The average is approximately 2.27Vdc (adjustable) per cell. It is factory set for AlphaCell batteries. If another manufacturer's batteries are used, consult the battery manufacturer for Float voltage levels.

**Charger Temperature Compensation:** Battery charger temperature compensation control. Programming this parameter to “0.0” disables temperature compensation. It is factory set for AlphaCell batteries (5mV/cell). If another manufacturer's batteries are used, consult the battery manufacturer for Charger Temperature compensation ranges.

**Date of Last Conductance (MHO's) Reading:** The date the last conductance test was performed on the battery.

**End of Battery Discharge (EOD):** The point at which the battery is fully discharged (default 1.75V/C \* 6 cells) and the power supply shuts off, preventing permanent damage to the batteries.

**Frequency Range Limit:** AC input voltage frequency range limit. This limit establishes the acceptable input frequency range outside of which standby operation is initiated.

**Output 1 Overcurrent Trip level:** *Primary leg:* Value of RMS current that causes an overcurrent trip on the Output 1 + Output 2 protection relay after a specified delay. This limit is linked to counter data item Overcurrent Tolerance Period. This parameter is only visible when the Protective Interface Module (PIM) is installed.

**Output 2 Overcurrent Trip level:** *Secondary leg:* Value of RMS current that causes an overcurrent trip on the Output 2 protection relay after a specified delay. This limit is linked to counter data item Overcurrent Tolerances Period. This parameter is only visible when the optional PIM is installed.

**Major Conductance Alarm:** The alarm issued when the battery conductance is below the critical level. This is an indication the battery is near the end of its useful life.

**Minor Conductance Alarm:** The alert issued when the conductance of the battery has dropped below the preset minor limit. This is an indication the battery is aging and may require close observation.



## 4.0 Operation, continued

### 4.6 Smart Display Glossary, continued

**Overcurrent Tolerance Period:** An output overcurrent condition is tolerated on either of the PIM outputs for this amount of time. When this delay expires, the output protection relay disables the output. This parameter is only visible when the Protective Interface Module (PIM) is installed.

**Power Supply priority:** The Power Supply Priority is set by the service provider and identifies the priority level of the unit at time of service if multiple service calls are issued simultaneously.

**Reset Output 1, Reset Output 2:** Programming this feature resets the corresponding output in the event one or both outputs are tripped. Upon clearing the alarm, either manually or via an automatic retry, the output(s) remain on. This parameter is only visible when the Protective Interface Module (PIM) is installed.

**Retry Delay:** PIM option output fault retry interval timer. This is the period of time between each attempt to restart an output connection. A value greater than 600 seconds disables the automatic retry function. This parameter is only visible when the Protective Interface Module (PIM) is installed.

**Retry Limit:** PIM fault retry count limit. This is the number of times the XM2-300HP attempts to restart an output connection at the frequency specified by Retry Delay. Once the retry limit is exceeded, attempts to restart the feeder occur indefinitely, once every 30 minutes. This parameter is only visible when the Protective Interface Module (PIM) is installed.

**Set Defaults:** When programmed to YES, all the programmable data levels (except DEVICE ADDRESS) are reset to the original factory settings.

**Self Test:** When programmed to YES, the XM2-300HP automatically starts a 10 second self-test 30 seconds after initial start up

**Standby Events:** XM2-300HP standby events counter. This does not include self test events. Use the Setup Menu to reset Standby Events to zero.

**Standby Time:** The total amount of time the XM2-300HP has operated in standby mode. This does not include self test time and represents the sum total number of minutes of AC line failure since the last time the counter was reset. Use the Setup Menu to reset Standby Time to zero.



#### NOTE:

Resetting factory defaults does not clear Standby Events or Standby Time.

**Technician ID number:** The Technician ID number is determined by the service provider and is entered to record the service history of the unit.

**Test Countdown:** The number of days remaining before the next scheduled automatic self-test initiates. This variable is programmable and you can select the day that the autotest sequence will begin. This counter has no effect if test interval is set to 0.

**Test Duration:** Automatic self test duration timer. This sets the number of minutes the XM2-300HP performs a battery maintenance cycle test. This timer applies to automatically or manually initiated tests.

**Test Discharge percentage:** The depth of discharge allowed during a battery/inverter test and is based on battery capacitance and power supply load.

**Test Inhibit:** Becomes active when programmed by the operator (or when the unit runs in inverter mode for more than 5 minutes). The XM2-300HP delays the start of a scheduled self test for seven days if the test countdown is less than seven days (See Section 4.4, Automatic Performance Test for complete details).

**Test Interval:** Automatic self test control timer. The number of days between battery maintenance cycle tests. Set this value to zero to disable automatic self test.

**Total Run Time:** The amount of time (in days) the power supply has functioned in any mode of operation. This is not a resettable value.



## 4.0 Operation, continued

### 4.7 Automatic Performance Test

**Automatic Self-Test:** The XM2-300HP can periodically perform an automatic self test to verify the state of the battery and the inverter circuitry. The automatic test feature has several programmable parameters that determine the frequency and duration of automatic tests. In addition to automatic testing, you can manually put the XM2-300HP into test mode by pressing ENTER and DOWN simultaneously. A running test may be halted manually by pressing ENTER and DOWN a second time.

The test sequence process:

- Begins with a check to verify that battery is attached and the battery switch is OFF. If the battery is discharged or not connected, the XM2-300HP does not attempt to operate in inverter mode, preventing a drop of the load.
- Next, the XM2-300HP switches to standby mode for a pre-programmed period. Successful completion of a test sequence indicates the XM2-300HP is operating normally in standby mode, the battery voltage did not drop below a preset threshold, and the output was stable throughout the test. Failure of test is indicated by a Self Test Fail alarm, which can be cleared by subsequently running a successful test for at least one minute.

**Test Control:** You can initiate a manual test (or a running test may be halted) at any time by pressing ENTER and DOWN simultaneously or by changing the Self Test switch via the front panel interface or status communications. You can also start a self test via the status monitoring card.

To prevent an automatic test scheduled to occur in the next week, issue a Test Inhibit command. This command is useful if periodic maintenance of the power supply is scheduled close to the next scheduled automatic test.

This control feature may also be used when inclement weather is expected that might cause a utility failure. The Test Inhibit command only affects an automatic test scheduled to run in the next seven days. Multiple issues of the Test Inhibit command result in the deferral of the next automatic test until at least seven days after the last request. This command has no affect if an automatic test is not scheduled to take place in the next week. Starting a test manually overrides the Test Inhibit command.

The automatic test feature is on by default. To turn auto-test off, change Test Interval to 0 days in the Setup Menu. Auto-test may be enabled at any time by changing the test interval to any numerical value (excluding "0"). The default test interval is 30 days.

**Test Countdown:** Indicates a pending automatic test.

**Test Duration:** The Test Duration is adjustable to meet customer requirements. Exercise caution when increasing the parameter because long self tests compromise the standby capability during, and shortly after, the test.

**Standby Time and Standby Events:** Counters that are not incremented during XM2-300HP self tests.



## 4.0 Operation, continued

### 4.8 Providing Power via Portable Generator or Inverter

In the event of an extended utility failure, an external AC or DC power supply can provide backup power to the system. This backup power enables the power supply to continue charging the batteries ensuring interrupted service to the network. Follow the documentation and connection procedures listed below.

#### 4.8.1 AC Powering

Should it become necessary to power the CATV system with a portable AC generator, truck-mounted AC generator or truck-mounted inverter, follow the procedures below for the protection of service personnel and powering system equipment.

##### Connection Procedure:

1. Read the Smart Display to determine if there is output power to the system. If there is still power to the system, check the battery voltage on the Smart Display:
  - If the battery voltage is greater than 11.5Vdc then approximately one hour remains to complete the changeover to generator power before the cable system loses power to its customers.
  - If the battery voltage is less than the previous numbers, move rapidly as there is not much time until the system fails. However, exercise caution as there are dangerous voltages in the system that can shock you or damage the cable amplifiers.
2. Verify the AC Input breaker from the utility powering system is in the OFF position. This ensures that if power returns suddenly, you will not experience a surge in power. This also ensures when you connect the generator it will not put AC voltage back onto the power lines.
3. Properly ground the generator by connecting a #6 AWG wire from the grounding lug on the output panel of the generator to either a driven ground rod or the strand ground on the pole to which the power supply is mounted. If working with a ground-mounted power supply, locate the grounding point inside the enclosure and clamp on to that point.



##### CAUTION!

Grounding the generator is *mandatory* for safety and for proper operation of the power supply.

4. After the generator is properly grounded, unplug the power supply from the convenience outlet inside the enclosure and plug the power supply input cable into the generator output. Use an NEC or UL approved extension cord.
5. Start and operate the generator according to the generator operation manual.
6. If the generator kilowatt rating is twice the Watts used by the power supply indicated on the Smart Display, leave the battery breaker on and the generator will charge the batteries. If the generator fails, the power supply will continue to provide battery backup. If the generator output is not approximately twice the Watt rating indicated on the Smart Display, switch the battery switch off to reduce the load on the generator if battery backup of the system is unavailable.



## 4.8 Providing Power via Portable Generator or Inverter, continued

### 4.8.1 AC Powering, continued

7. In either case, after the power from the generator is applied to the power supply, use the Smart Display to increase the Frequency Input Tolerance to  $\pm 6\text{Hz}$  from the normal  $\pm 3\text{Hz}$ , inhibiting the power supply from switching to battery backup if the generator occasionally does not operate on the proper frequency. It is not uncommon for smaller (4 kilowatt or less) sized generators to get “off frequency” due to the step loading of the power supply.



### **WARNING!**

Ground the vehicle before operating a truck inverter or truck-mounted generator. Failure to do so places service personnel at risk for electric shock.

### 4.8.2 Using a Truck-mounted Inverter or Generator

To use a truck-mounted inverter or generator follow the steps listed in Section 4.8.1. with the additional step of grounding the truck. Run the ground wire from an unpainted point on the truck chassis to either a driven ground rod or strand ground to complete the grounding circuit. The rubber tires on the truck insulate it from being grounded in all but the most exceptional circumstances.



## 4.9 Resumption of Utility Power



### WARNING!

Use caution when disconnecting and reconnecting a generator to utility power. Dangerous voltages are present.



### CAUTION!

Exercise care to ensure that both powering systems are **not** connected at the same time, or damage to the power supply and the generator may result.

1. Before turning on the AC voltage input breaker, use a voltmeter to verify the input voltage is within specifications.
2. When the proper voltage is present, verify the battery voltage indicated on the Smart Display is greater than 10.5Vdc. Disconnect the power supply from the generator output and plug the power supply input cord into the convenience outlet within the enclosure. The power supply operates on battery backup for this short period of time, but exercise caution during this changeover as the grounding circuit to the power supply is broken.  
  
If the battery is at or below the low voltage cutoff, then the power supply will NOT transfer to battery back up and there will be a momentary power outage to the cable system while you make this changeover.
3. Turn on the AC input power.
4. Shut down the generator and remove the grounding system.



## 5.0 XM2-300HP Maintenance

A routine maintenance program, performed every three to six months, ensures the XM2-300HP will provide years of trouble-free operation.

Good battery care is the first step in any power supply maintenance program. In addition to voltage checks, visually inspect the batteries for signs of cracking, leaking or swelling.

To aid in quick identification and tracking of voltages in the maintenance log, number the batteries inside the enclosure using labels or masking tape. Batteries are temperature sensitive and susceptible to overcharging and undercharging. Since batteries behave differently in the winter than in the summer, Alpha's battery chargers automatically compensate for changes in temperature by adjusting float and accept charge voltages.



### CAUTION!

- The XM2-300HP must be serviced by qualified personnel.
- Use heavy gloves when handling an XM2-300HP that has recently been taken out of service. The transformer generates heat that may cause burns if handled with bare hands.
- Alpha Technologies is not responsible for battery damage due to improper charger voltage settings. Consult the battery manufacturer for correct charger voltage requirements.
- When removing batteries, ALWAYS switch the battery switch off before unplugging the battery connector.
- Always wear safety glasses when working with batteries.

## 5.1 System Information

Observe and record the following system information from the Operation Normal and Additional Information menus in the maintenance log in Section 5.8.

Operation Normal:	Input Voltage	Output 2 Voltage (Only with factory-installed PIM option)
	Output 1 Voltage	Output 2 Current (Only with factory-installed PIM option)
	Output 1 Current	Standby Events
	Battery Voltage	Charger Mode
	Standby Time	Operation Mode
	Battery Temperature	Charger Current
	Input Frequency	Output Watts
	Output VA	Percent Load
Comms Status/Menu:	CM	CPE
	CM MAC	CPE MAC
	CM Version	DSM Version
	CMTX	CMRX



## 5.0 XM2-300HP Maintenance, continued

### 5.2 Battery Charger Voltage

The advanced three-stage charging features of the XM2-300HP are completely self-monitoring. During normal power supply operations, the power supply continuously verifies the operating condition of the battery charger. If, for any reason, the battery charger fails, a Charger Fail alarm displays on the Smart Display. No operator voltage checks are required.

### 5.3 Battery Terminals and Connecting Wires

- Check each battery terminal and connection.
- Verify hardware is clean and the crimped connectors are tight. Terminal connectors should be torqued and re-torqued to the battery manufacturer's recommended specifications.
- If there is an "in-line" fuse in the battery cable, check the fuse holder and fuse.
- Verify the terminals are properly protected with an approved battery terminal corrosion inhibitor such as NCP-2.
- Record date of maintenance in the maintenance log.



#### NOTE:

Whenever the battery breaker is turned off, or the batteries are not connected, the XM2-300HP automatically reports a No Batteries alarm. This is a built in safety feature. The unit does not attempt inverter operations, either standby or test, during a No Battery alarm.

### 5.4 Output Voltage

Observe Output voltages using the Smart Display. Record the voltages in the maintenance log.

### 5.5 Output Current

With the XM2-300HP in normal operating mode observe the Smart Display Output Current. The value of output current is dependent on the total amount of load connected to the power supply. Record the current in the maintenance log.

### 5.6 Check Output Connections

Inspect the XM2-300HP output connectors to prevent problems that may be caused by improper connector engagements. A good inspection consists of a careful visual inspection.

#### 5.6.1 Visual Inspection

1. Unplug and inspect the XM2-300HP output connections, using the Service Power Supply to safely bypass the XM2-300HP.
2. Remove the AC and DC power sources from the XM2.
3. Carefully inspect the separated halves of each connector for signs of abnormal heating, such as a deformed housing or other damage.



## 5.0 XM2-300HP Maintenance, continued

### 5.7 Inverter Module Maintenance

1. Carefully remove the inverter module assembly (see Section 2.3, Inverter Module Removal and Installation).
2. Inspect the inverter module for signs of dust or corrosion.



#### CAUTION!

Circuit boards are static-sensitive and must be handled with care.

3. Inspect ventilation holes to verify they are clear of obstruction from debris or other equipment.
4. Reinstall the inverter module (see Section 2.3 Inverter Module Removal and Installation) and test the XM2-300HP for proper operation (see Section 4.1, Start-up and Test).



#### CAUTION!

If the XM2-300HP fails the following test, there will be a loss of power to the load without the use of a Service Power Supply. Do not perform the next test step if the power supply or battery is suspect, or the load is at a critical stage.

5. If the XM2-300HP passes all previous tests (e.g. Battery Load Test, Self Test):
  - Turn off the utility input breaker to remove input power. The XM2-300HP will go into standby operation.
  - Verify there is no interruption to the output.
  - Observe the battery voltage reported on the Smart Display. If battery voltage drops below 11.5Vdc, reapply utility power immediately. After five minutes reapply utility power. The power supply then transfers back to Operation Normal, clears any alarms and starts the battery charger (BULK mode, if needed). This test adds standby events and time to the event counter.



## 5.0 XM2-300HP Maintenance, continued

### 5.8 Maintenance Log

Battery Maintenance		
	Battery 1	Battery 2
Battery Manufacturer		
Date Code/Lot Number		
Terminal Check		
Voltage (Unloaded)		
Voltage (Loaded)		
Mhos level (Date / Date)	/	/
XM2-300HP Maintenance		
Model Number		
Serial Number		
Operation Normal		
Input Voltage		
Output (1) Voltage		
Output (2) Voltage		
Output (1) Current		
Output (2) Current		
Battery Voltage		
Standby Events		
Standby Time		
Charger Mode		
Operation Mode		
Battery Temperature		
Charger Current		
Input Frequency		
Output Watts		
Output VA		
Percent Load		
Communications Status		
CM		
CM MAC		
CM Version		
CMTX		
CPE		
CPE MAC		
DSM Version		
CMRX		
Commissioning		
Service Technician		
Date Serviced		



## 6.0 Return and Repair Information

In the event you need to return the power supply to Alpha and Outback Energy for service, a Return Material Authorization (RMA) form must accompany the unit. The form can be found at AOE's Web site ([www.alpha-outback-energy.com](http://www.alpha-outback-energy.com)). Follow the instructions contained in the form to obtain an RMA. Once an RMA number has been issued, pack the unit per instructions and return to the service center assigned by Alpha and Outback Energy Or, if preferred, contact Alpha and Outback Energy at +49 9122 79889 0 for assistance.



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**NOTE:**

Any information pertaining to the nature of the power supply failure or problem, along with a copy of the power supply's maintenance log, should be included with the returned XM2-300HP.



## 6.0 Return and Repair Information, continued

### 6.1 Emergency Shutdown

The XM2-300HP contains more than one live circuit. During an emergency, utility power can be disconnected at the service entrance or main electrical panel to protect emergency personnel. However, power is still present at the output. To prevent the possibility of injury to service or emergency personnel, always follow this procedure to safely shutdown the power supply.

#### Emergency Shutdown Procedure:

- **STEP 1:** Turn the battery switch to OFF.
- **STEP 2:** Unplug the AC Input Line Cord from the service entrance.
- **STEP 3:** Disconnect both the Output 1 and Output 2 connections.

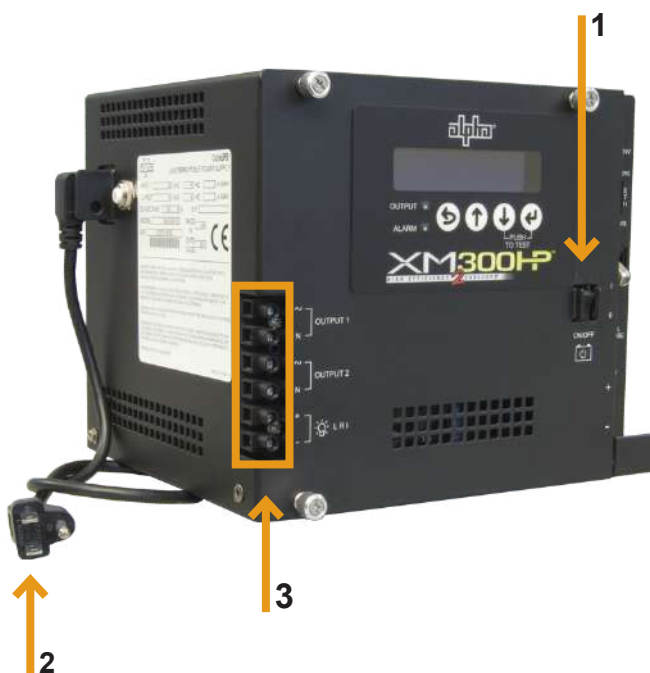


Fig. 6-1 Emergency Shutdown



## 7.0 Specifications

The following tables show the electrical, mechanical, and physical specifications for the various models of the XM2-300HP power supply.

	<b>XM2-300HP</b>	<b>XM2-300CE-HP</b>
<b>ELECTRICAL INPUT</b>		
Input Voltage	+10%/-15% of nominal	+10%/-15% of nominal
Input Frequency	60Hz $\pm$ 3%	50Hz $\pm$ 3%
Input Power Factor at Nominal	0.9	0.9
Input Line Voltage	120	230
Low Line Voltage	102	195
High Line Voltage	132	253
Input Current (max)	6	4
Input Frequency ( $\pm$ 3%)	60	50
<b>OUTPUT</b>		
Output Power	300W	300W
Output Voltage	60 / 87V	63Vac
Output Current	6	5
Output Voltage Regulation	$\pm$ 5%	$\pm$ 5%
Inverter Output Frequency	$\pm$ 0.1%	$\pm$ 0.1%
Output Current Limit	150% of max. output rating	150% of max. output rating
Inverter Transfer Time	<4ms	<4ms
Efficiency	93% Line Mode 86% Inverter Mode	93% Line Mode 86% Inverter Mode
PIM Option	2 outputs @ 3.5-5A	2 outputs @ 1-5A
Smart Display	Std 2x20 backlit LCD	Std 2x20 backlit LCD
<b>BATTERY</b>		
Battery Voltage	12Vdc	12Vdc
Low Voltage Cutout	10.5Vdc	10.5Vdc
Float Voltage	13.6Vdc nominal	13.6Vdc nominal
Equalize Voltage	14.4Vdc nominal	14.4Vdc nominal
Temp Compensation	0.0 to 0.005Vdc/C/C°	0.0 to 0.005Vdc/C/C°
Current Charger (max)	10A	10A
Typical Recharge Time	12Hr w/100Ah battery	12Hr w/100Ah battery
<b>MECHANICAL</b>		
Chassis Dimensions W x H x D(in/mm)	8.5 x 9.75 x 8.0 216 x 248 x 203	8.5 x 9.75 x 8.0 216 x 248 x 203
Shipping Weight (lb/Kg)	23/10.4	25/11.3
Inverter & Connections	Front panel access	Front panel access
<b>ENVIRONMENT</b>		
Operating Temperature	-40°C to +55°C	-40°C to +55°C
Humidity	0 to 90% Non-condensing	0 to 90% Non-condensing

Table 7-1, XM2-300HP Power Supply Specifications



## 7.0 Specifications, continued

### 7.1 Safety and EMC Compliance

North American Product Compliance	
Safety (NRTL/C)	UL1778 and CSA C22.2 No.107.1, CSA C22.2 No. 107.3 UL/CSA 60950-1
Electromagnetic Compatibility (EMC):	FCC Part 15, sub-part B, Class B (when installed in Alpha enclosure)
European Union Product Compliance	
<u>Safety (CE)</u>	
Low Voltage Directive	2006/95/EC
Technical Standards	EN 62040-2 Category 1 (when installed in Alpha enclosure), EN 60950-1 EN 50083-2:2006 CATV EMC (when installed in Alpha enclosure)
<u>Electromagnetic Compatibility (EMC)</u>	
EMC Directive	2004/108/EC
Technical Standards	EN 62040-2 Category 2

#### **ATTENTION:**

A separate product specification document can be supplied for models not covered in this manual.













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