Alpha Micro, Micro XL, Micro XL3 UPS

Installation & Operation Manual

Part # 017-237-B0

Effective: 09/2012

Alpha Micro, Micro XL, Micro XL3 UPS Installation and Operation Manual

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, 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 inconsistent with its intended purpose, or if installed or operated in an unapproved manner, or improperly maintained.

For technical support, contact Alpha Technologies:

Canada and USA: **1-888-462-7487**
International: **+1-604-436-5547**
Email: **support@alpha.ca**

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1. Safety

SAVE THESE INSTRUCTIONS: This manual contains important safety instructions that must be followed during the installation, servicing, and maintenance of the product. Keep it in a safe place. Review the drawings and illustrations contained in this manual before proceeding. If there are any questions regarding the safe installation or operation of this product, contact Alpha Technologies or the nearest Alpha representative. Save this document for future reference.

1.1 Safety Symbols

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.

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. Notes are designated with a checkmark, the word NOTE, and a rule beneath which the information appears.

CAUTION!

CAUTION indicates safety information intended to PREVENT DAMAGE to material or equipment. Cautions are designated with a yellow warning triangle, the word CAUTION, and a rule beneath which the information appears.

WARNING!

WARNING presents safety information to PREVENT INJURY OR DEATH to personnel. Warnings are indicated by a shock hazard icon, the word WARNING, and a rule beneath which the information appears.

HOT!

The use of HOT presents safety information to PREVENT BURNS to the technician or user.

1.2   General Warnings and Cautions

You must read and understand the following warnings before installing the Alpha Micro and its components. Failure to do so could result in personal injury or death.

- Read and follow all instructions included in this manual.

- Do not work alone under hazardous conditions.

- Only qualified personnel are allowed to install, operate and service this system and its components.

- Use proper lifting techniques whenever handling equipment, parts, or batteries.

- Always assume electrical connections or conductors are live. Switch off all circuit breakers and double-check connections with a voltmeter before performing installation or maintenance.

- Place warning label(s) on the utility panel to tell emergency personnel a UPS is installed.

- The Alpha Micro uses more than one live circuit. AC power may be present at the outputs even if the system is disconnected from line or battery power.

- The Alpha Micro's surface can be very hot to the touch.

- Battery installation and servicing should be done or supervised by personnel knowledgeable about batteries and their safety procedures.

- If electrolyte splashes on your skin, immediately wash the affected area with water. If electrolyte gets into your eyes, wash them for at least 10 minutes with clean running water or a special neutralizing eye wash solution. Seek medical attention at once.

- Neutralize spilled electrolyte with special neutralizing solutions in a "spill kit" or a solution of 1 lb. (0.45 kg) of baking soda (bicarbonate of soda) in 1 gallon (3.8 L) of water.

- Be extra cautious when connecting or adjusting battery cabling. An improperly connected battery cable or an unconnected battery cable can result in arcing, fire, or explosion.

- Use new batteries when installing a new unit. Verify that all batteries are the same type with identical date codes.

- Always replace batteries with ones of identical number, type and rating. Never install old or untested batteries. One sealed lead-acid battery is rated to a maximum voltage of 12 VDC.

- A battery that shows signs of cracking, leaking or swelling must be replaced immediately by authorized personnel using a battery of identical type and rating.

- Keep the chassis area clear and dust-free during and after installation.

- Keep tools away from walk areas where you or others could fall over them.

- Wear safety glasses when working under any conditions that might be hazardous to your eyes.

- Do not work on the unit or connect or disconnect cables during periods of lightning activity.

- Do not smoke or introduce sparks in the vicinity of a battery.

- Never open or damage the batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic and hazardous to the environment.

- A battery can present a risk of electrical shock and high short-circuit current. The following precautions should be observed when working on batteries:

  a. Remove watches, rings, or other metal objects.

  b. Use tools with insulated handles.

  c. Wear rubber gloves and boots.

  d. Do not lay tools or metal parts on top of batteries.

  e. Disconnect the charging source before connecting or disconnecting battery terminals.

  f. Determine if the battery is inadvertently grounded. If inadvertently grounded, remove the source from the ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if the grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

- Never let live battery wires touch the Alpha Micro the enclosure or any other metal objects. This can cause a fire or explosion.

- Never dispose of batteries in a fire. The batteries may explode. Follow the manufacturer's directions and check with your local jurisdictions for safe battery disposal.

- Before attaching the batteries to the Alpha Micro make sure that the polarity is correct.

- If the batteries have been in storage for more than 3 months, recharge them for at least 24 hours and then test them with a load before installation.

- Each AlphaCell™ battery has a date code, found on the warning label, which must be recorded in the maintenance log. If non-Alpha batteries are used, see the manufacturer's documentation for date code type and placement.

1.3   Certifications and Compliances

The Alpha Micro has been designed, manufactured, and tested to the requirements of the following national and international safety standards:

- CAN/CSA-C22.2 No. 107.3-05 – Uninterruptible Power Systems; additional requirements (RD): CAN/CSA-C22.2 No. 60950-1-03 - Information Technology Equipment - Safety.

- UL 1778 (Edition 4) – Uninterruptible Power Systems; additional requirements (RD): UL 60950-1 (Edition 1) - Information Technology Equipment - Safety.

- FCC CFR47 Part 15 Class A – This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2.   General Description

2.1   Overview

The Alpha Micro are designed with NEMA 3R rated enclosures for outdoor applications. Three different enclosures exist: (1) standard Micro, (2) Micro XL, and (3) Micro XL3. Each of these enclosures can be configured with the 300 W or the 1000 W power module (E-Module). Although the end system configuration may look different, the front panel connectors and circuit breakers along with the input and output terminal blocks are functionally the same. They all operate in the same way unless otherwise stated in this manual.

Alpha Micro
1 battery tray

Alpha Micro XL
2 battery trays

Alpha Micro XL3
4 battery trays

Figure 1 — Alpha Micro Family

Output terminal block

Input terminal block

Attachment fitting
for optional battery
restraining bar

Wire management panel

Attachment holes for
mounting bracket

Knockouts for wiring

Front panel securing screw
and attachment for user-
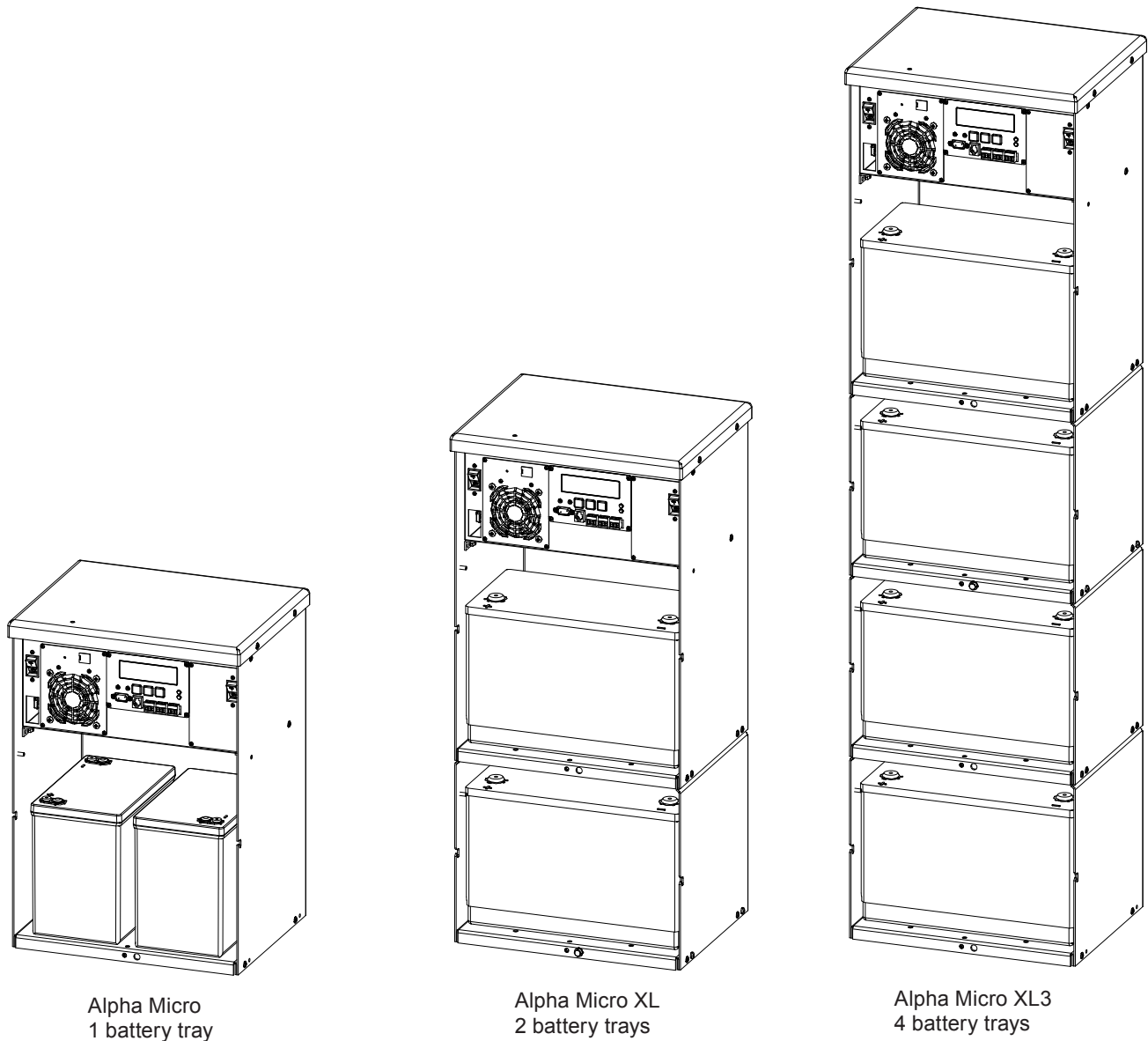provided lock
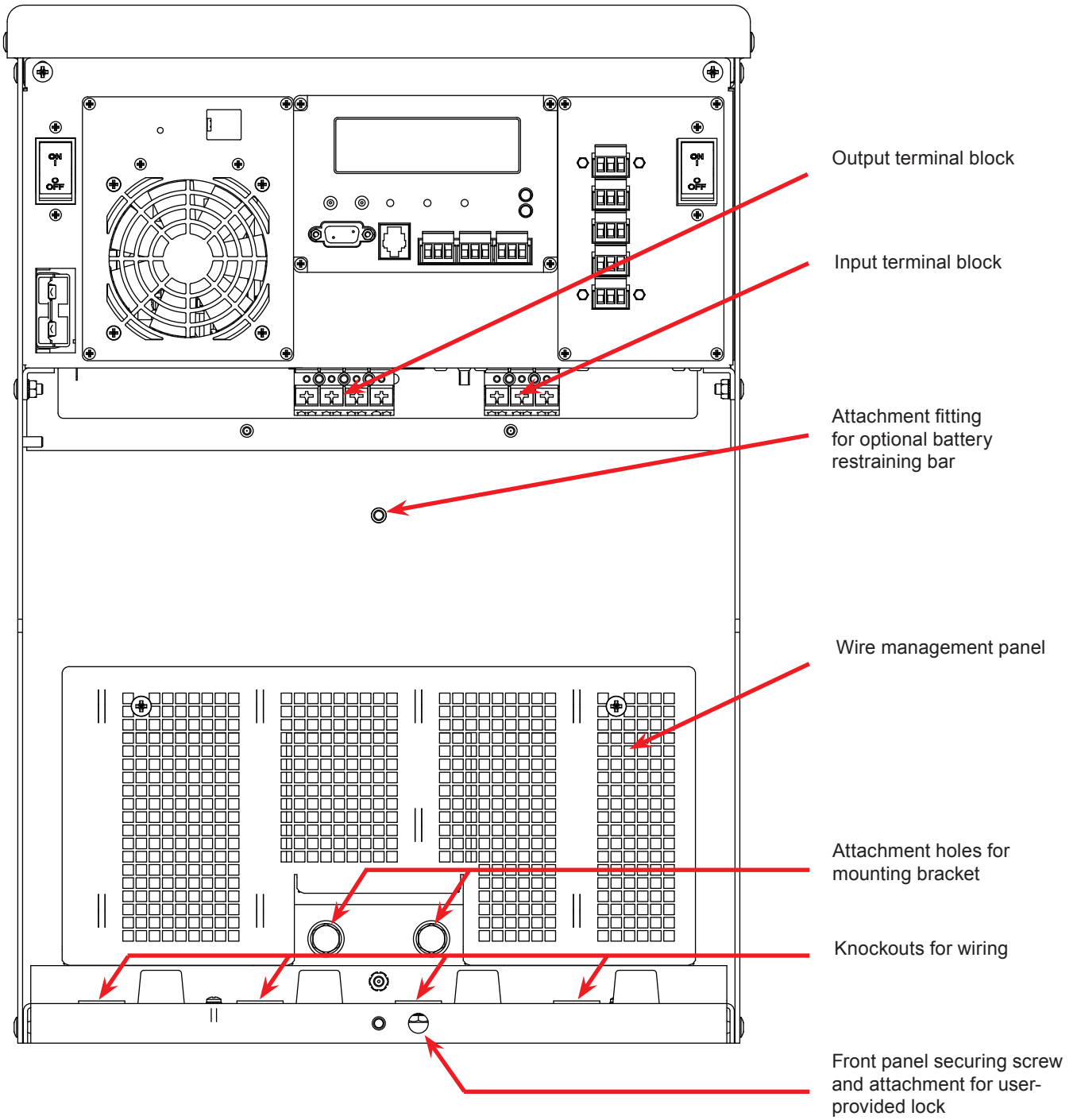
Figure 2 — Alpha Micro Interior

2.2 Front Panel.
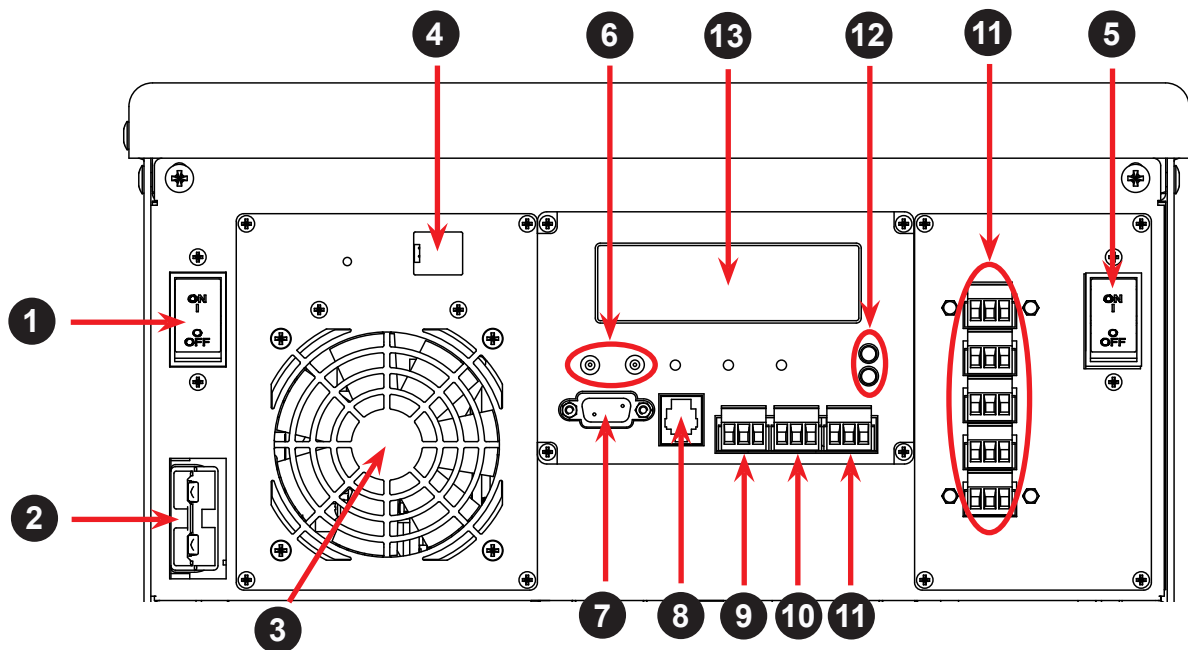
Figure 3 — Front panel description

1 Battery Circuit Breaker

This circuit breaker provides over-current protection and is uses as an on/off switch for the battery power. It must be switched on for proper UPS operation.

2 Battery Connector

The battery connector connects the external batteries to the Alpha Micro.

3 Internal Fan

This microprocessor-controlled fan regulates the Alpha Micro's internal temperature for optimum performance. It must not be blocked. If the fan fails, an alarm is generated.

4 Ethernet

This optional, RJ-45 connector is the Alpha Micro Ethernet connector.

5 AC Input Circuit Breaker

This circuit breaker is an on/off switch for line power into the Alpha Micro and provides input protection. It must be ON for proper UPS operation.

6 Battery Voltage Test Points

These let you measure the battery voltage. They accept 2 mm diameter test probe tips. The battery circuit breaker must be on to measure the voltage.

CAUTION!

Do not use the battery voltage test points as a power outlet. Failure to do so may damage the internal electronics.

7 RS-232 Port

This DE-9 connector allows a straight-through DE-9 to DE-9 connector cable to be used to connect the Alpha Micro to a computer for remote control and monitoring.

8 **Battery Temp Sensor**

The Battery Temp connector attaches the battery temperature sensor to the Alpha Micro to monitor the battery temperature. The charging voltage is temperature dependant. The Alpha Micro's microprocessor adjusts the charging voltage for optimum charging.

The sensor MUST be attached to the Alpha Micro for normal operation. Firmly attach the sensor end to the centre battery's case with high-strength flameproof tape such as duct tape as shown in "Wiring the External Batteries" section. If the sensor isn't attached, a "Temperature Probe Unplugged" alarm will appear on the LCD.

9 **User Input C7**

This optically isolated input lets you attach an external switch panel for remote control of the Alpha Micro.

- **19 (S1):** Shorting this contact to 22 (C) starts the Alpha Micro's self test.
- **20 (S2):** Shorting this contact to 22 (C) activates an alarm.
- **21 (S3):** Shorting this contact to 22 (C) disables the AC output. There is no AC output power, the LCD display shows "SHUTDOWN", but the Alpha Micro is still energized. A manual restart is required to put the Alpha Micro back to normal operation.
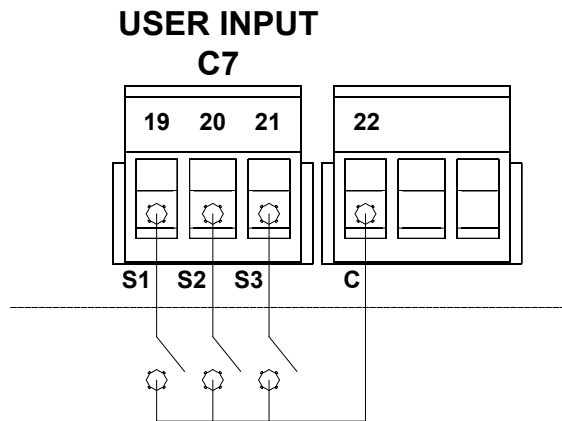- **22 (C):** Isolated return for contacts S1, S2 and S3.

Figure 4 — User Input Layout

10 **ATS C8**

When the Alpha Micro is in Inverter mode, the normally open relay closes (Figure 5), sending 48 VDC or 24 VDC from the batteries to this dry contact.

This contact can be used to power any external logic circuits or loads when the Alpha Micro is in Inverter mode.
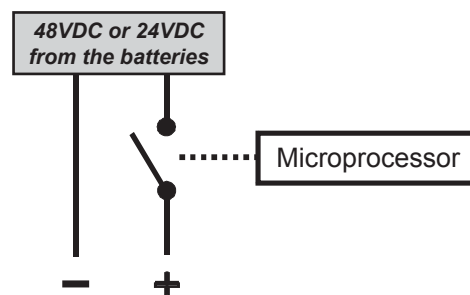
Figure 5 — ATS Contact

11 Dry Contacts C1 to C6

Contacts C1 to C5 allow the Alpha Micro to be connected to an external monitoring panel or to traffic control equipment.

The factory default settings can be reprogrammed to meet your requirements. See "Programming the Dry Contacts and the Clock" and "Alpha UPS Monitor, Operations, Relay and Load Shed".

For Contact C6, the factory default layout for this contact is a relay that is energized when the Alpha Micro is in Line or Inverter modes. It provides 48 VDC (500 mA) or 24 VDC (500 mA) from the external batteries to an external fan or other equipment. It can be factory-configured as a dry contact if requested. Figure 6 shows the contact's layout while Figure 7 shows the +48 VDC or +24 VDC terminal block layout.
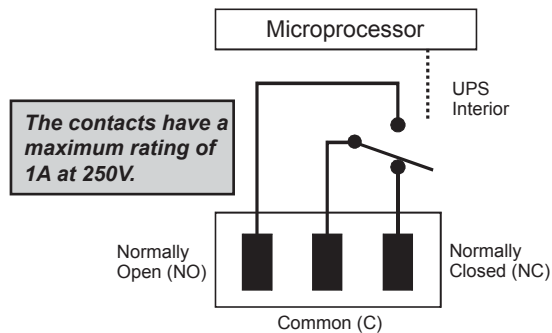
Figure 6 — Contact Layout (Standard for C1 to C5, Factory Option for C6)

C1: The C1 contact is energized when line power is unqualified and the Alpha Micro provides backup battery power to the load(s). It can be called the "On Battery" contact.

C2, C3: These contacts are energized when the battery drops below a pre-set voltage level. They can be called the "Low Battery" contacts. You can change the pre-programmed level to match the batteries used and the actual operating conditions. See "Operating the Alpha Micro "#35 Low Battery Warning Voltage".

C4: This contact is energized after the Alpha Micro has been in Inverter mode for 2 hours. It can be called the "Timer" contact.

You can change the pre-programmed 2 hours to match your operating conditions. See "Programming the Dry Contacts and the Clock, Setting the Timer Contact".

C5: The C5 contact is energized when the Alpha Micro is operating close to the specified limits. It can be called the "Alarm" contact.
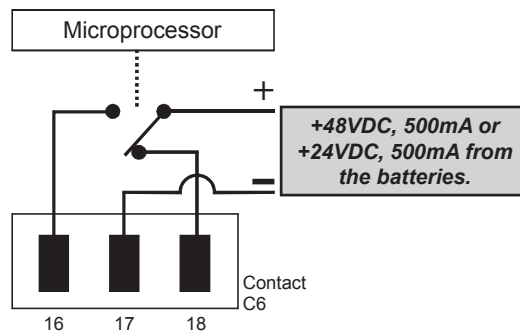
Figure 7 — 48 VDC / 24 VDC Contact Layout (De-energized Shown, Factory Default for C6)

12 **Status and Alarm LEDs**

Status: When this green LED is illuminated, the Alpha Micro is in Line mode and line power is provided to the load. When this LED is flashing, the unit is in Inverter mode and backup battery power is provided to the load.

Alarm: When this red LED is illuminated, there is a fault in the Alpha Micro. When this LED is flashing, there is an alarm.

13 **LCD Control Panel**

This panel and the **CANCEL**, **SCROLL** and **SELECT** buttons below it let you monitor and control the Alpha Micro.

3. Site Planning

The Alpha Micro must be installed in a restricted area accessible only by qualified service personnel.

The Alpha Micro must be correctly grounded for proper operation according to local and national electrical code.

Branch Circuit Protection: The utility line attached to the Alpha Micro input MUST be protected by a circuit breaker certified for this use in accordance with the local electrical code.

The AC input and AC output must each have a disconnect device attached. This device can be a listed branch circuit protection device or a disconnect switch used on AC Line only. Neutral or ground must never be disconnected by the user except during installation or maintenance.

3.1 Safety Precautions

- Install the Alpha Micro and batteries in a restricted access location, and on a structure that supports the total weight.
- The input wiring must reach a suitably grounded power outlet and the load wiring must reach the Alpha Micros output terminal blocks.
- In the Generator mode, the Alpha Micro's range of acceptable input frequency and voltage is expanded to accept the fluctuations created by a generator. See "Operating the Alpha Micro, Sense Type". Use a generator with electronic speed and voltage controls which produces less than 10% voltage total harmonic distortion (THD). Mechanical governors can force the Alpha Micro to run continuously in the Battery mode. Before installation, make sure the generator's output voltage is compatible with the Alpha Micro's input voltage requirements. To make sure the system runs smoothly, use a generator that supplies twice as much power as drawn by the total load.

3.2 Electromagnetic Compatibility (EMC) Requirements

Observe the following EMC requirements when setting up the Alpha Micro and its internal equipment:

- All AC mains and external supply conductors must be enclosed in a metal conduit or raceway when specified by local, national, and/or other applicable government codes and regulations.
- The customer facilities must provide suitable surge protection.

4.   Unpacking Alpha Micro

Follow these guidelines for unpacking the Alpha Micro.

⚡ **WARNING!**

The Alpha Micro is heavy, more than 45 kg (100 lb) with batteries. Use proper lifting techniques. The lifting and moving should be done by at least two people to avoid injury.

1. Select a suitable area for unpacking.

2. Store all the packing material and boxes for possible equipment returns.

3. Check the contents in your product package. See "Checking the Package Contents" on this page.

4. Compare the packing slip and the list of parts with the items you received. If the list of parts on your packing slip does not match the items you received, or any items appear damaged, immediately notify your carrier agent and the supplier who prepared your shipment.

4.2.1   Checking the Package Contents

Before starting the installation, inspect the package contents and make sure the following standard items as well as purchased options are included.

Table A — Standard Items	
Quantity	**Item**
1	Alpha Micro
1	Alpha Micro Operator's Manual
8	Terminal blocks and labels for the dry contacts
1	Temperature sensor cable

Table B — Optional Items	
Quantity	**Item**
	Batteries, if ordered from Alpha, will be shipped separately.
	Battery heating mats

5.   Installation

Once the installation location has been planned and prepared, you are ready to install the Alpha Micro. There are three steps to setting up the Alpha Micro:

1.   Mounting the Alpha Micro.

2.   Wiring the Alpha Micro.

3.   Wiring the external batteries.

5.1   Tools and Equipment Required for Installation

* Tools and equipment for mounting to a wooden pole.
* Tools and equipment for mounting to a concrete pole.
* Tools and equipment for mounting to a wall.

5.2   Transporting and Lifting

WARNING!

To avoid personal injury or damage to the equipment, always use at least two installation personnel to remove the unit from its container.

Electronic modules, batteries or other components, with the exception of factory-installed components, must not be installed until the Alpha Micro enclosure has been securely set in place at its permanent location. Transporting the unit with batteries installed may cause a short circuit, fire, explosion, and/or damage to the battery pack, enclosure and installed equipment. Damage caused by improper shipping or transporting a unit with batteries installed is not covered by the warranty.

CAUTION!

Enclosure must always remain in the upright position during the shipping, storage and installation process. Damage may result from enclosure being shipped or stored on its side.

A safe means of transportation to the site and a safe procedure for unloading the enclosure is necessary. At least two installation personnel are required to lift and handle it. The installation team must assess the transport path for all obstructions. An obstruction free path should be selected for transport. Use safe lifting practice at all times.

5.3   Mounting the Enclosure

The Alpha Micro can be wall or pole mounted as shown in the figures below Optional pedestal mounting is avail-able.
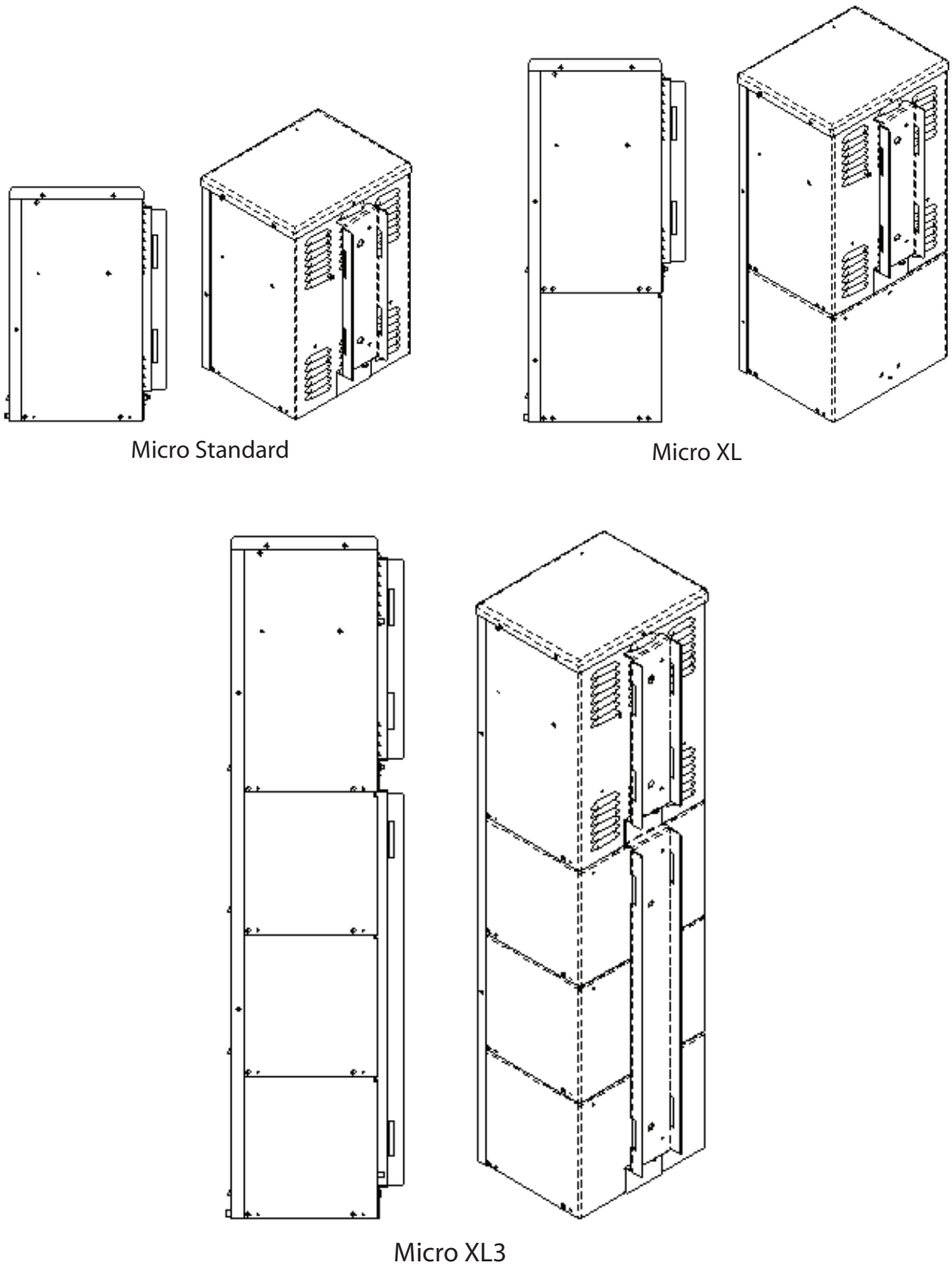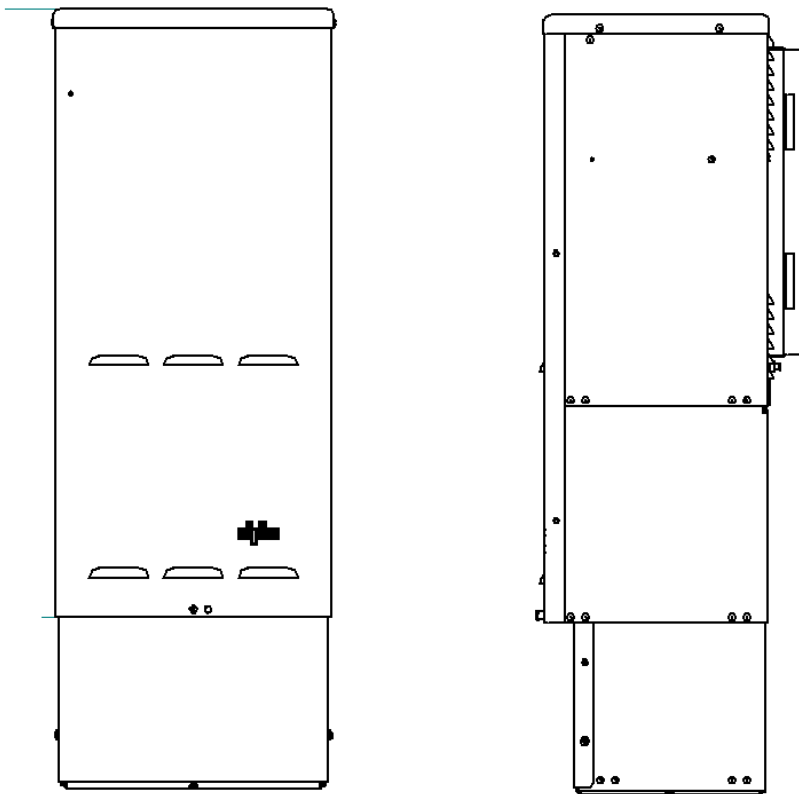
Micro Standard

Micro XL

Micro XL3

Figure 8 — Wall or pole mounting

Micro XL shown mounted on optional pedestal

Figure 9 — Optional pedestal mounting

5.3.1 Mounting Options

Choose any of the following four mounting options:

- Mounting to a wooden pole.
- Mounting to a steel/concrete pole.
- Mounting to a wall.
- Mounting onto an optional pedestal.

5.3.2 Mounting to a Wooden Pole

Tools and Materials Required:

- 13 mm nut driver for the bolts that attach the cabinet to the mounting bracket.
- Two 5/8" diameter machine bolts, UNC tread), SAE Grade 5 or better, length to suit the pole, which is not provided.
- Two 5/8" diameter zinc-plated flat washers.
- Two 5/8" diameter hex nuts UNC thread.
- Auger or drill for boring 3/4" diameter holes in the wood pole.

Procedure

1. Using the mounting bracket as a template, drill 2 holes into the pole to accept the machine bolts.

2. Secure the mounting bracket to the pole with the machine bolts as shown in Figure 10.

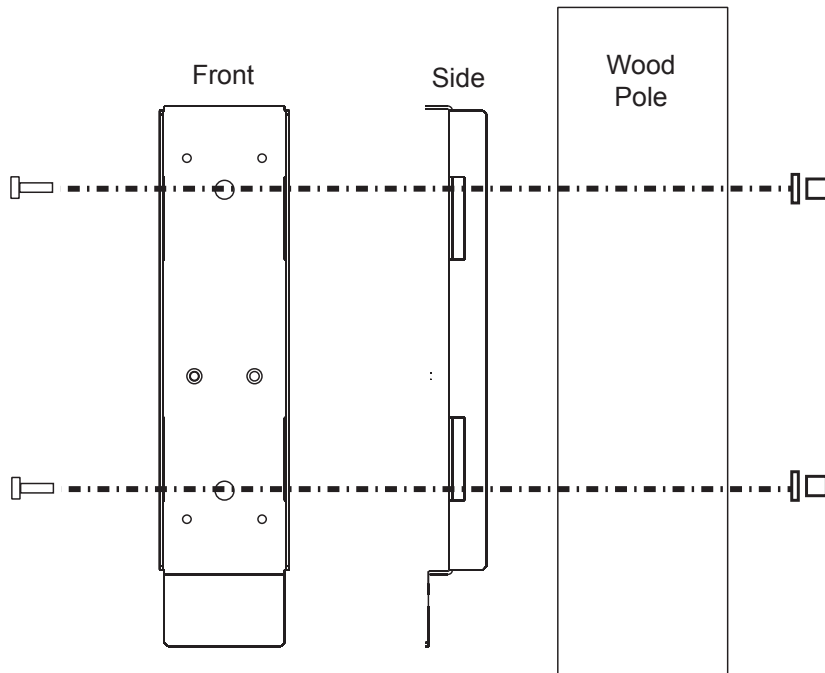3. Secure the Alpha Micro cabinet to the mounting bracket with the supplied bolts. See Figure 11.

Figure 10 — Mounting to a wooden pole
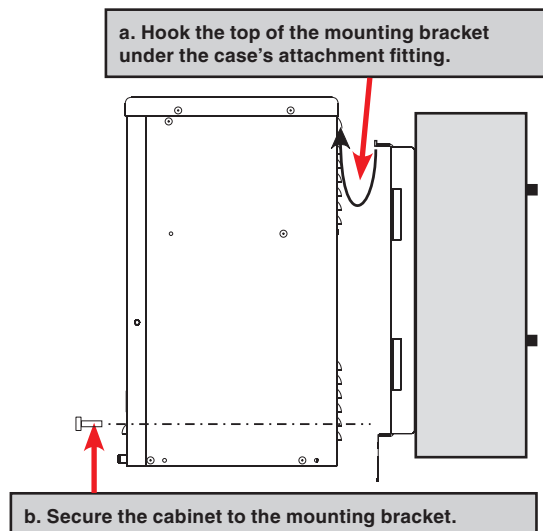
Figure 11 — Securing the enclosure to the mounting bracket

5.3.3 Mounting to a Steel or Concrete Pole

Tools and Materials Required:

- 13 mm nut driver for the bolts that attach the cabinet to the mounting bracket.
- Two pole mount straps that fit the pole. Straps must be stainless or galvanized.
- C001 Band-It tool or equivalent.
- C206 3/4 inch stainless steel Band-It band or equivalent.
- C256 3/4 inch stainless steel Band-It buckles or equivalent.

Procedure

1. Secure the mounting bracket to the pole with the straps.

Steel or Concrete Pole

Figure 12 — Mounting to a steel or concrete pole

2. Secure the Alpha Micro cabinet to the mounting bracket with the supplied bolts.

a. Hook the top of the mounting bracket under the case's attachment fitting.

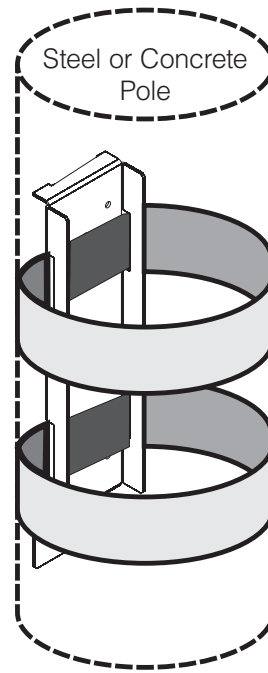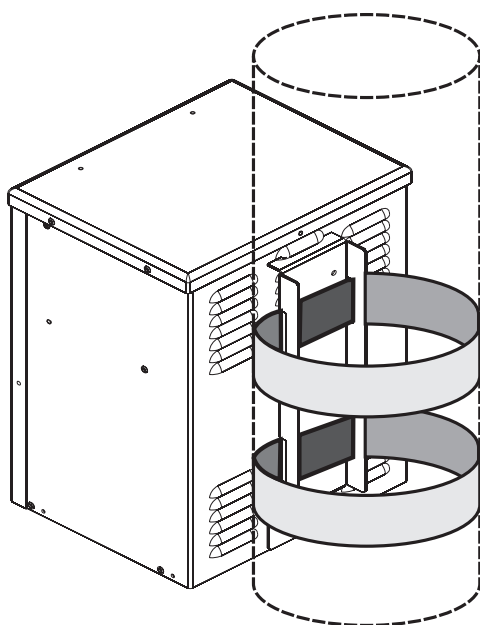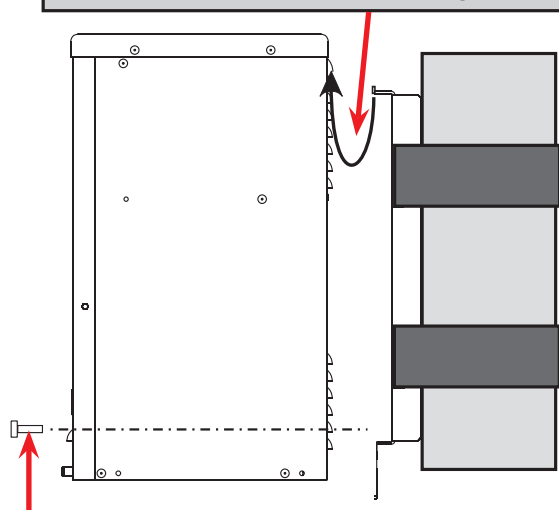**b. Secure the cabinet to the mounting bracket.**

Figure 13 — Securing the Alpha Micro enclosure to the mounting bracket

5.3.4   Mounting to a Wall

Tools and Materials Required:

- 13 mm nut driver for the bolts that attach the cabinet to the mounting bracket.
- Four 1/4" x 1-1/8" lag bolts.
- Four 1/4" diameter flat washers.
- Drill with 1/8" bit for drilling pilot holes.
- Assorted sockets and wrenches.

Procedure

1. Using the mounting bracket as a template, drill 4 pilot holes (indicated by the arrows in Figure 6.7) into the wall to accept 1/4" bolts.
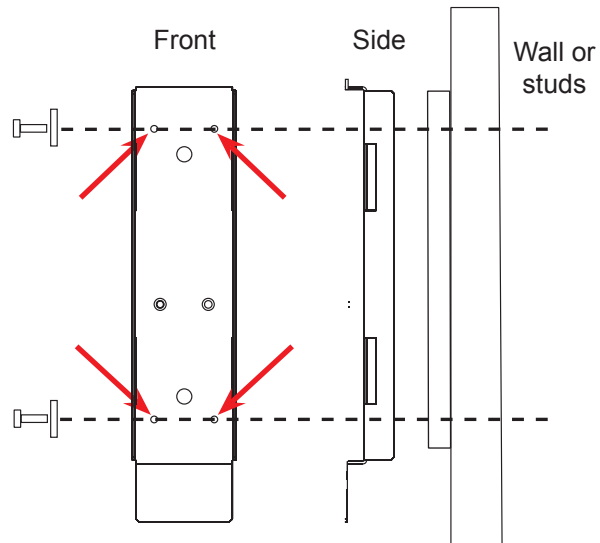
Figure 14 — Attaching the mounting bracket to the wall studs

2. Secure the mounting bracket to the wall with the 4 bolts and washers.

If the wall structure is not strong enough to support the weight of the Alpha Micro enclosure and batteries, use a wooden backing plate that has a minimum thickness of 1-1/4" and a maximum width of 4" that is securely mounted to a wall stud or studs.

3. Secure the Alpha Micro enclosure to the mounting bracket with the supplied bolts.

5.4 Wiring the Alpha Micro

WARNING!

Before starting, disconnect the Line power and turn off BOTH the Alpha Micro's Battery AND AC input circuit breakers.

If stranded wires are used for connection at the input and output terminal blocks, ferrules or equivalent crimping terminals must be used.

Separate the AC input power cables from the output power cables within the Alpha Micro enclosure. Route them through separate conduit openings in the enclosure.

Separate the DC Battery cable from the AC Input and Output power cables. Route the cable through its own opening.

5.4.1 Tools and Materials Required

- Hammer for removing the knockouts.
- A slot head screwdriver to fit the front panel dry contact terminal blocks and a slot head screwdriver for removing the knockouts.
- DC voltmeter.
- High strength, water-resistant tape such as duct tape.
- Battery terminal corrosion inhibitor such as NOCO Company's NCP-2 or Sanchem Inc.'s No-Ox ID Grease "A".
- Maximum of 12 AWG wire for wiring the input and output terminal blocks.
- If used, 1/2" conduit connectors to fit the knockouts (7/8" diameter) and armored conduit to fit.
- Optional battery heater mats.

Procedure

1. Remove the front cover of the enclosure. Lift it up and then pull out at the bottom.

2. If necessary, remove the knockouts using a hammer and screwdriver. If you have more than one battery cabinet installed, you will have to remove the knockouts on each shelf.

3. If used, install conduits into the openings.

4. Install the wires into the cabinet.

5. Strip the ends of the wires by 7/16" (11 mm).

Push button down to insert wires
into terminal block

Alternate routing for
output wiring.

Secure wiring to
backing plate with
tie wraps.

Remove knockouts as needed.
Install conduits if used.
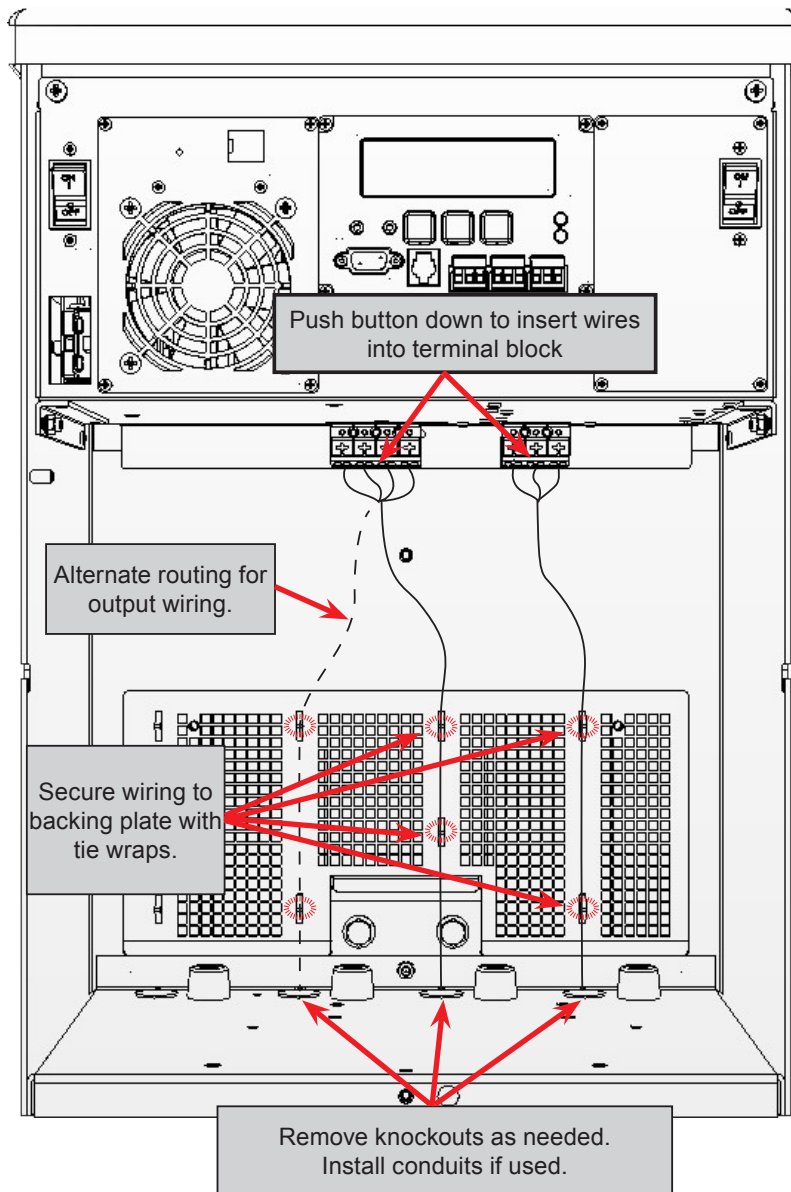
Figure 15 — Wiring the Alpha Micro

6. Secure the wiring to the wiring management panel with tie-wraps provided with the Alpha Micro. Make sure that the wiring is long enough to reach the terminal blocks.

WARNING!

The input and output wiring must NOT touch the cabinet except for the wiring management panel.

Each terminal block has two inputs for each pole (line, neutral and ground). Make sure you have inserted each wire into the correct position and not accidentally connected the line and neutral to the same pole.

Verify the line wire is attached to the line terminal block, the ground wire is attached to the ground terminal block and the neutral wire is attached to the neutral terminal block to prevent accidental shocks or electrocutions.

CORRECT

INCORRECT
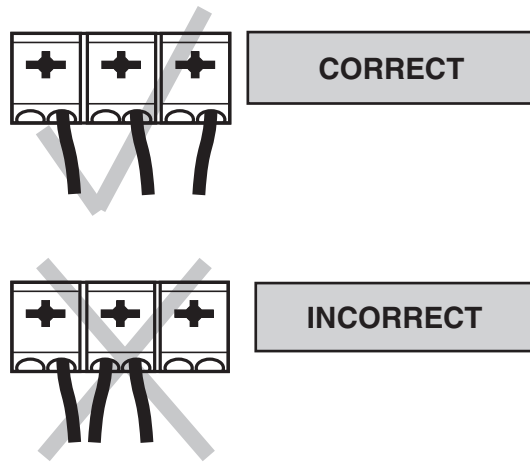
7. Push in the button on the output terminal block and then insert the wire into the terminal block until no uninsulated wire is visible. Repeat until all the wires are installed.

8. Repeat step 7 above for the input terminal block.

9. If used, connect the following ports:

   a. Ethernet port.

   b. RS-232 port.

   c. Dry contacts and the user inputs.

Figure 16 — Connecting the front panel ports

5.5 Installing and Wiring the Batteries

WARNING!

The batteries must be installed by qualified personnel trained in the safe use of high-energy power supplies and their batteries. Refer to the Product Safety Information at the beginning of this manual.

5.5.1 Procedure

1. Install the optional battery heater mats. Connect them to the input terminal block.

2. Connect the battery cables to the Battery Connector of the Alpha Micro Use the red cable for the positive terminal and the black cable for the negative terminal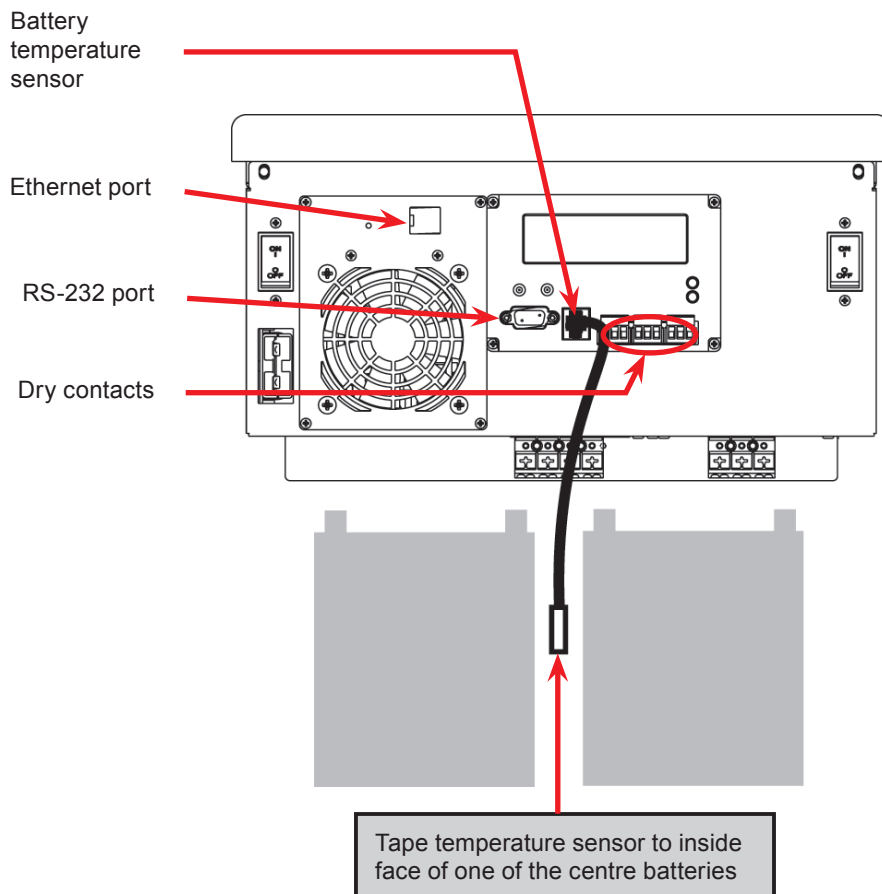. Secure the cables to the backing plate with tie-wraps provided with the Alpha Micro. Make sure the battery cables can reach the battery terminals after they are installed.

3. Coat the battery terminals with the corrosion inhibitor.

CAUTION!

Torque the battery terminals according to the manufacturer's specifications as given on the name plate or data sheet.

4. Place the batteries into the enclosure. Orient them in a way so that connecting cable lengths are minimized.

5. If the optional battery restraining bar is used, install it as shown in Figure 18.

6. Connect the batteries as shown in Figure 17.

7. Verify the voltage and polarity of the battery string with a DC voltmeter. Perform troubleshooting if it is not correct.

8. Connect the battery temperature sensor to the Alpha Micro. Attach the sensor end of the cable to the side of one of the centre batteries. See Figure 17.

9. If the Micro XL or XL3 is used, connect and install the extra shelves of batteries.

10. Connect the black battery cable to the negative terminal of the battery string, and the red battery cable to the positive terminal of the battery string.

To positive terminal

Optional in-line fuse

To negative terminal

+ − Battery #4
+ − Battery #3
+ − Battery #2
+ − Battery #1

Tape the battery temperature sensor to the side of either battery #2 or #3.

To positive terminal

Optional in-line fuse

To negative terminal

+ − Battery #2
+ − Battery #1

Tape the battery temperature sensor to the side of either battery #2 or #1.
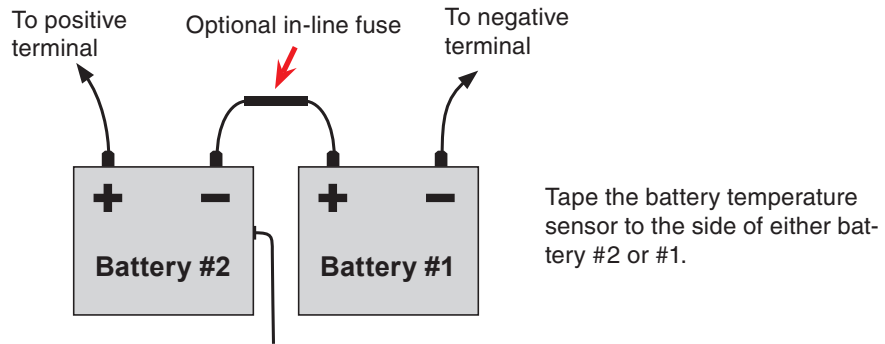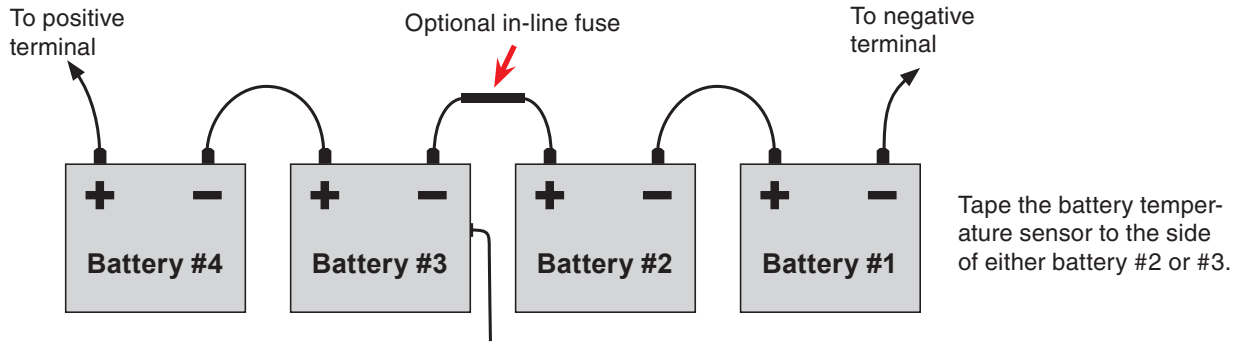
Figure 17 — Wiring the batteries: 48VDC (top), 24 VDC (bottom)

1: Hook the bar under the restraining screw.

2: Secure the bar to the chassis
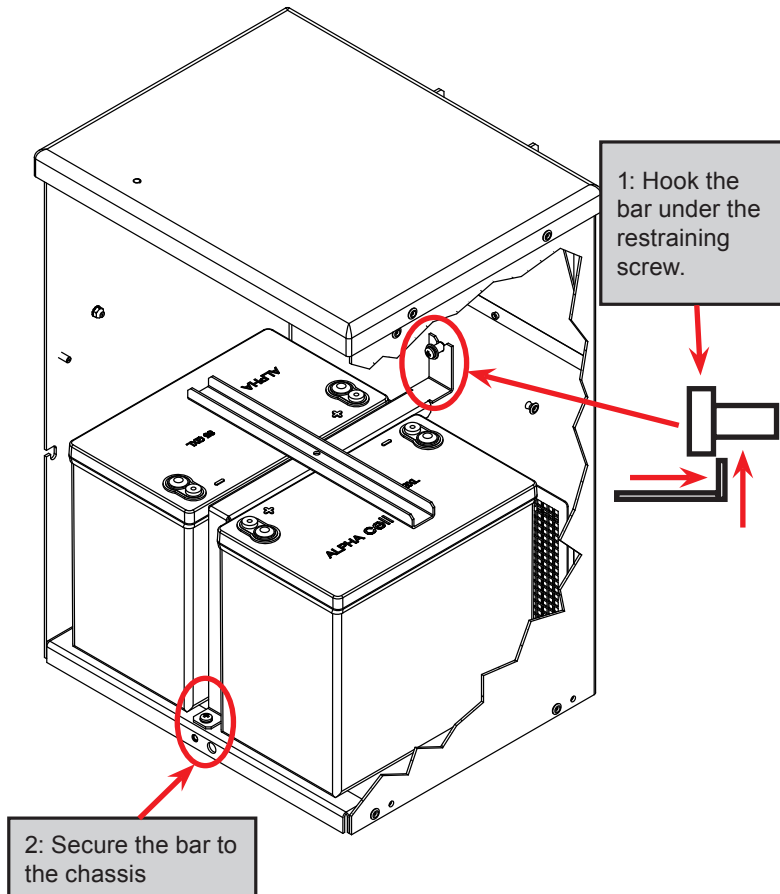
Figure 18 — Securing the batteries with the optional restraining bar

5.6   UATS and (UGTS) Option

The ATS (automatic transfer switch) and the GTS (generator transfer switch) are two separate optional add-on switching units for the Alpha Micro family of UPS. The ATS provides power and/or bypass capacity (automatic or manual) so the operator may disconnect the Alpha Micro from line power for easy removal and servicing. In bypass mode, the loads are directly connected to the line power without any conditioning. The ATS and GTS can be used alone or together to allow the use of 3 different back-up sources (line, batteries and or generator). Refer to the ATS/GTS Installation Manual (Alpha P/N 020-161-B0) for details.

⚡ **WARNING!**

Make sure you have read and understood the instructions given in the UATS/UGTS Installation Manual before making any connection to the supply.

6. Operation

The following subsections describe the operation of the Alpha Micro:

- Communicating with the Alpha Micro.
- Operating the control panel.
- Switching the Alpha Micro on and off.
- Operating the Alpha Micro.
- Making measurements.
- Viewing the 100-event log.
- Communicating with the RS-232 interface.
- Communicating via the intranet or internet.

6.1 Communicating with the Alpha Micro

There are several ways you can communicate with the Alpha Micro UPS:

1. Using the control panel.

2. Using an RS-232 interface, you can access the UPS command line system with Window's HyperTerminal or other terminal emulation program.

3. Using an RS-232 serial connection via the Alpha UPS Monitor installed on your computer. The Alpha UPS Monitor software can be downloaded from www.alpha.ca./downloads/.

4. Using the optional factory-installed communication module, you can communicate with the Alpha Micro over a company intranet or the internet using a web browser or with SNMP communications.
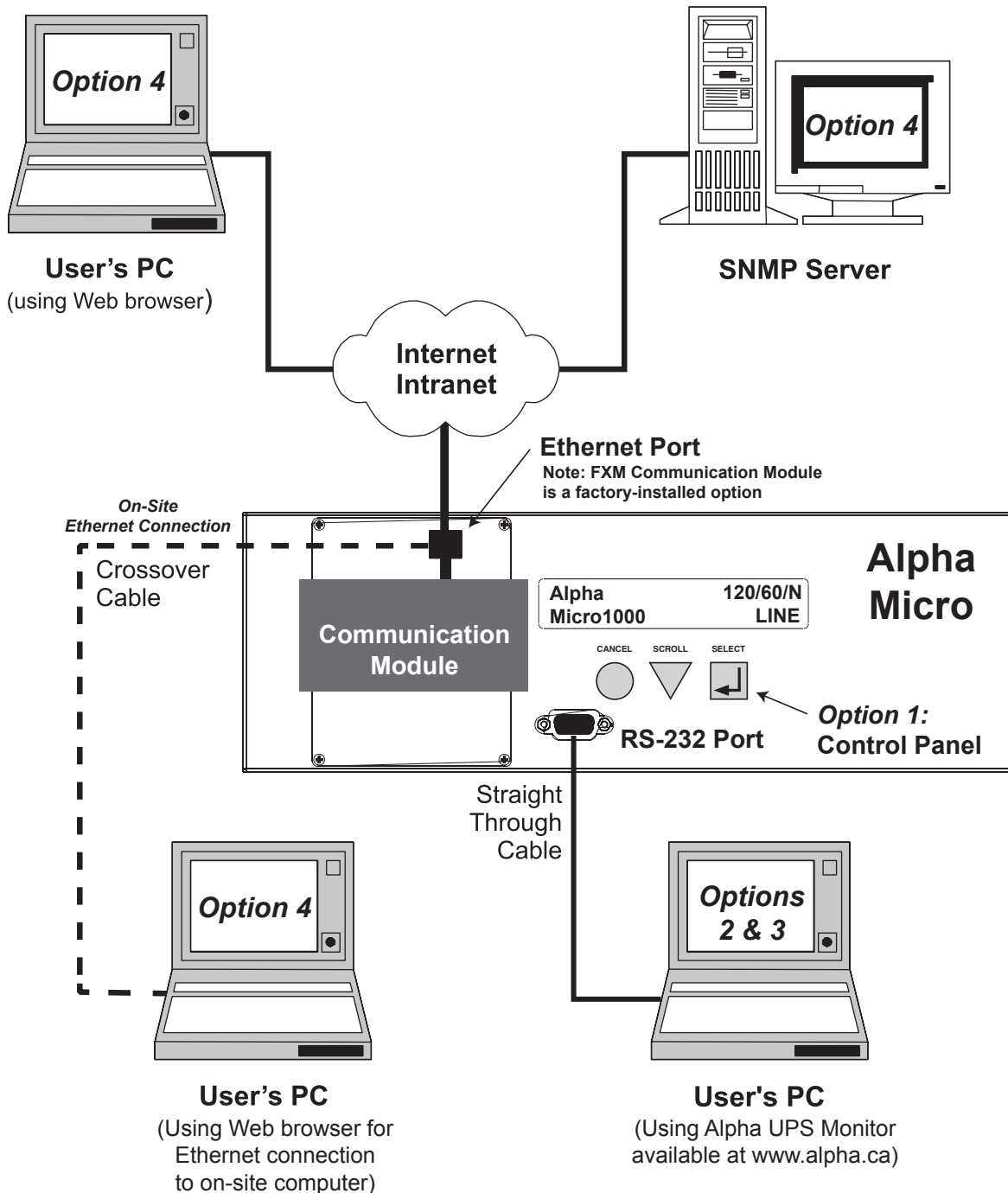

Figure 19 — Alpha Micro Communication Options

6.2 Operating the Control Panel

The LCD control panel provides "at a glance" monitoring. This panel, when used along with the **CANCEL, SCROLL** and **SELECT** buttons, allows you to program, make measurements, and troubleshoot the Alpha Micro The layout is shown in the figure below.

The Alpha Micro is monitored and controlled with a series of menus and submenus. The Menu Tree is shown in Figure 11. For a tutorial on how to use this panel, see "Replacing the Batteries".
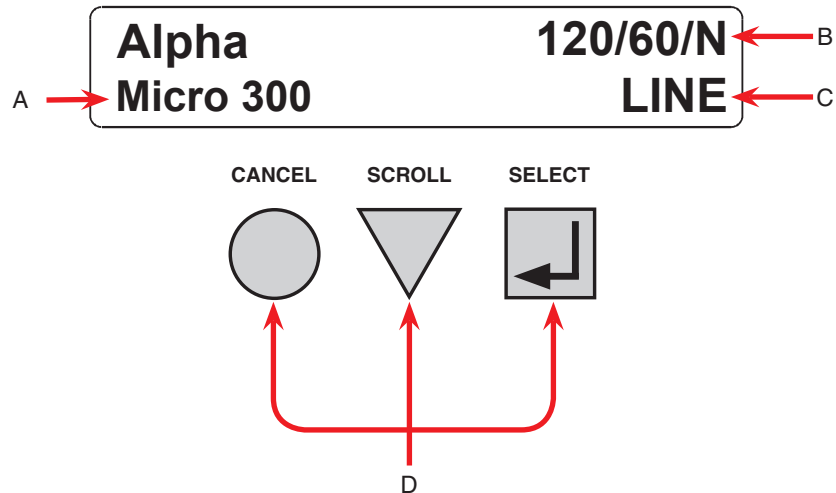

Figure 20 — LCD Control Panel Logo Screen

A	**Alpha FXM model name**
B	Alpha FXM voltage configuration - 120 VAC or 230 VAC Alpha FXM Frequency - 50 Hz or 60 Hz Sense Type setting - Normal (N) or Generator (G); see "Operating the Alpha Micro", Sense Type.
C	**Present operating mode** - (LINE mode shown) See Figure 10.
D	Control buttons: **SELECT** - Pressing SELECT moves you down 1 level in the menu tree (Table C) or accepts a change when programming. **SCROLL** - Pressing SCROLL moves you through the submenus (Table C) or toggles between choices when programming. **CANCEL** - Pressing CANCEL moves you up one level in the menu tree (Table C).

The Alpha Micro's operating mode automatically changes as a result of changes in the line or the Alpha Micro's operating mode. See Table C and also "Specifications, Boost/Buck/Line Transfer Thresholds". The LCD panel automatically updates to reflect this.

Table C — UPS Operating Modes	
LCD display	**Description**
SHUTDOWN	The Alpha Micro's inverter is switched off. Line power is disconnected from the load.
LINE	The Alpha Micro is switched on. Line power is provided to the load.
BOOST1 OR BOOST2	The Alpha Micro's transformer is raising line voltage without using the batteries. AVR is enabled.
BUCK1 OR BUCK2	The Alpha Micro's transformer is lowering line voltage without using the batteries. AVR is enabled.
INVERTER	The Alpha Micro is providing backup battery power to the load. See Figure 11, "Control Menu, INVERTER".
RETRAN	The Alpha Micro is transferring from INVERTER mode to Line mode.
TRAN	The Alpha Micro is transferring from the state it is now in into Inverter mode.
STANDBY	The Alpha Micro is switched on and waiting for the line power to qualify or the user clear some faults. CAUTION: Do not touch the AC output terminals, which may be still energized.
BYPASS	This mode is manually set with the Control Menu. See Figure 11, "Control Menu, INV BYPASS". This locks the unit into line mode and turns off the battery charger so the unit can work with a manual break-before-make bypass switch.

Pressing the CANCEL, SCROLL and SELECT buttons let you to navigate through the menus and submenus to control, monitor and troubleshoot the Alpha Micro as shown in Figure 11.

① *Starting at the Logo Screen, press the **SELECT** button to go down one level.*

② *Press the **SCROLL** button to move between the menus. The **SCROLL** button moves only in one direction, so if you overshoot, you have to go all the way around the menu tree again.*

③ *Press the **SELECT** button to enter the submenu. Then press the **SCROLL** button to cycle through the submenu items. The **SCROLL** button moves only in one direction, so if you overshoot, you have to go all the way around the submenu again.*

The CONTROL MENU (Table D) lets you control, program and adjust the Alpha Micro for connection to traffic intersection equipment or other applications. You can control the:

- INVERTER
- BYPASS
- BATT TEST
- AUTO TEST
- SHUTDOWN
- SENSE TYPE
- FUNC MODE
- VOLTAGE
- FREQUENCY
- QUAL TIME
- BATT COMP
- DATE FRMT
- INV RECORD
- CLOCK FRMT
- CHGR CUR
- RELAY TEMP
- TEMP DISP
- Daylight

The SYSTEM STATUS menu (Table E) lets you measure various inputs, outputs and other values. The available measurements are:

- VIN
- VOUT
- IOUT AC
- BATT TEMP
- FREQ IN
- OUTPUT PWR
- BATT VOLT
- CHGR CUR
- DATE
- TIME
- INV COUNT
- INV TIMER
- SHED TIMER 1, 2 OR 3
- VERSION
- MAC Address
- IP Address
- kWh
- Remain Tm
- Serial Number

The ALARM and FAULT menus in the Trouble-shooting section are invisible and disabled until the Alpha Micro has a malfunction.

When the front panel's alarm LED is on or flashing, press SELECT.

One of the malfunctions listed in Table R and Table S will appear on the LCD. Press the SCROLL button to see if more than one malfunction is present.

Fix the malfunction. Press the SELECT button to clear the malfunction from the screen.

If the malfunction is fixed, the malfunction is cleared from the LCD. If it isn't fixed, it will reappear on the screen.

The EVENT STATUS menu displays the last 25 Alpha Micro events on the LCD. For the event log, see "Viewing the 100-Event Log".

Press the SELECT button to access the menu. Press the SELECT then the SCROLL button to scroll through the events. To see what a specific event was, press the SELECT button. Press the SCROLL button to see what malfunction triggered the event.

Figure 21 — LCD Menu Tree

6.3 Switching the Alpha Micro On and Off

Under normal operation, the Alpha Micro is always powered ON to supply uninterruptible power to the load. Switching off the Alpha Micro will disconnect the power supply to the load. If for any reason you need to switch off the Alpha Micro while maintaining power to your critical load, make sure that you have a plan that provides an alternate source of power.

6.3.1 Switch Off Procedure

1. Switch off the AC input circuit breaker.

2. Switch off the battery circuit breaker. The status LED turns off and the LCD panel goes blank. The Alpha Micro is now switched off and no backup power is supplied to the load.

6.3.2 Switch On Procedure (LINE mode)

Before you put the Alpha Micro back into commission, make sure that the line is qualified and the batteries are fully charged.

1. Switch on the battery circuit breaker. The LCD displays **STANDBY** and the fan turns on for about a minute. If the temperature is below –15°C, the LCD display may not function. See "Troubleshooting".

2. Switch on the AC input circuit breaker. The Alpha Micro qualifies the line power. The LCD displays **RETRAN**, then shows **LINE**, **BUCK** or **BOOST**. The status LED illuminates.

3. If there is no line power, the Alpha Micro will remain in the STANDBY mode until it the line power is qualified. If you need to provide backup battery power to the load, perform a manual start by using the Inverter command See "Operating the Alpha Micro Inverter".

4. The Alpha Micro uses auto-frequency detection. When it is first switched on, it senses the line frequency and adjusts its output frequency to match that of the input. The load should be receiving power, If not, perform troubleshooting.

6.3.3 Switching the Alpha Micro from Line mode to Inverter mode

You can force the Alpha Micro to operate in the Inverter mode by manually switching off the input circuit breaker. Doing so will effectively disconnect any line power to the Alpha Micro simulating a power outage which triggers the Alpha Micro to switch to the inverter mode of operation.

Procedure

1. Switch off the input circuit breaker. The LCD shows **INVERTER**, the status LED starts flashing to show that the Alpha Micro is running on backup battery power. Confirm that the load is receiving power.

6.3.4 Switching the Alpha FXM from Inverter mode to Line mode

The Alpha Micro remains in the Inverter mode for as long as the input circuit breaker is switched off. Backup power is provided to the load until the batteries are drained to a preset level which triggers the Alpha Micro to shutdown automatically. If it is not necessary to operate the Alpha Micro in the Inverter mode, switch the Alpha Micro back to the Line mode as soon as possible.

Procedure

1. Switch on the input circuit breaker. The Alpha Micro qualifies the line power. The LCD displays **RETRAN**, then shows **LINE**, **BUCK** or **BOOST**. The status LED illuminates.

If the Alpha Micro constantly switches between Inverter and Line modes because of a noisy line, the Alpha Micro's input parameters should be broadened from Normal to Generator. See "Operating the Alpha Micro Sense Type". Also see the specifications, "Boost/Buck/Line Transfer Thresholds".

In the Generator mode, the range of acceptable input frequency and voltage are expanded to accept the fluctuations created by a generator.

6.4   Operating the Alpha Micro

The control menu (Table D) lets you operate the Alpha Micro or program it to suit your operating conditions. You can also use the Alpha UPS Monitor to make these adjustments. See "Alpha UPS Monitor".

6.4.1   Procedure

1. From the Logo screen go to the Control menu.

2. Press the **SELECT** button to enter the submenu (Table D).

3. Press the **SCROLL** button to move between items in the submenu.

4. When you have reached the item you want to change, press the **SELECT** button. The item chosen is blinking.

5. To toggle between the choices, press the **SCROLL** button. Stop when you reach the choice you want.

6. To make the change, press the **SELECT** button. The blinking stops.

Table D — Control Menu		
LCD display	**Meaning**	**Description**
INVERTER	Inverter	When inverter mode is set to ON, the Alpha Micro provides backup battery power to the load. This mode of operation is normally activated automatically when line power becomes unavailable, or the line power is not qualified. You can also put the Alpha Micro into this mode during initial startup in the absence of line power or because of unqualified line power. See "Adjusting and Controlling the Alpha Micro, #31 Inverter On/Off".
INV BYPASS	Inverter Bypass	This function can only be switched on when the Alpha Micro is in line mode. When switched on, it locks the Alpha Micro into the Line mode, switched off the battery charger and makes the output voltage equal to the input voltage. This is done to: Replace the batteries. OR: Allow the use of a break-before-make manual bypass switch so the Alpha Micro can be shut off for maintenance or replacement without interrupting power to the load.
BATT TEST	Battery Test	Lets you set the desired battery test duration to a value between 0 and 250 minutes. Make sure that the set time duration is shorter than the depth of discharge of your battery bank. Otherwise, you will drain the battery and trigger a fault. See "Batt Volt low".
AUTO TEST	Automatic Test	If the GUI's periodic self test is enabled, this starts the test no matter when it is scheduled to take place.
SHUTDOWN	Shutdown	When this function is switched on, the Alpha Micro's inverter is shut off. Neither Line nor Inverter power is supplied to the load.
SENSE TYPE	Sense Type	This function can only be used when the Alpha Micro is in Standby or Shutdown mode (Table C). This function toggles between: NORMAL: The Alpha Micro can operate successfully with most line conditions. OR: GENERATOR: The Alpha Micro's input voltage and frequency parameters are expanded so the Alpha Micro can work with the fluctuations caused by a generator or noisy line.
FUNC MODE	Functional Mode	The Functional mode can only be changed when the Alpha Micro is in Standby or Shutdown mode (Table C and Specifications, "Boost/Buck/Line Transfer Thresholds"). This function toggles between: AUTOMATIC VOLTAGE REGULATION (AVR): The buck and boost modes are active. OR: QUALITY: The buck and boost modes are switched off, the input voltage is the Alpha Micro's output voltage.
VOLTAGE	Voltage	Lets you set the Alpha Micro's output voltage setting to 120 VAC, 230 VAC or 220 VAC. This should ONLY be done by a qualified technician acting under the instructions of Alpha Technologies Customer Service Department. Failure to contact Alpha Technologies before performing this procedure could void your warranty.
FREQUENCY	Frequency	The frequency can only be changed when the Alpha Micro is in Standby mode. This lets you set the Alpha Micro's frequency setting to 50 Hz or 60 Hz. This should ONLY be done by a qualified technician acting under the instructions of Alpha Technologies Customer Service Department. See "Service and Technical Support". Failure to contact Alpha Technologies before doing this procedure could void your warranty.

	Table D — Control Menu	
LCD display	**Meaning**	**Description**
QUAL TIME	Line qualify time	Lets you set how long it takes for the Alpha Micro to return to Line mode after the line has become requalified to make sure the line is stable. It can be set to 3, 10, 20, 30, 40 or 50 seconds. The factory default setting is 3 seconds. Also See "Adjusting and Controlling the Alpha Micro, #34: Line Qualify Time".
BATT COMP	Battery temperature compensation	Lets you set the battery temperature compensation to match the batteries you are using. It can be set to -2.5, -4, -5 or -6 mV/°C/Cell. The factory default setting is -5 mV/°C/Cell.
DATE FRMT	Date Format Selection	This lets you toggle the Alpha FXM's date format between YY-MM-DD, MM-DD-YY, YYY-MM-DD, MM-DD-YYYY, DD-MM-YYYY, YY-TXT-DD, TXT-DD-YY, DD-TXT-YY, YYYY-TXT-DD, TXT-DD-YYYY, DD-TXT-YYYY, YYYY-DD-TXT, YY-DD-TXT, YYYY-DD-MM, YY-DD-MM. The factory default setting is MM-DD-YY.
CLOCK FRMT	Clock display format option	Lets you select which format to display time information: in 24 hour clock format or 12 hour clock (AM/PM) format.
INV RECORD	Inverter record clear	This clears the inverter counter and timer from the LCD's system status menu. This does not clear the 100-event log in the RS-232 menus.
CHGR CUR	Charger current	Allows you to set the battery charger current to either 0 A, 3 A, 6 A or 10 A. NOTE: If you set the battery charger to 0 A, you will turn the charger off.
RELAY TEMP	Relay temperature	Temperature setting to activate the specified dry contact. The configured dry contact will activate when the set battery temperature is reached. Setting range: 20°C to 55°C.
TEMP DISP	Temperature display format	The temperature can be displayed in Celsius or Fahrenheit.
Daylight	Daylight saving option	Switch "ON" this option to activate Day Light Saving time.

6.5 Making Measurements

The System Status menu lets you make measurements of various Alpha Micro inputs, outputs, temperatures and other values. You can also use the Alpha UPS Monitor to make these measurements. See "Alpha UPS Monitor".

6.5.1 Procedure

1. From the Logo screen go to the System Status menu.

2. Press the SELECT button to enter the submenu (Table E).

3. Press the SCROLL button to move between items in the submenu. When you reach the item you want to measure, stop pressing the button. The measurement is automatically displayed on the LCD. It is automatically updated every 0.5 second.

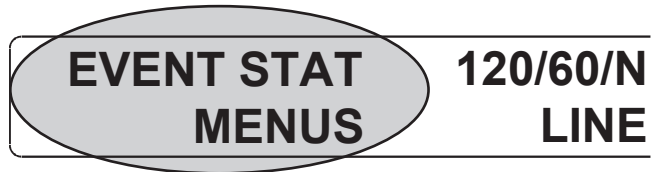| Table E — System Status Menu		
LCD display	**Meaning**	**Description**
VIN	Input Voltage	The line input voltage into the Alpha Micro
VOUT	Output Voltage	The Alpha Micro's output voltage (true RMS).
IOUT AC	Output Current (AC)	The Alpha Micro's AC output current (true RMS).
BATT TEMP	Battery Temperature	The battery's temperature (°C).
FREQ IN	Input Frequency	The frequency of line power into the Alpha Micro (Hz).
OUTPUT PWR	Output Power	The Alpha Micro's output power in VA (true RMS).
BATT VOLT	Battery Voltage	The battery's output voltage (VDC).
CHGR CUR	Charger Current	The Alpha Micro's battery charging current is set to this value (Amps).
SHED TIMER1	Amount of time until the dry contact is activated.	The factory default dry contact for this setting is contact C4. SHED TIMER2 and SHED TIMER3 can be field programmed. See "Setting the Timer Contact". This display shows the amount of time left in seconds until the contact is activated. The factory default setting is 2 hours, but this can be changed as shown in "Programming the Dry Contacts and the Clock".
SHED TIMER2		
SHED TIMER3		
MAC Address	CXC MAC	The CXC MAC address will be displayed.
IP Address	CXC IP	The CXC IP will be displayed.
kWh	kW Meter	The accumulated output power will be displayed.
Remain Tm	Remaining Battery Runtime	The remaining runtime of the battery will be displayed.
Serial Number	Unit Serial Number	The unit serial number of the Alpha Micro will be displayed.
VERSION	Software Version	The software version used in this Alpha Micro.

6.6 Viewing the 100-Event Log

Using the LCD display, RS-232 or web interface, you can view up to the last 100 events the Alpha Micro went through and the malfunctions that triggered each of them. If more than 100 events occurred, the oldest is over-written. To clear this log, see "Operating the Alpha Micro INV RECORD."
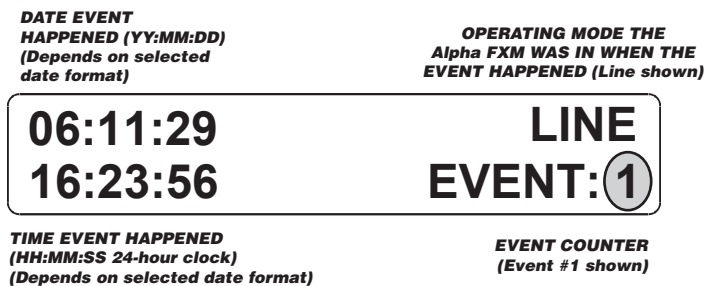
To view the events on the LCD display, refer to the following procedure. To view the events using the RS-232 or web interface, see "100-Event Log" or "Alpha UPS Monitor, Event History" respectively.

6.6.1 Procedure

1. From the Logo screen, navigate to the **EVENT STATUS MENU**.

```
┌─────────────────────────────────┐
│  EVENT STAT      120/60/N       │
│  MENUS              LINE        │
└─────────────────────────────────┘
```

2. Press the **SELECT** button to enter the submenu.

3. The following log screen appears.

DATE EVENT HAPPENED (YY:MM:DD) (Depends on selected date format)

OPERATING MODE THE Alpha FXM WAS IN WHEN THE EVENT HAPPENED (Line shown)

```
┌─────────────────────────────────┐
│  06:11:29            LINE        │
│  16:23:56         EVENT: 1       │
└─────────────────────────────────┘
```

TIME EVENT HAPPENED (HH:MM:SS 24-hour clock) (Depends on selected date format)

EVENT COUNTER (Event #1 shown)

4. Press the **SELECT** button. The event counter flashes.

5. Press the **SCROLL** button to scroll through the event counter.

6. When you reach the event you want press the **SELECT** button.

7. The event loading screen appears and then the log screen reappears with the details for that event.

```
┌─────────────────────────────────┐
│  Event                          │
│  Loading         EVENT: 1       │
├─────────────────────────────────┤
│        ALARM STATUS             │
│         Over Load               │
└─────────────────────────────────┘
```
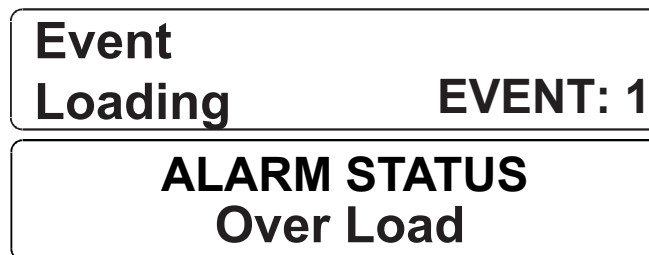
8. Press the **SCROLL** button. One of the faults or alarms shown in Table R and S is displayed and is the malfunction that triggered the event.

6.7 Communicating with the RS-232 interface

The following subsections describe the operation of the Alpha Micro via the RS-232 interface.

- Wiring the RS-232 port.
- Using the Main menu.
- Adjusting and controlling the Alpha Micro.
- Programming the dry contacts and the clock.
- 100-event log.
- Communicating with the "Alpha UPS Monitor".

6.7.1 Wiring the RS-232 port

The Alpha Micro's front panel has a DE-9 female connector. When connected to a PC with Windows HyperTerminal or other terminal emulation software, the Alpha Micro can be remotely monitored and controlled with it's command-line system. The Alpha UPS Monitor provides a Windows or web browser type of control.

Procedure

1. Connect a 9-pin, fully shielded, straight-through DE-9 to DE-9 connector cable between the computer's port and the Alpha Micro's port.
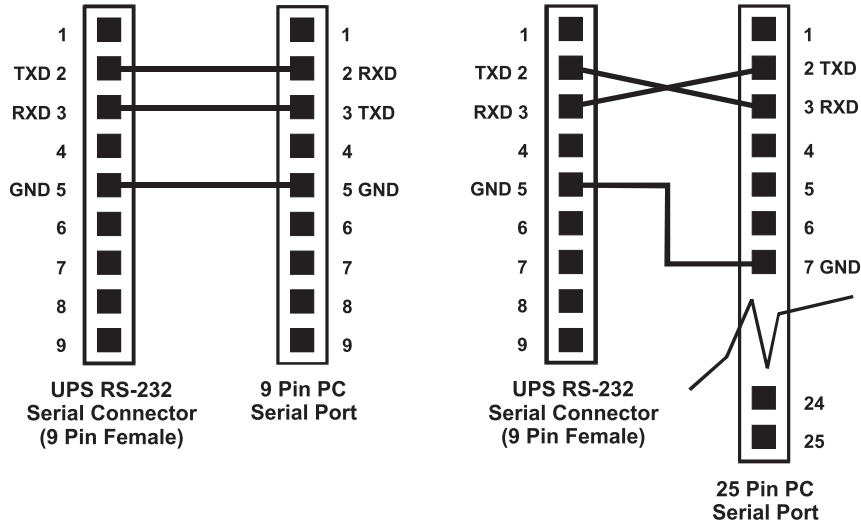
Figure 22 — RS-232 pin connections

2. Configure the communications parameters to the values shown in the terminal set up table below.

Table F — Terminal Set Up Table			
Emulation Type	VT 100 or Compatible	Backspace	N/A
Duplex Mode	Half Duplex	Break Length	N/A
Xon/Xoff Flow Control	None	Emulation Type	N/A
RTS/CTS Flow Control	Off	**Communication Parameters**	
Line Wrap	On	Handshaking	Software Handshaking
Screen Scroll	On	Baud Rate	2400 bps
CR Translation	CR	Data Format	8-bit Data, No Parity, 1 Stop Bit, No Flow Control.

6.8   Using the Main Menu

The Alpha Micro's main menu screen runs on a command line system. This program does not recognize the backspace or delete keys even if it appears that way on the monitor. If you make a mistake and press **Enter**, the Alpha Micro echoes the command back exactly as you typed it. Press **Enter** and retype the command again.

If you choose not to use the command line system, you can use the Alpha UPS Monitor to control and monitor the Alpha Micro

6.8.1   Main Menu Screen

The main menu screen shows the Alpha Micro's current input and output values, displays if any faults or alarms are present and gives access to the submenus. It can be accessed from anywhere in the menu tree by typing **0** and pressing **Enter**. The Alpha Micro is controlled by submenu 3.

To access a particular submenu, type in the submenu number and press **Enter**. To update the main menu screen, press **Enter**.

The complete menu tree is given in Figure 14. Tables describing the Line Status, Output Status, Faults and Alarms displays are given in Tables G, H, I, and J.

a. The readings on the main menu screen do not automatically update to reflect changes in the Alpha Micro's status. Press **Enter** to update the screen.

b. For many functions you need to enter a password. The factory setting is 1111.
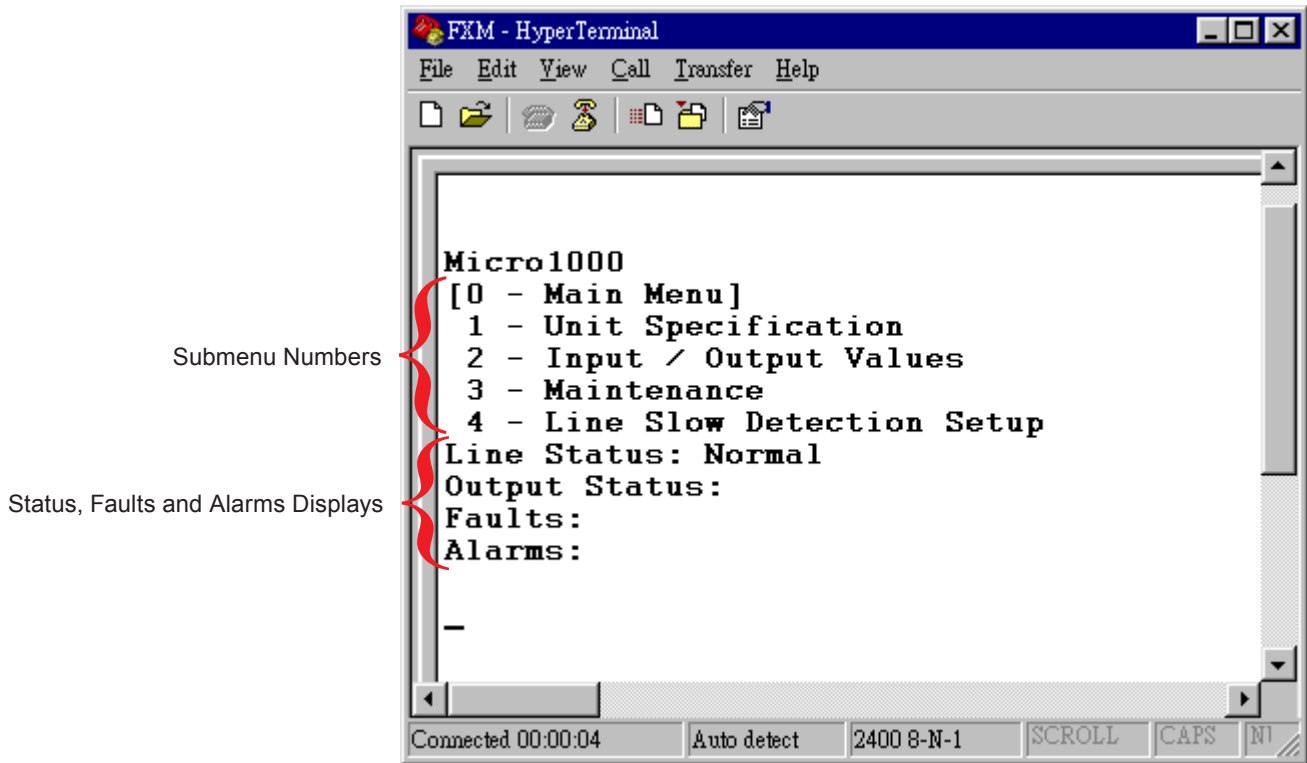
Figure 23 — Main Menu Screen

6.9   RS-232 Menu Tree

Submenus #1, 2 and 4 are read-only screens for monitoring the Alpha Micro To control the Alpha Micro use sub-menu #3, the Maintenance submenu.

0-Main Menu

Submenus   *Submenus*

1-Unit Specifications   **2-Input/Output Values**   **3-Maintenance**   **4-Line Slow Detection Setup**

1-Unit Specifications	2-Input/Output Values	3-Maintenance	4-Line Slow Detection Setup
Unit Model	**Input**	**30-Battery Test Options**	*This read-only screen shows the Alpha FXM's input voltage parameters. These values are factory set and cannot be changed in the field. See Specifications, "Boost/Buck/Line Transfer Thresholds."*
Input	**Voltage**	*300-Set Battery Test Period*	
Voltage	**Frequency**	*301-Battery Test On/Off*	
Frequency	**Output**	**31-Inverter On/Off**	
Output	**Voltage**	*310-Set Inverter-Off Delay*	
Voltage	**Current**	*311-Inverter On/Off*	
VA	**VA**	**32-Change Password**	
Battery Voltage	**Battery**	**34-Line Qualify Time**	
Voltage	**Voltage**	*1) Set to 3 seconds (default)*	
Software Version	**Temperature**	*2) Set to 10 seconds*	

34-Line Qualify Time
1) Set to 3 seconds (default)
2) Set to 10 seconds
3) Set to 20 seconds
4) Set to 30 seconds
5) Set to 40 seconds
6) Set to 50 seconds

35-Low Battery Warning Voltage

36-Load Shed Timer On/Off
1) Timer 1 on
2) Timer 1 off
3) Timer 2 on
4) Timer 2 off
5) Timer 3 on
6) Timer 3 off

---

*These 2 read-only screens show the Alpha FXM's factory specifications or the present input and output measurements. The Input/Output Values submenu does not automatically update. For an updated value, type **2** and press **Enter**.*

Press **Enter** to go up 1 level in the menu tree.

To reach any submenu, type in its number and press **Enter**.

To reach the main menu, type 0 and press **Enter**.

Figure 24 — RS-232 Menu Tree

6.9.1 Line Status

Line status tells you the line's condition. For an updated value, press **Enter**.

Table G — Line Status	
Normal	The line is within specifications. See specifications, "Boost/Buck/Line Transfer Thresholds". The Alpha Micro is operating in Line mode.
Boost	Line voltage is out of tolerance. The Alpha Micro is operating in Boost mode.
Boost2	Line voltage is out of tolerance. The Alpha Micro is operating in Boost 2 mode.
Buck	Line voltage is out of tolerance. The Alpha Micro is operating in Buck mode.
Buck2	Line voltage is out of tolerance. The Alpha Micro is operating in Buck 2 mode.
Blackout	The line is absent.
Freq low	Line frequency is too low.
Freq high	Line frequency is too high.

6.9.2 Output Status

Output status tells you how the Alpha Micro is producing power. For an updated value, press **Enter.**

Table H — Output Status
Line mode
Battery mode
Battery mode, low bat. warning
Battery mode (testing battery)
Boost mode
Boost 2 mode
Buck mode
Buck 2 mode
Hot swap mode
Inverter off due to fault
Inverter off due to low battery
Inverter off at start-up
Shutdown due to user request

6.9.3   Fault and Alarm Displays

Fault and alarm displays any malfunctions the Alpha Micro has encountered. Also see "Troubleshooting".

Table I — Faults	
Short_Circuit	The load has a short.
Vout_Hi	The output voltage is above specifications.
Batt_Hi	The batteries cannot be charged.
Batt_Lo	The batteries are almost discharged.
Vout_Lo	The output voltage is below specifications.
Overload	The Alpha Micro is overloaded. Remove excess loads.
Backfeed	A relay inside the Alpha Micro has failed and it cannot be replaced in the field. Contact Alpha Technologies customer service department.
Bad_Battery	The battery voltage has dropped below a specified level. Inverter shuts down.
Temp_Hi	The Alpha Micro is operating above temperature range.

Table J — Alarms	
Overload	The Alpha Micro is overloaded. Switch off excess loads.
Temp_Hi	The ambient battery temperature is too high.
Temp_Lo	The ambient battery temperature is too low.
User_Input	The user input contact "User Input: S2" is shorted.
Line_Freq	The line frequency is outside of the Alpha Micro's input specifications.
No_Temp_Probe	The battery temperature sensor has become disconnected or has failed.
Weak_Battery	The battery has failed the background scan in Line mode.
Batt_Low	The battery voltage is low.
Batt_Brkr_Open	The battery breaker is opened.
Self_test	The Alpha Micro is performing self test.
Fan_Fail	The Alpha Micro internal fan has failed.
Wrong_Softwre	The Alpha UPS Monitor is invalid (either version or part number).
AC_Brkr_Open	The AC breaker is opened.

6.9.4 Adjusting and Controlling the Alpha Micro

The Maintenance submenu lets you control the Alpha Micro and change selected items to meet your operational needs.

Procedure

From the Main menu, type **3** and press **Enter**.

Table K — Maintenance Submenu	
30 Battery Test Options	This starts the battery test and sets how long the test will run. The default setting for the test duration is 2 minutes, but this can be adjusted in 1 minute intervals. See "Operating the Alpha Micro, BATT TEST".
31 Inverter On/Off	This switches the inverter on or off to allow you to prevent a damaging deep battery discharge or to provide backup battery power to the load. See "Operating the Alpha Micro INVERTER". You can set a delay before the inverter switches off to allow time for switching off critical loads. The Set Inverter ON/OFF delay is only available when the Alpha Micro is in the Battery or Standby modes. The delay can be adjusted in 1 second steps with a default setting of 0 seconds to a maximum of 600 seconds (10 minutes). The delay is only available in the Standby or Battery modes. Once the Alpha Micro returns to the Line mode, the delay resets itself to 0 seconds.
32 Change Password	This changes the Alpha Micro's password. The factory set password is 1111, which can only be changed when the Alpha Micro is in Line mode. The password is limited to 4 alpha-numeric characters in length.
34 Line Qualify Time	This lets you set the delay when the Alpha Micro goes from Battery mode to Line mode after the line becomes requalified. The purpose of this delay is to make sure the line is stable before the Alpha Micro switches back to it. See "Operating the Alpha Micro, QUAL TIME". The default setting is 3 seconds, but you can set this to 3, 10, 20, 30, 40 or 50 seconds.
35 Low Battery Warning Voltage	The lets you set the Alpha Micro's low battery warning voltage, adjusting the setting to match the batteries you are using and the actual operating conditions. The default value is 40% (47 VDC) and can be adjusted in 1% (0.05 VDC) increments between 45.0 (0 %) and 50.0 VDC (100%) by typing in the % battery voltage level where you want the warning to be triggered.
36 Load Shed Timer On/Off	This lets you switch the timer contacts on or off. See "Contacts C1 to C6".

6.9.5 Programming the Dry Contacts and the Clock

The Alpha Micro's front panel contacts (C1 to C6) can be programmed to meet your specifications with RS–232 communications. You can also adjust the Alpha Micro's date and time.

Programming the Dry Contacts

The functions of dry contacts C1 to C5 (and if factory configured, dry contact C6) can be changed with RS-232 communications.

For example, to change contact C1:

1. To see how it is currently programmed, type **c1** (all lower case) and press **Enter**.

2. The Alpha Micro responds with ***c1=1** where the ***** shows the unit responded to your command.
   For example: a "**1**" shows it is programmed to be the **On Battery** indicator as shown in the Dry Contact Configuration table below.

Table L — Dry Contact Configuration		
1= On Battery	4= Alarm	7= Timer 2
2= Low Battery	5= Fault	8= Timer 3
3= Timer 1	6= Disabled	9= 48 VDC (Only available for contact C6)

3. To change the contact, type **c1=X** where X is 1 to 9 and press **Enter**.
   The Alpha Micro responds with ***c1=(1 to 9)**. The programming is done for that contact. Repeat as necessary for the other contacts.

Each contact can only be programmed for one function at a time and cannot show multiple conditions.

4. To reset the contacts to the factory default, type **default** and press **Enter**. The Alpha Micro responds with ***default**, showing it is reset. This command also resets the timer setting to the 2 hours factory default. See "Setting the Timer Contact". See "Specifications" for the factory default settings of dry contacts C1 to C6.

6.9.6 Setting the Timer Contact

The front panel's timer contact can be programmed to suit your application. See "Contacts C1 to C6" and "Programming the Dry Contacts and the Clock". The table below explains how.

<table>
<tr>
<th colspan="4">Table M — Setting the Timer Contact</th>
</tr>
<tr>
<th></th>
<th>Enter command</th>
<th>UPS display</th>
<th>Description</th>
</tr>
<tr>
<td rowspan="3">Displaying the Timer</td>
<td>timer and press Enter</td>
<td>*timer=02:00:00</td>
<td>Returns the value of timer</td>
</tr>
<tr>
<td>timer1 and press Enter</td>
<td>*timer1=02:00:00</td>
<td>Returns the value of timer1</td>
</tr>
<tr>
<td>timer2 and press Enter</td>
<td>*timer2=02:00:00</td>
<td>Returns the value of timer2</td>
</tr>
<tr>
<td rowspan="7">Setting the Timer</td>
<td>timer=00:01:00 and press Enter</td>
<td>*timer=00:01:00</td>
<td rowspan="2">Sets the value of timer1 to 60 seconds.</td>
</tr>
<tr>
<td>timer=00:01:00 and press Enter</td>
<td>*timer=120</td>
</tr>
<tr>
<td>timer1=00:01:00 and press Enter</td>
<td>*timer1=00:01:00</td>
<td rowspan="2">Sets the value of timer1 to 60 seconds.</td>
</tr>
<tr>
<td>timer1=120[†] and press Enter</td>
<td>*timer1=120</td>
</tr>
<tr>
<td>timer2=00:01:00 and press Enter</td>
<td>*timer2=00:01:00</td>
<td rowspan="2">Sets the value of timer2 to 60 seconds.</td>
</tr>
<tr>
<td>timer2=120[†] and press Enter</td>
<td>*timer2=120</td>
</tr>
<tr>
<td>default and press Enter</td>
<td>*default</td>
<td>Resets the timer to the factory default of 02:00:00 (2 hours); and resets contacts C1 to C5 to the factory default settings.See "Programming the Dry Contacts".</td>
</tr>
<tr>
<td colspan="4">Note: In the above example, the default timer setting of 2 hours is used.
* Indicates that the Alpha Micro has responded to the command you entered.
† Time can be entered in units of 0.5 second; e.g. 120 units of 0.5 seconds = 60 seconds. However, it is more intuitive to enter time in the hh:mm:ss format, such as 00:01:00 for 1 minute or 60 seconds in the above example.</td>
</tr>
</table>

6.9.7 Setting the Date and Time

<table>
<tr><th colspan="3">Table N — Setting the Date and Time</th></tr>
<tr><th>Enter command</th><th>UPS display</th><th>Description</th></tr>
<tr><td>clock and press Enter</td><td>*clock=12/31/07 22:00:00</td><td>Returns the current date and time.</td></tr>
<tr><td>clock=010107 ␣ 120000 and press Enter</td><td>*clock=01/01/07 12:00:00[†]</td><td>Sets the date and time to Jan 01, 2007, 12:00 pm.</td></tr>
<tr><td colspan="3">
Notes:

1. Time is displayed in the 24 hours clock format.

2. Changing the mm/dd/yy format with DATE SEL on the LCD Control menu does not change the RS-232 mm/dd/yy format.

3. If the Alpha Micro has been in storage or switched off for a prolonged period, the backup Lithium coin battery could be drained and may not correctly keep a backup of the date and time you entered. After switching on the Alpha Micro check the date and time settings. The Alpha Micro should display the current date and time. If it displays the date as "00:01:00", then the battery is spent and you need to ask a qualified service personnel to replace the lithium coin battery. See "Troubleshooting".

* Indicates that the Alpha Micro has responded to the command you entered.

† If the date or time change is invalid, the Alpha Micro will return the time and date it was set to before you tried making the change. The date and time must be entered as one complete line command. You cannot change only the time or the date alone. Both must be set at the same time. If you make a mistake, press Enter and try again.
</td></tr>
</table>

6.9.8 Viewing the Serial Number

To display the serial number of the Alpha Micro UPS, type "∗QY0" at the command line and press "Enter".

```
∗QY0
SN0000001
```
Connected 0:00:40   Auto detect   2400 8-N-1   SCROLL   CAPS   NUM   Capture   Pr
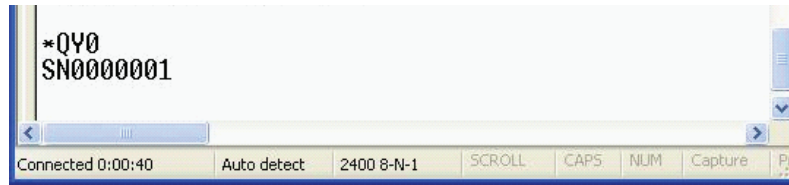
6.9.9 Setting the Peukert Number and Capacity

You can set the Peukert Number and Capacity using the RS-232 interface or the web interface. To display the current Peukert Number, type "∗QY6" at the command line and press "Enter".

```
∗QY6
Peukert Num=1.1000
```
Connected 0:02:35   Auto detect   2400 8-N-1   SCROLL   CAPS   NUM   Capture   Pr
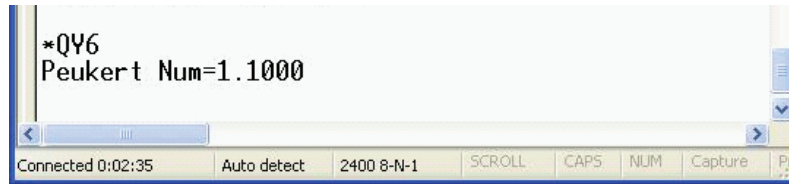
To change the Peukert Number to 1.1345, type "∗ST6:1.1345" at the command line and press "Enter".

```
∗ST6:1.1345
OK
_
```
Connected 0:03:05   Auto detect   2400 8-N-1   SCROLL   CAPS   NUM   Capture   Pr

To display the current Peukert Capacity, type "∗QY7" at the command line and press "Enter".

```
∗QY7
Peukert Capacity=100.0000
_
```
Connected 0:03:33   Auto detect   2400 8-N-1   SCROLL   CAPS   NUM   Capture   Pr
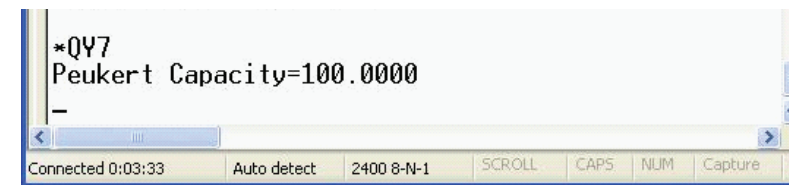
To change the Peukert Capacity to 109.123, type "∗ST7:109.123" at the command line and press "Enter".

```
∗ST7:109.123
OK
_
```
Connected 0:04:04   Auto detect   2400 8-N-1   SCROLL   CAPS   NUM   Capture   Pr

To determine the Peukert number and capacity of your battery, refer to "Puekert Number and Battery Capacity".

6.9.10 100-Event Log

Up to 100 events are stored in the Alpha Micro's log. If more than 100 events occur, the oldest is over-written.

Procedure

1. To see the log, type **event** (all lower case) and press **Enter**. The events are listed starting with the most recent and appear as: If less than 100 events occurred, the last entry will appear as:

eventX=12/25/99 01:45:59 0000000000000000, 0000000000000000, 000
Event　　Date　　Time　　　Alarm　　　　　　Fault　　Mode

Date & Time formats depend on selected display format

See below for details on these readouts.
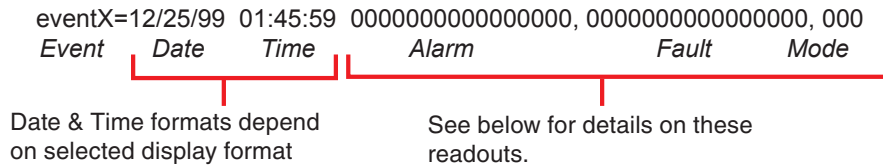
Alarm: When the following bits show a 1, the following alarms are displayed.

0000000000000000

- UPS Overloaded
- Fan Fail
- Self Test
- Battery Temperature High
- Battery Temperature Low
- Battery Voltage Low
- Temperature Probe Unplugged
- Input Frequency Out of Range
- User Input
- Battery Breaker Open
- Weak Battery
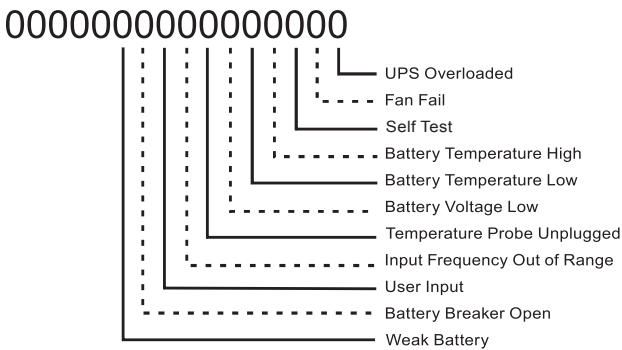
Fault: When the following bits show a 1, the following faults are displayed..

0000000000000000

- UPS Overloaded
- Short Circuit
- Internal Temperature High
- Output Over Voltage
- Output Below Voltage
- Battery Over Voltage
- Battery Low Voltage
- Blank (Not Used)
- Battery Failed
- Back Feed
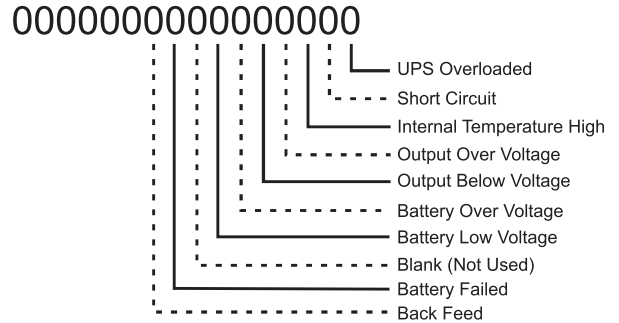
Table O — Event Codes					
Code	Mode	Code	Mode	Code	Mode
000	Standby	003	Boost 1	006	Inverter
001	Line	004	Buck 1	009	Shutdown
002	Boost 2	005	Buck 2	010	Bypass

2. If less than 100 events occurred, the last entry will appear as:

eventX=00/00/00 00:00:00 0000000000000000, 0000000000000000, 000

3. To clear the log, type **eventclr** and press **Enter**. It takes the Alpha Micro 30 seconds to clear the log. Do not enter any other commands during this time.

4. To see a specific event, type **eventX** where X is from 1 to 100 and press **Enter**. To see a range of events (for example, events 20 to 30), type **eventX-X** where X are events from 1 to 100 and press **Enter**. To clear the log, type **eventclr** and press **Enter**. It takes the Alpha Micro 30 seconds to clear the log. Do not enter any other commands during this time.

5. To see a specific event, type **eventX** where X is from 1 to 100 and press **Enter**. To see a range of events (for example, events 20 to 30), type **eventX-X** where X are events from 1 to 100 and press **Enter**.

6.9.11   Communicating with the Alpha UPS Monitor

Introduction

The Alpha UPS Monitor graphical user interface (GUI) provides web or Windows© like computer communications with the Alpha Micro The screen and its features are shown below. It is used to monitor, control and set various parameters like the date and time, determine when to perform the weekly self test, change the relay configurations, etc. The Fault or Alarm indicators show if the Alpha Micro has experienced a malfunction and the cause. Descriptions of all the screens and their functions are given in "Operation".
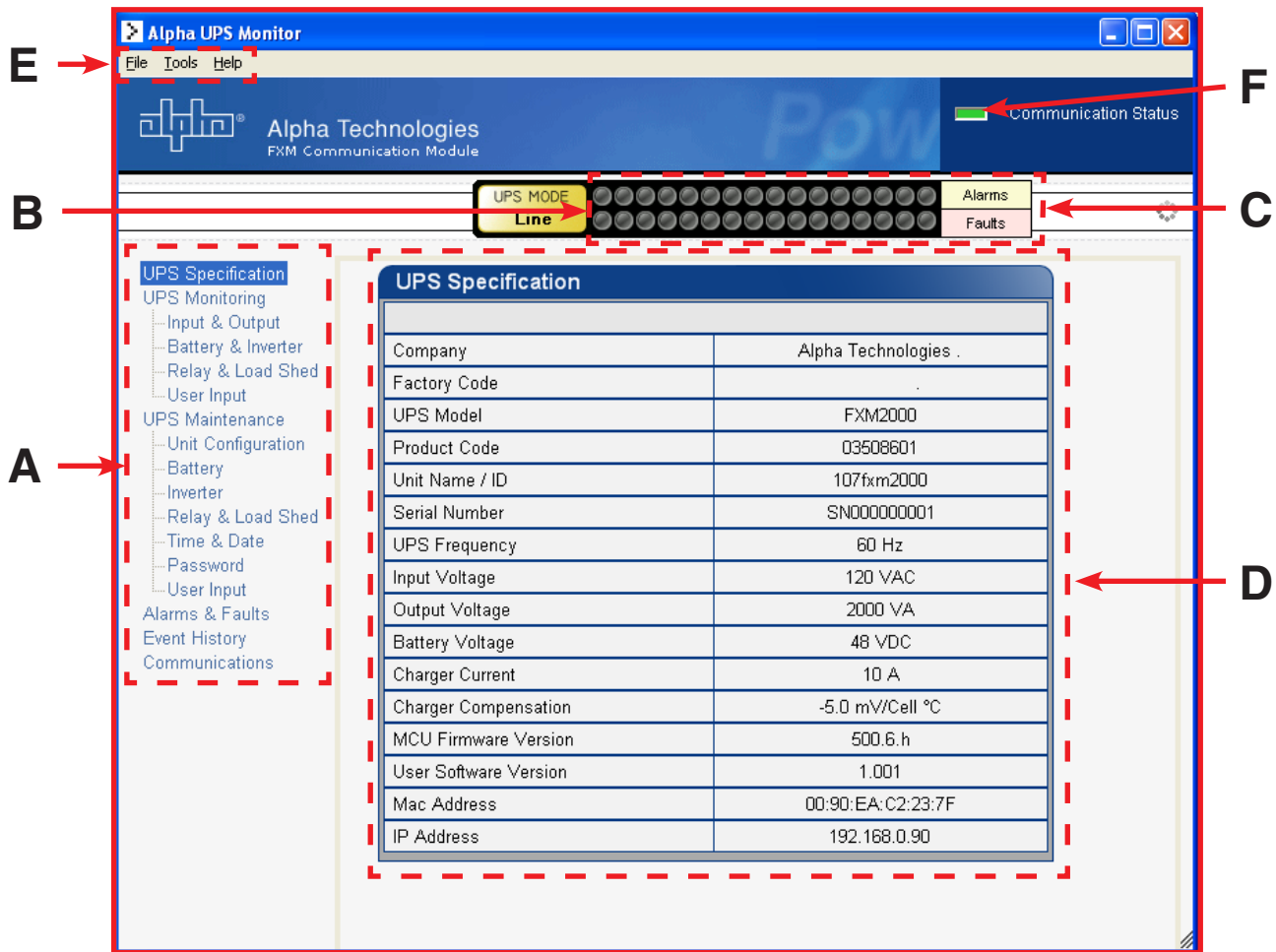
Figure 25 — Alpha UPS Monitor (UPS Specification Screen shown)

A	Screen selection menus.
B	Current UPS operating mode. This is updated automatically.
C	Fault and alarm indicators – when a light in this bar is illuminated, move the mouse cursor over the light to determine the malfunction. Double-clicking on the light will send you to the Alarms & Faults screen.
D	Readout screens.
E	Drop-down menus.
F	Online indicator.

6.9.12 Checking Your Windows Computer for the .NET Framework

1. Click on the **Start** button.

2. Go to and click on **Settings**.

3. Click on **Control Panel**.

4. Double-click on the **Add or Remove Programs** icon.

5. When the window shown in the figure below appears, scroll through the list of applications. If you see Microsoft .NET Framework listed, the Framework is already installed and you can install the Alpha UPS Monitor. If you don't see it listed, you MUST install it from the Microsoft Windows update web site before installing the software.
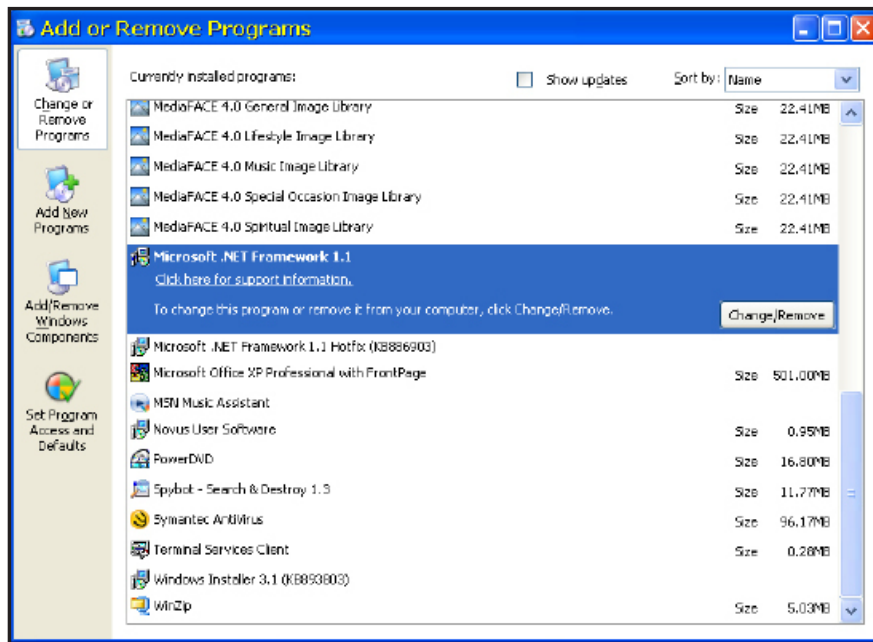
Figure 26 — Add or Remove Programs Window

If you are downloading from Microsoft's web site, an Internet web browser such as Internet Explorer or Firefox must be installed on your computer. In addition to installing .NET, downloading from the web site will update your computer with all the latest security updates. If your computer is part of a company network, check with your network administrator before downloading software from the Internet.

6.9.13   Installation and Set Up

The following tools and materials are required:

- Alpha UPS Monitor, available for download from www.alpha.ca./downloads/.
- Windows 98 or later with Microsoft's .NET framework installed.
- DE–9 serial straight-through computer cable.

Procedure

1. Install the Alpha UPS Monitor onto your computer. Restart the computer.

If you install the Alpha UPS Monitor on a version of Windows without the .NET framework installed, an error message saying the framework is not installed will appear. Install the framework onto your computer according to "Communicating With the Alpha UPS Monitor". Restart your computer and then try to install the Alpha UPS Monitor again.

2. Connect the computer cable from any available communications port on the computer to the RS–232 port on the Alpha Micro's front panel. See "Wiring the RS-232 Port".

3. Set the communications parameters on your computer to:

   a. COM Port: The COM port on your computer you have selected to use.

   b. Baud Rate: 2400.

4. To start communications between the computer and the Alpha Micro do one of the following:

   a. Click on the screen's Online Indicator, or

   b. In the **File** drop-down menu, click on **Connect to Alpha Micro**

If the computer cannot connect to the Alpha Micro a pop up screen appears asking you to check the wiring and that you are connected to the proper com port.

6.10 Operation

The various screens are described on the following pages and operate like Web or Windows-type screens. Point and click to change the various functions or fields.

The on line indicator shows if you are connected to the Alpha Micro The Alpha UPS Monitor automatically polls the Alpha Micro to obtain its status. The default setting is polling once every 3 seconds, but you can change this in the **UPS Maintenance-Unit Configuration** screen in the "**Status Refresh Time**" menu.

If a light or lights are illuminated in the Fault or Alarm fields, the Alpha Micro has a malfunction. Hover your mouse cursor over the light to learn the type of malfunction or double-click on it to go straight to the Alarms & Faults screen.

To control the unit or change it's settings or parameters, either click on the On/Off buttons, or choose an item from a drop down menu. Then click on the **Update Settings** button.

If you do not click on this button, the change will not happen.

6.10.1 UPS Specifications

This screen displays the various specifications of the Alpha Micro

Figure 27 — Alpha UPS Monitor: UPS Specification screen

6.10.2 UPS Monitoring

These read-only screens show the Alpha Micro's current input and output values and other measurements.

Input & Output

Shows the current line input and Alpha Micro output values and the Alpha Micro's present operating mode.

Figure 28 — UPS Monitoring: Input & Output screen

Battery & Inverter

Shows the battery string's status and how many times and for how long the inverter has been active.

Figure 29 — UPS Monitoring: Battery & Inverter screen

Relay & Load Shed

Shows how the front panel dry contacts are configured. If any relays are used for load shedding, the time setting is shown.

Figure 30 — UPS Monitoring: Relay & Load Shed screen

User Input Status

Shows the current status of the user programmable inputs 1 to 3.

Figure 31 — UPS Monitoring: User Input Status screen

6.10.3 UPS Maintenance

The UPS Maintenance screens are used to configure and adjust the Alpha Micro to meet your operating needs. To change parameters, either click on the **On/Off** buttons or choose an item from a drop down menu. To execute the changes, click on the **Update Settings** button. If you do not click this button, the changes will not happen.

Unit Configuration

Is used to set the name, input, output and how often the GUI polls the Alpha Micro

Figure 32 — UPS Maintenance: Unit Configuration screen

Battery

Allows adjustments of battery string voltage, charging parameters, low battery warning time, periodic self test time, and starts the self test.

Figure 33 — UPS Maintenance: Battery screen

An accurate battery runtime estimation requires the following parameter to be adjusted:

- **Peukert Number:** Refer to the appendix for information about how to calculate the Peukert number to be entered here.

- **Battery Capacity**: This is the rated capacity (Ah) of the battery shown on the battery data sheet. Do not confuse the battery capacity with the Peukert capacity.

- **Battery Open Circuit Voltage**: This number is obtained from the battery data sheet. The battery data sheet shows the value for a single battery, so for a 48 V system where 4 batteries are connected in series, this number must be multiplied by four.

The "Battery Runtime Remaining" algorithm attempts to calculate the health of the battery to get a more accurate prediction of the remaining battery runtime. An accurate estimate of the battery health requires that at least one battery discharge greater than 20% depth of discharge has taken place since the unit was switched on. When the unit is powered up from an off state, the algorithm assumes that a new battery is connected to the unit. Each discharge of greater than 20% will result in a new calculation for the relative battery health. This value is then used in the "Battery Runtime Prediction algorithm to compensate for an aging battery. We recommend that the user set up a periodic (every 6 months) battery test with a depth of discharge of at least 20%.

The "Battery Runtime Remaining" algorithm relies heavily on the battery voltage to predict the remaining runtime. This results in a less accurate predicted runtime during periods when the battery voltage is changing rapidly. The battery voltage typically changes rapidly during the first few minutes of discharge when the unit switches from charging to discharging while the unit is in the Inverter mode. The battery voltage may also change rapidly during the last 20% of the discharge time when the battery is almost drained.

Inverter

Is used to turn the inverter on or off to start or stop backup battery power to the load.
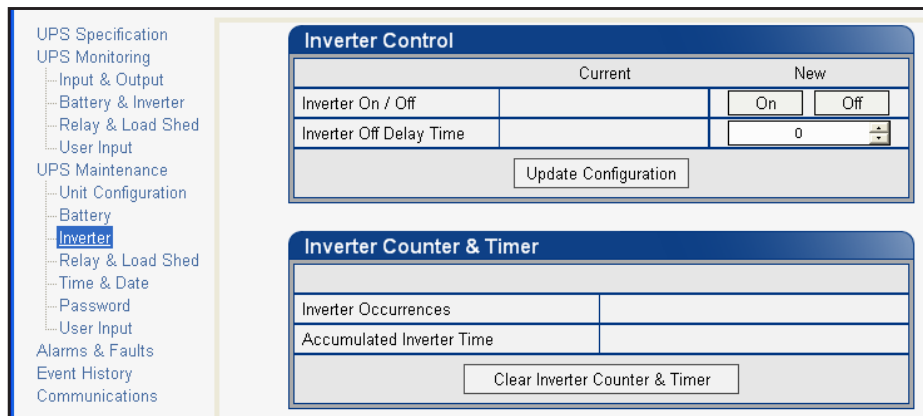
Figure 34 — UPS Maintenance: Inverter screen

Relay & Load Shed

Is used to configure the front panel's dry contact to provide a signal for turning off the load.

Figure 35 — UPS Maintenance: Relay & Load Shed screen

Controlling the external fan by temperature triggered dry contact

The Alpha Micro has up to 6 dry contacts (C1 to C6) on the front panel which can be configured by the user to open or close based on the specific trigger conditions. Dry contact functions currently available include: Alarm, Fault, Timer, Low Battery, On Battery, etc. The Temperature trigger has been added as a new function, with a user configurable range of +20°C to +55°C. When the battery temperature (monitored by the Battery Temperature Probe) reaches the threshold, the assigned relay closes and turns on the external fan.

Dry contact C6 is by default factory hard wired to External VDC. To configure C6 as a programmable dry contact, the unit must be sent back to the factory.

The Temperature trigger can be programmed via one of the following 3 interfaces:

1. LCD panel – from the Logo screen, navigate to **Control Menu** > **RELAY TEMP**. Press the **SELECT** button and the current temperature display will start flashing. Use the **Scroll** button to change the temperature in 5°C increments. Press **SELECT** to accept the changes or **CANCEL** to abort.

```
RELAY TEMP    120/60/N
        55        LINE
```

Dry contact functions are not programmable through the LCD. Use the RS-232 GUI or the HyperTerminal instead.

2. RS-232 GUI – Figure 26a shows the Relay Configuration window under the UPS Maintenance > Relay & Load Shed screen. As an example, to assign C1 as the Temperature trigger, select Temperature from the drop down menu. Click Update Configuration and the current status will update momentarily. In the example shown below, the fan on temperature threshold is set at 55°C. To change this value, simply type the new value into the Fan On Temperature box (or use the up/down arrow keys) and click Update Configuration to update the current status display.

  a. Assigning the Temperature trigger function to a dry contact.
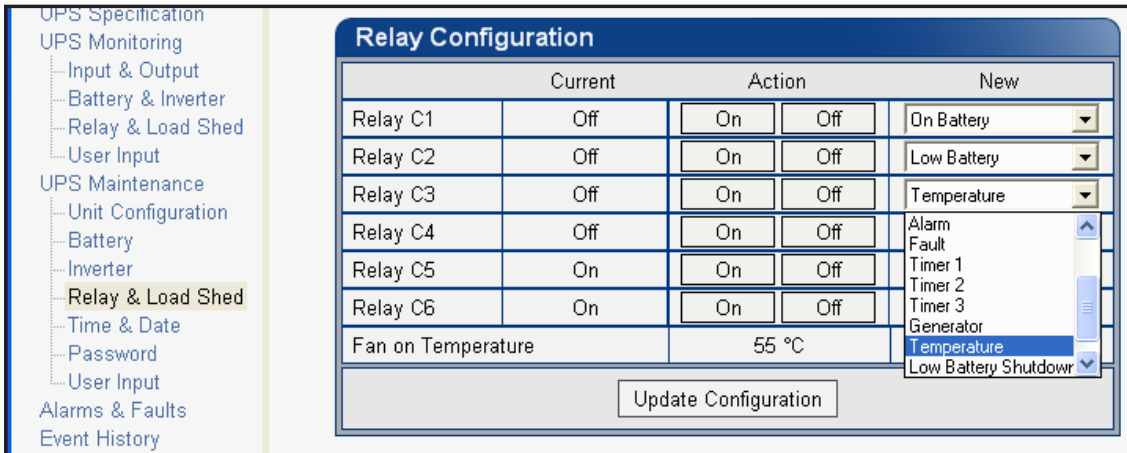
  b. Setting the Temperature trigger value.
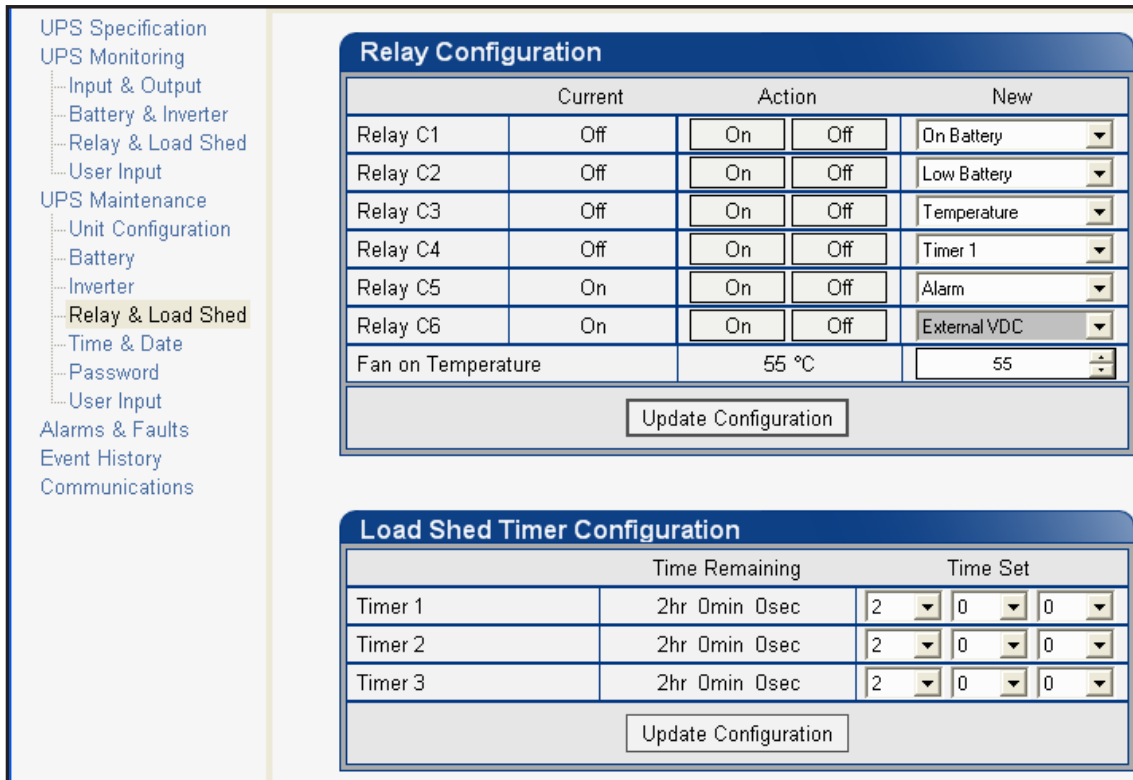
Figure 36 — Temperature trigger function via Alpha UPS Monitor

3. RS-232 HyperTerminal – the Temperature trigger function can be assigned to any available dry contacts as described in "Programming the Dry Contacts" (e.g. c1=11, where 11 is the assigned index for the Temperature trigger function.)
   After establishing an RS-232 connection with the Alpha Micro at the HyperTerminal screen prompt, type Temp and press Enter to display the current temperature setting Alpha Micro returns *temp=20). To change the value to +35°C, type temp=35 and press Enter. The Alpha Micro returns *temp=35 as confirmation.
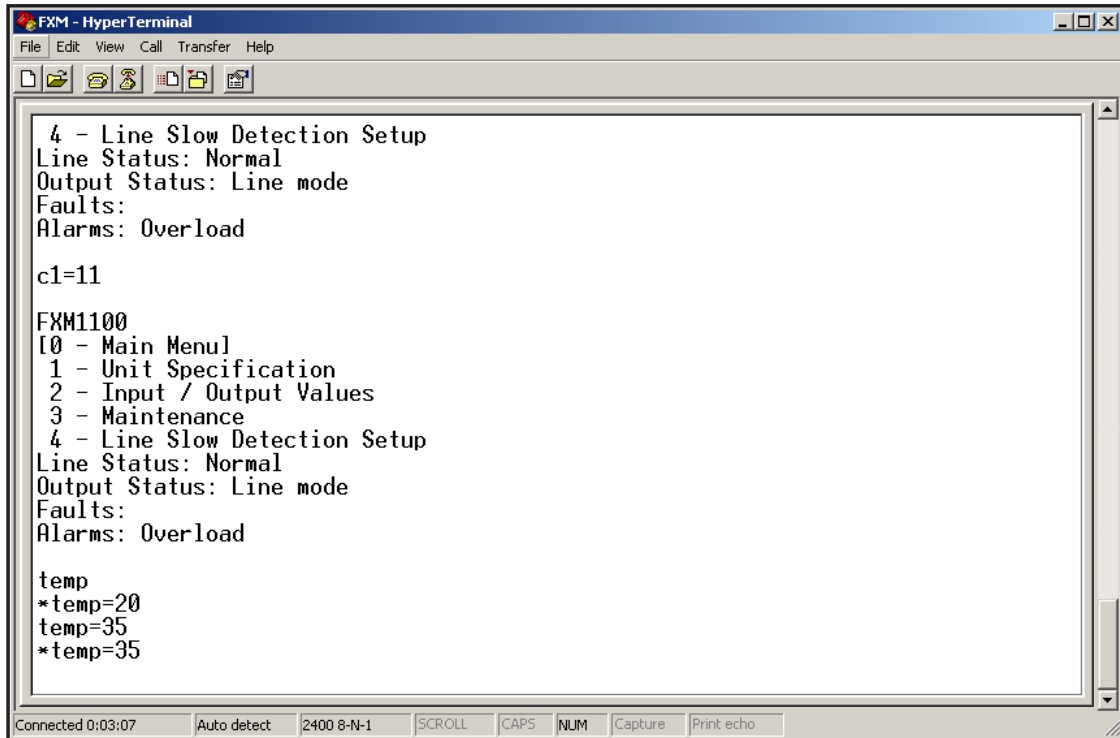
Figure 37 — Temperature trigger function via HyperTerminal

Programmable Dry Contact Time of Day Action

You can assign a dedicated timer to a dry contact. Upon entering the Inverter operating mode, the timer is activated and begins to count down from a user defined value. When the timer reaches zero, the programmed dry contact relay will be activated (Status = ON).
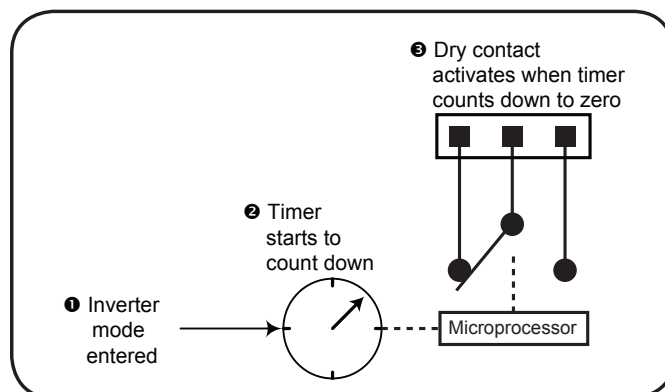
Figure 38 — Programmable Timer Operation

A typical application of this timer controlled dry contact function is to control a traffic light. When the grid power fails, the Alpha Micro goes into the Inverter mode and continues supplying backup power to the traffic light. Since the batteries supplying the backup power have limited capacity, a timer controlled dry contact is usually configured to switch the traffic light into the flashing amber or flashing red mode after a user-defined period to conserve battery power. This setup works fine during non rush hour traffic, but during rush hour, it may be more desirable to keep the traffic light running normally for as long as backup power is available. To address this issue, a new feature called the **Time of Day Action** has been added to deactivate the timer during a user defined time period up to twice each day.
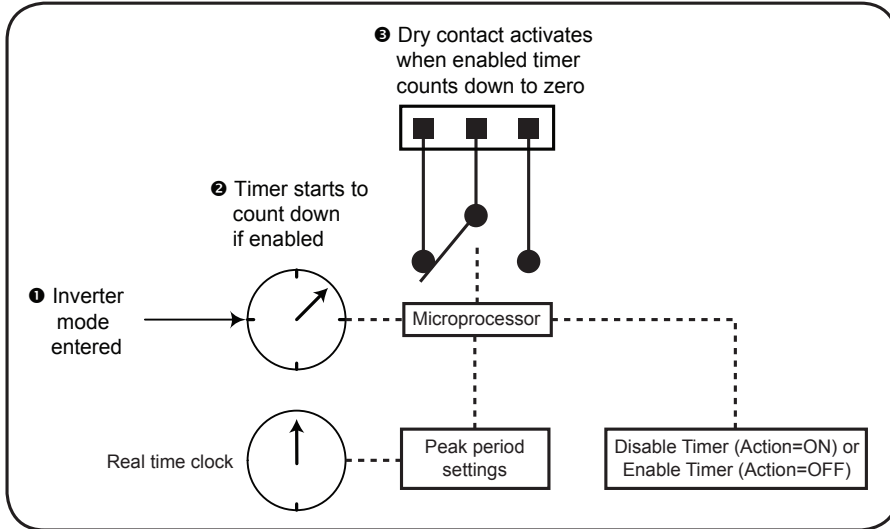
Figure 39 — Time Of Day Action Operation

You can define up to 2 peak time periods of the day:

1. Go to the UPS Maintenance > Relay & Load Shed screen.

2. In the Time of Day Action Configuration dialogue box, set up the start and end time of the first rush hour under Time Period 1 and the second rush hour under Time Period 2. In this example, during the first time period (7 AM to 9 AM), all 3 timers are disabled (they do not count down at all). Similarly, all timers are disabled during the second time period (3 PM to 6 PM).

3. Select ON under each time period. Click the Update button under each time period to store the settings. Confirm your settings in the UPS Monitoring > Relay & Load Shed > Time of Day Action Status screen.

Figure 40 — Time Of Day Configuration

017-237-B0   Rev A

Figure 41 — Time Of Day Action Status

Once the Time of Day Action is configured, the Alpha Micro will automatically disable the timers during the Inverter mode at the defined peak periods.

You can switch off the Time of Day Action by setting one or both time period(s) to **OFF**. The dry contact will be activated by the timer regardless of the peak period settings.

Time & Date

Is used to set the Alpha FXM's date and time.

Figure 42 — UPS Maintenance: Time & Date screen

Password

Is used to set the Alpha Micro's password. The factory set password is 1111.
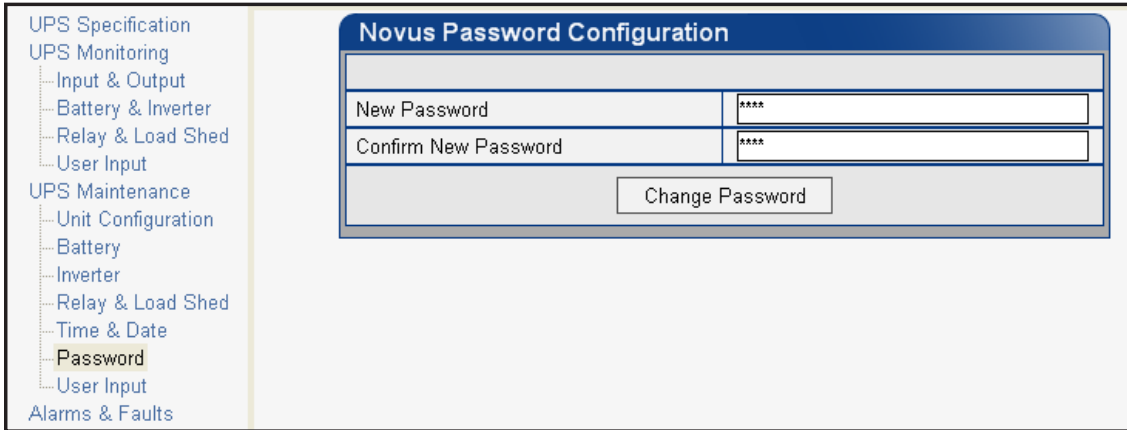
Figure 43 — UPS Maintenance: Password screen

The password is limited to 4 alphanumeric characters. The software will not accept more than 4 characters.

User Input

Three programmable User Inputs exist. Their functions are similar to the Dry Contact relays. Supported functions include: (a) Shutdown, (b) User Alarm and (c) Self Test.
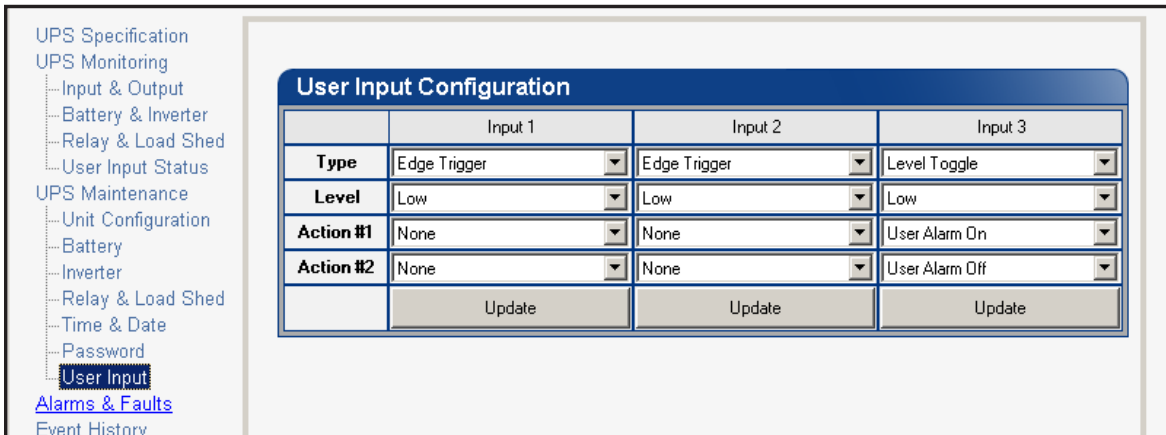
Figure 44 — UPS Maintenance: User Input screen

Any user input can be configured to perform a certain action in response to different trigger types and logic levels. For example, if you want the Alpha Micro to issue an intrusion alarm when the door is opened, you will need to wire the door with a switch that triggers a user input every time the door is opened. The following procedure describes how User Input 1 can be configured as an intrusion alarm input.

Procedure

1. Select **UPS Maintenance** > **User Input** to display the **User Input Configuration** window.
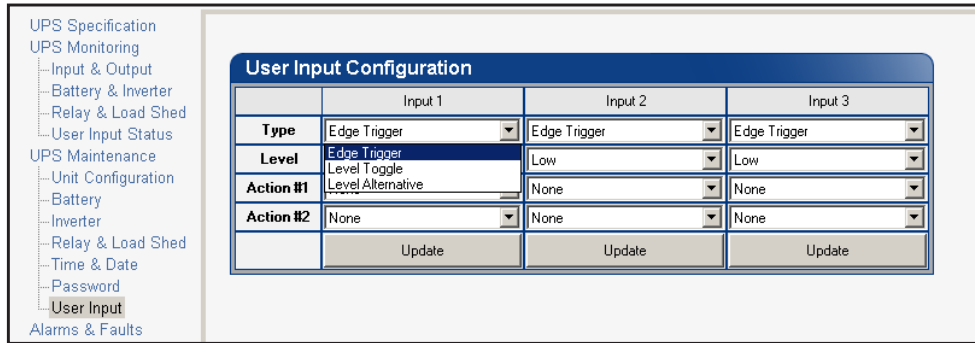
Figure 45 — User Input Configuration: Setting the Trigger Type

2. In the Input 1 column, select the **Type** down arrow to display the 3 types of available triggers: Edge Trigger, Level Toggle, and Level Alternative. For more information on how triggers work, see "Types of Trigger".

3. Select **Edge Trigger**.

4. Select **Low** from the **Level** drop down menu. The User Input will go to logic level "low" whenever it is triggered.

5. Select **User Alarm On** from the **Action #1** drop down menu.
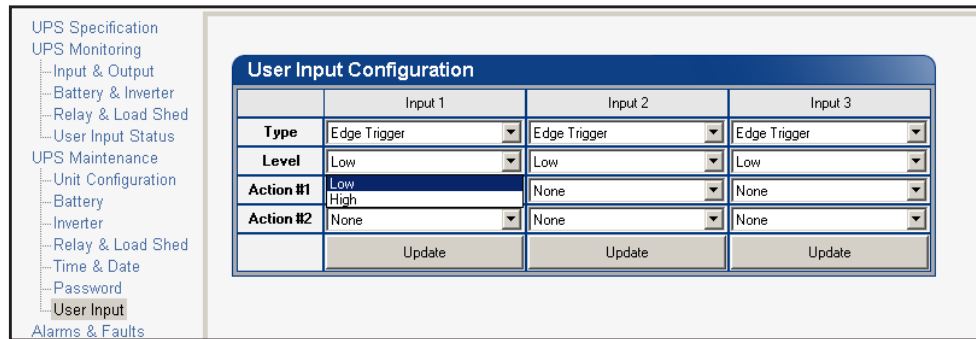
Figure 46 — User Input Configuration: Setting the Logic Level

6. Click the **Update** button and enter the password to confirm if required.
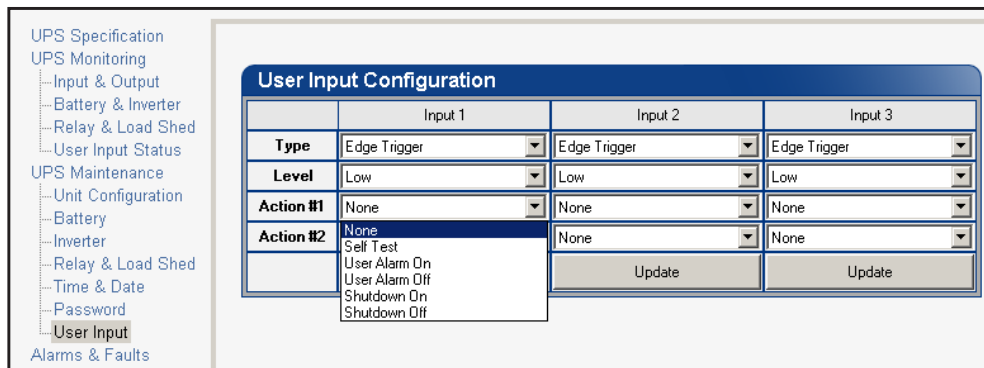
Figure 47 — User Input Configuration: Setting an Action

7. Check the **User Input Current Status** at the **UPS Monitoring > User Input Status** page.
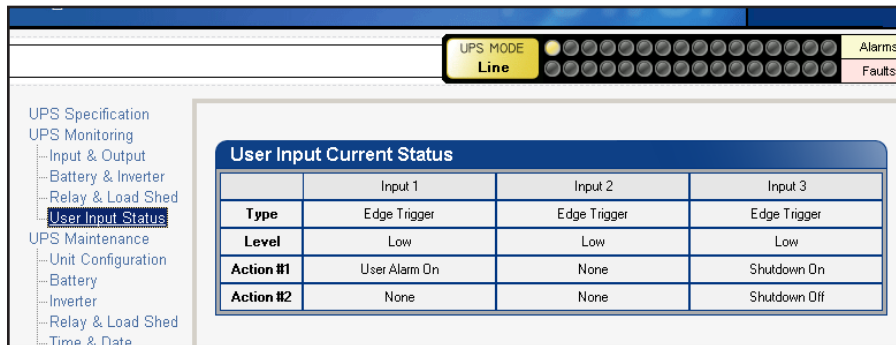
Figure 48 — User Input Current Status

Perform a quick test by shorting the User Input 1 dry contact pin (Pin 19 of C6) to ground (Pin 22 of C6) with a short length of PVC insulated electronic wire. This will trigger the Alpha Micro to issue a User Input Alarm as shown below.
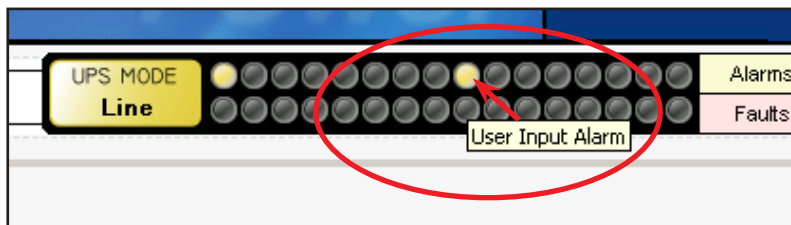
Figure 49 — User Input Current Status

Hovering the cursor over the amber indicator will display the corresponding context sensitive message.

Operation

Many of the screens used for Ethernet communications look and function the same and contain the same information as the Alpha UPS Monitor screens. There are additional screens only available with Ethernet communications which are detailed below.

Configure Site Information

This screen is used to enter site location information into the UPS's memory.

Figure 50 — Alpha UPS Monitor: Configure Site Information

Communications

- Configure TCP/IP is used to set the UPS's IP or TCP address.
- Configure SNMP is used to set the UPS for use with SNMP communications.
- Configure RS-232: You cannot change RS-232 parameters with this screen.
- Email Notification tells the card to send an e-mail message whenever selected UPS events happen.

Figure 51 — Alpha UPS Monitor: UPS Communications screen

Restoring All Parameters to Default Values

The purpose of this command is to reset the Alpha Micro to the factory default state. See Table P for a list of parameters that will be restored to their default values.

⚠️ **CAUTION!**

This command resets all parameters that are user-configurable. All previously programmed operation will be lost. Implement a backup plan for mission critical operations. This command is password protected.

The default command can be issued via the RS-232 HyperTerminal or the RS-232 GUI as follows:

- RS-232 HyperTerminal – type **default:all** and **press Enter**. **Enter the password and the** Alpha Micro returns ***default** as confirmation.

- RS-232 GUI – From the UPS Maintenance > Unit Configuration screen, click the Restore Defaults button. Enter the password to execute the command.

Figure 52 — Restore all default commands

Table P — List of Parameters
Maximum battery charging current
Temperature compensation of battery charging
Maximum allowable duration of output short circuit before shutdown
Property settings of programmable user input #1
Action #1 setting of programmable user input #1
Action #2 setting of programmable user input #1
Property settings of programmable user input #2
Action #1 setting of programmable user input #2
Action #2 setting of programmable user input #2
Property settings of programmable user input #3
Action #1 setting of programmable user input #3
Action #2 setting of programmable user input #3
Start hour of rush hour of time of day action period #1
Start minute of rush hour of time of day action period #1
End hour of rush hour of time of day action period #1
End minute of rush hour of time of day action period #1
Start hour of rush hour of time of day action period #2
Start minute of rush hour of time of day action period #2
End hour of rush hour of time of day action period #2
End minute of rush hour of time of day action period #2
Scheduled events
Format setting of date display on LCD
Line qualify time
Time setting of periodical self-test (minute) (hh:mm)
Inverter off delay setting
RS-232 baud rate
Number of weeks setting of periodical self-test
Day of the week setting of periodical self-test
Time of the day setting of periodical self-test
Battery low warning threshold setting (%)
Self test duration setting (minutes)
Internal temperature setting to turn on cooling fan
Load shed timer1 duration
Load shed timer2 duration
Load shed timer3 duration
Programmable dry contact #1 setting
Programmable dry contact #2 setting
Programmable dry contact #3 setting
Programmable dry contact #4 setting
Programmable dry contact #5 setting
Programmable dry contact #6 setting
Password setting

Alarms & Faults

This read-only screen shows the operating status of the Alpha Micro When the fault or alarm indicators on the horizontal bar are illuminated, place the mouse cursor over the light to display the context sensitive message.
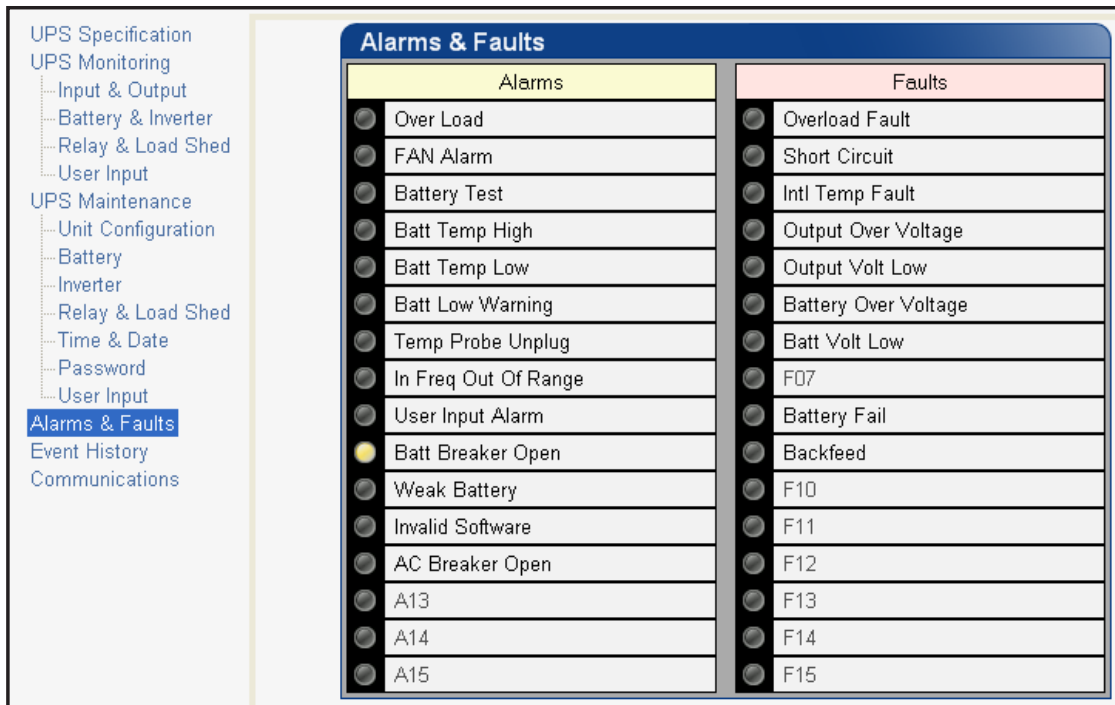
Figure 54 — Alpha UPS Monitor: UPS Alarms & Faults screen

Event History

This screen shows the last 100 events recorded by the Alpha Micro Choosing a number in the **Event Index** drop-down box and then clicking on the **View Selected** button will display the updated information about the selected event.
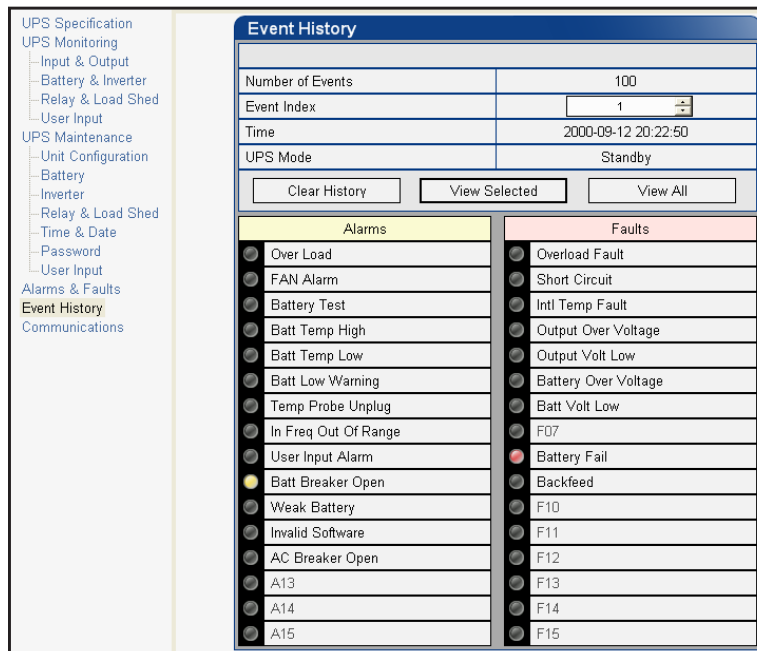
Figure 53 — Alpha UPS Monitor: UPS Event History screen

To view all the events, click on the **View All** button to open the **Event Log Monitor** window. Clicking on the **Clear History** button clears the log. This action cannot be undone.
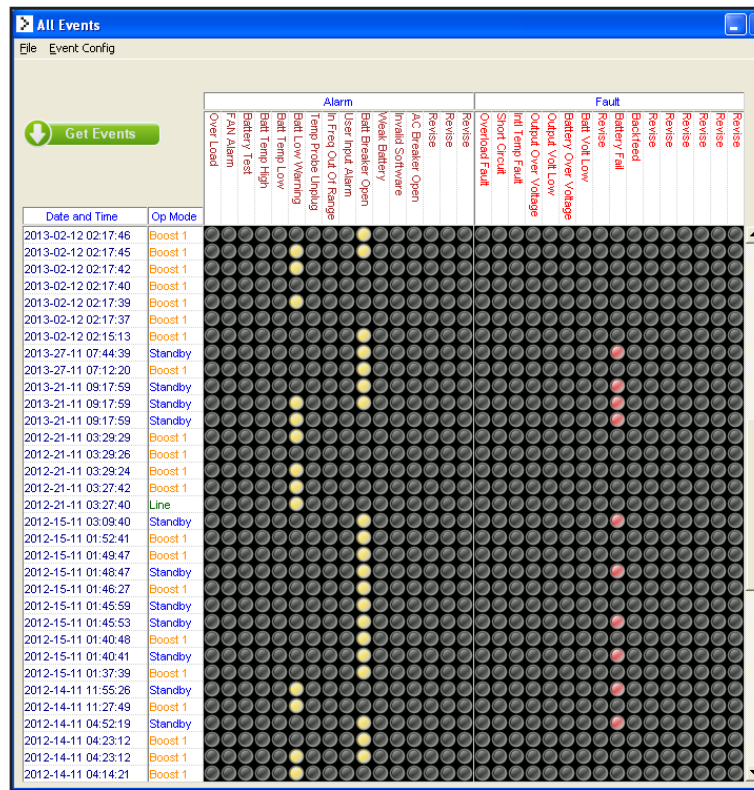
Figure 55 — Alpha UPS Monitor: Event Log Monitor screen

In the **Event Log Monitor** window, the events are displayed by date and time. Scroll up and down the list to select the events you want to see. To download the latest events from the Alpha Micro click on the **Get Events** button. This process may take a few minutes. When the process is finished the events can be saved to an event file by selecting File > Save As.

To build a complete history of events for an Alpha Micro save all the downloaded events from the unit to the same event file. A maximum of 100 events can be stored on the Alpha Micro The oldest events are replaced by the newest ones. However, saving to the same event file gives the option of appending to an existing event file when selecting File > Save As.
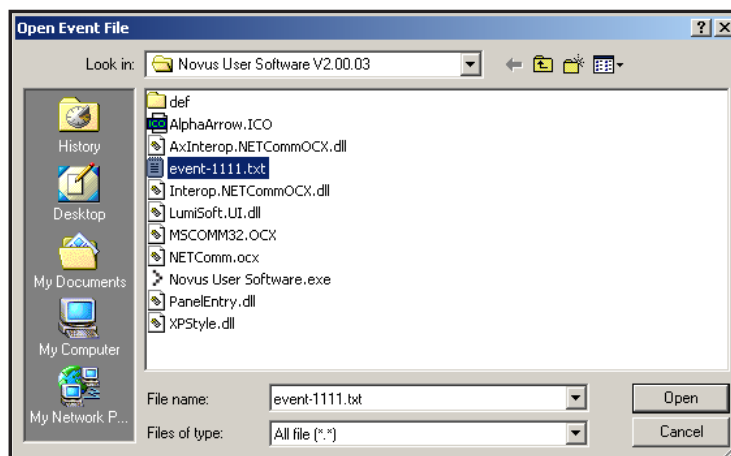
Figure 56 — Event Log Monitor, Open Event File window

To view a previously saved event log without downloading any new events from the Alpha Micro and overwriting the saved event file, select **File > Open** and navigate to the saved event log file.

When opening or saving event log files, only files with the extension 'evt' can be opened or closed. This is the file type associated with event log files in the Alpha UPS Monitor.

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Upgrade Files

This feature is available only on Alpha Micro UPS equipped with the network interface card factory option.

To upgrade the Alpha UPS Monitor firmware, browse to the .bin file and click OK to start the upload. This may take a few minutes to complete.
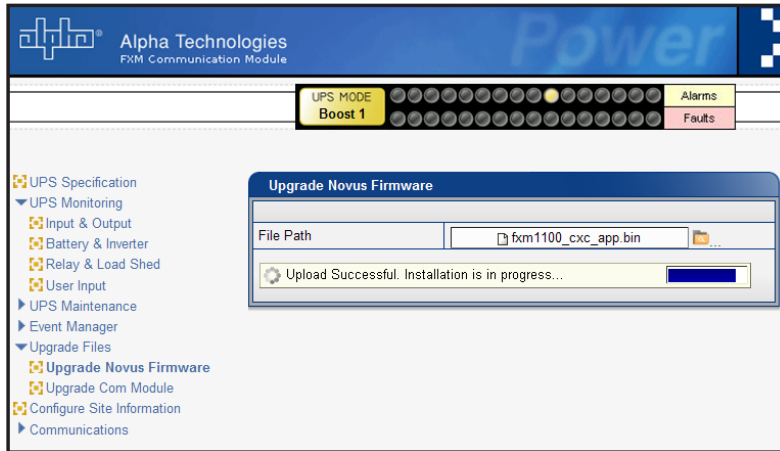
Figure 57 — Alpha UPS Monitor: Upgrade Firmware

To upgrade the Communication module, browse to the .ezip file and click OK to start the upload. This may take a few minutes to complete.
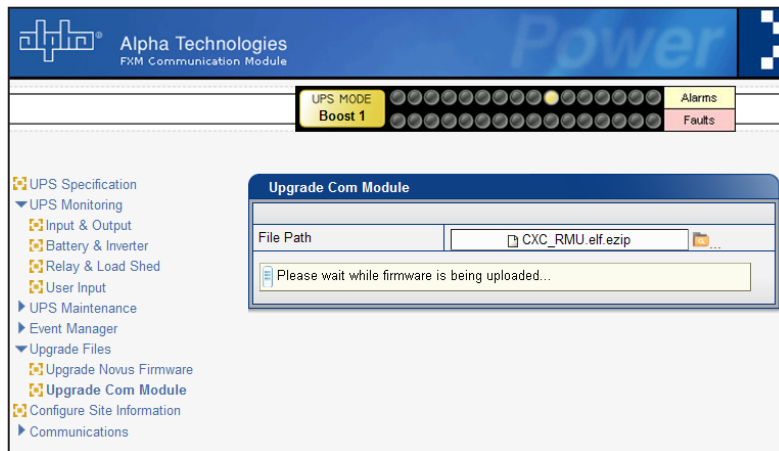
Figure 58 — Alpha UPS Monitor: Upgrade Communication Module

Communications

This screen changes the Alpha Micro's communication parameters. The RS-232 Baud Rate cannot be changed.
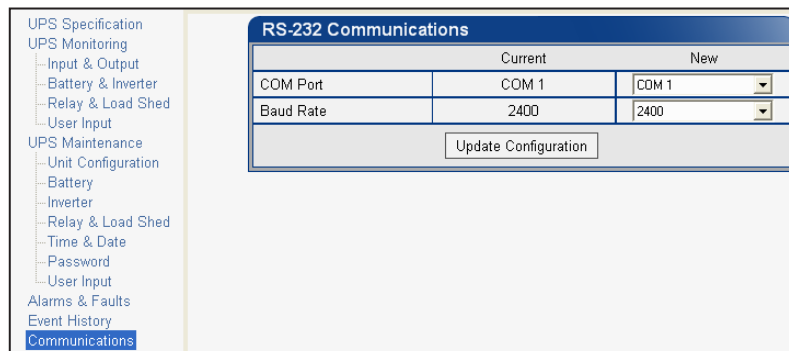
Figure 59 — Alpha UPS Monitor: UPS Communications screen

Keep Alive

The Keep Alive feature can be used to reset power when a communication failure is detected. The purpose of the reset is to temporarily remove power and reset the local communications equipment powered by this unit. The goal of the Keep Alive feature is to attempt to restore communications by resetting the local communication equipment until communications is re-established

UPS Specification
▼ UPS Monitoring
  Input & Output
  Battery & Inverter
  Relay & Load Shed
  User Input
▼ UPS Maintenance
  Unit Configuration
  Battery
  Inverter
  Relay & Load Shed
  Time & Date
  Password
  User Input
▼ Event Manager
  Alarms & Faults
  Event History
  All Events
▼ Upgrade Files
  Upgrade Novus Firmware
  Upgrade Com Module
Configure Site Information
▼ Communications
  Configure TCP/IP
  Configure SNMP
  Email Notification
Keep Alive

Keep Alive Status/Manual Control

	Current	New
Status	Ping Echo Recieved	On / Off
Delay To Startup	60 Sec	60

Update Configuration

Keep Alive Method To Detect Communication Failure

	Current	New
Protocol	Ping	Ping
IP address	10.1.8.172	10.1.8.172
Delay Between Retry	5 Sec	5

Update Configuration

How To Detect Communication Failure

	Current	New
Timeout	15 Sec	15
Retries Before Failure	3	3

Update Configuration

Keep Alive Action To Attempt To Restore Communication

	Current	New
Action	Reset Power	Reset Power
Action Duration	30 Sec	30

Update Configuration

When To Fail

	Current	New
After X Consecutive Actions	3	3

Update Configuration

Keep Alive Failure

	Current	New
Send Trap	On	On / Off
Delay To Re-Startup	120 Sec	120

Update Configuration

UPS MODE
Line
Alarms
Faults

Alpha Technologies
FXM Communication Module

Keep Alive status/manual control:

a. The Status field allows the user to enable or disable the Keep Alive function. When disabled the alarm is cleared.

b. The Delay to Startup field allows the user to set the time to the first ping from the enable ping or UPS restart after a ping failure. Minimum = 5 s, Maximum = 3600 s.

Keep Alive Method to detect communication failure:

a. The Protocol field allows Ping as the only option.

b. The IP Address field is used to enter the IP address to be pinged.

c. The Delay Between Retry field is the delay between pings. Minimum = 5 s, Maximum = 65535 s.

How to detect communication failure:

a. The Timeout field is where the ping time out setting is configured. Minimum = 2 s, Maximum = 65534 s.

b. The Retries Before Failure field is the number of pings to repeat before power cycling. Minimum = 1, Maximum = 20.

Keep Alive action to attempt to restore communication:

a. The Action field allows Reset Power as the only option.

b. The Action Duration field is how long the output will be shut off by the UPS, Minimum = 1 s, Maximum = 3600 s.

When To Fail:

a. The After X Consecutive Actions field determines the number of times the UPS will go through the ping and power down and back up cycle before registering an Alarm for Keep Alive. Other alarms and events will occur regardless of this value. After the final power cycle, the UPS will issue another ping after the Delay between retry has elapsed. This ensures the destination IP is not alive. The UPS will then set the Keep Alive alarm. Minimum = 1, Maximum = 20.

Keep Alive Failure:

a. The Send Trap field allows the email and SNMP trap notification to be switched on and off for the Keep Alive only.

b. The Delay to Re-Startup field configures the delay after the Keep Alive alarm is set and the next ping is sent in delay to restart. Minimum = 5 s, Maximum = 3600 s.

6.11 Communicating Via The Intranet or Internet

If the Alpha Micro is equipped with the optional, factory-installed communication module, then the internet or a company intranet can be used to communicate with the Alpha Micro In addition, the Alpha Micro can be monitored and controlled via a web browser or with SNMP protocols.

6.11.1 Installation and Set Up

The following tools and materials are needed:

- Computer with network card and web browser.
- Cross over cable or hub.
- The UPS's: Final IP Address and Subnet Mask and if needed the Default Gateway and the DNS Server addresses.

⚠️ **CAUTION!**

To successfully complete this procedure, you should have a working knowledge of network protocols and how to configure them. Consult your network administrator for details.

If multiple UPS's are installed on the same network, configure each unit's IP address before the installation. Each UPS on the network MUST have its own unique IP address See "Communications, Configure TCP/IP".

6.11.2 Procedure

1. Connect the Alpha Micro to the computer with either the cross over cable or a hub.

2. Switch on the computer.

3. Configure the network card to talk to the communication module. The module's default address is http://192.168.0.90.

4. Type the IP address into the browser and press ENTER. The input and output screen appears. See "UPS Monitoring".

5. Go to the communications screen, "Configure TCP/IP", and configure the TCP/IP properties according to your network's requirements. Push the Apply Settings button. The screen will prompt for the password. The factory default password is 1111.

6. Connect the Alpha Micro to the configured network according to your new properties.

7. Access the Alpha Micro according to the new network properties.

6.11.3   Operation

Many of the screens used for Ethernet communications look and function the same and contain the same information as the Alpha UPS Monitor screens. There are additional screens only available with Ethernet communications which are detailed below.

Configure Site Information

This screen is used to enter site location information into the UPS's memory.

Figure 60 — Alpha UPS Monitor: Configure Site Information

Communications

- Configure TCP/IP is used to set the UPS's IP or TCP address.
- Configure SNMP is used to set the UPS for use with SNMP communications.
- Configure RS-232: You cannot change RS-232 parameters with this screen.
- Email Notification tells the card to send an e-mail message whenever selected UPS events happen.

Figure 61 — Alpha UPS Monitor: UPS Communications screen

6.11.4 Restoring All Parameters to Default Values

The purpose of this command is to reset the Alpha Micro to the factory default state. See Table P for a list of parameters that will be restored to their default values.

⚠️ **CAUTION!**

This command resets all parameters that are user-configurable. All previously programmed operation will be lost. Implement a backup plan for mission critical operations. This command is password protected.

The default command can be issued via the RS-232 HyperTerminal or the RS-232 GUI as follows:

- RS-232 HyperTerminal – type **default:all** and **press Enter**. **Enter the password and the** Alpha Micro returns ***default** as confirmation.
- RS-232 GUI – From the UPS Maintenance > Unit Configuration screen, click the Restore Defaults button. Enter the password to execute the command.

Figure 62 — Restore all default commands

Table Q — List of Parameters

Maximum battery charging current
Temperature compensation of battery charging
Maximum allowable duration of output short circuit before shutdown
Property settings of programmable user input #1
Action #1 setting of programmable user input #1
Action #2 setting of programmable user input #1
Property settings of programmable user input #2
Action #1 setting of programmable user input #2
Action #2 setting of programmable user input #2
Property settings of programmable user input #3
Action #1 setting of programmable user input #3
Action #2 setting of programmable user input #3
Start hour of rush hour of time of day action period #1
Start minute of rush hour of time of day action period #1
End hour of rush hour of time of day action period #1
End minute of rush hour of time of day action period #1
Start hour of rush hour of time of day action period #2
Start minute of rush hour of time of day action period #2
End hour of rush hour of time of day action period #2
End minute of rush hour of time of day action period #2
Scheduled events
Format setting of date display on LCD
Line qualify time
Time setting of periodical self-test (minute) (hh:mm)
Inverter off delay setting
RS-232 baud rate
Number of weeks setting of periodical self-test
Day of the week setting of periodical self-test
Time of the day setting of periodical self-test
Battery low warning threshold setting (%)
Self test duration setting (minutes)
Internal temperature setting to turn on cooling fan
Load shed timer1 duration
Load shed timer2 duration
Load shed timer3 duration
Programmable dry contact #1 setting
Programmable dry contact #2 setting
Programmable dry contact #3 setting
Programmable dry contact #4 setting
Programmable dry contact #5 setting
Programmable dry contact #6 setting
Password setting

6.11.5 Types of Trigger

There are 3 types of trigger:

Edge trigger

When the user input changes from one state to the other, the Alpha Micro is triggered to perform Action #1. If the level is set to High, the action will be triggered by a Low to High edge (leading edge). If the level is set to Low, the action will be triggered by the High to Low edge (falling edge).
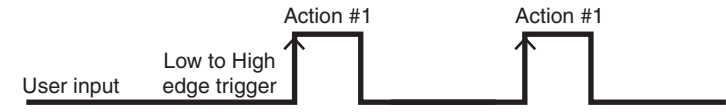
(a) Level = High
User Input = Low to High, Action #1 is triggered
User Input = High to Low, no action triggered

(b) Level = Low
User Input = High to Low, Action #1 is triggered
User Input = Low to High, no action triggered

Figure 63 — Edge Trigger

Level Toggle

When the Level is set to High, the Alpha Micro is triggered to perform the other action when the user input changes from Low to High. If the input then changes from High to Low, Action #2 will be triggered. In other words, a level change in the user input will trigger an action toggle between Action #1 and #2.
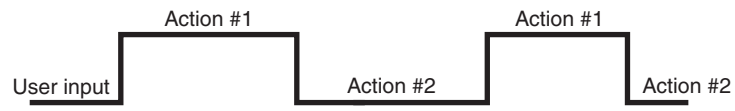
(a) Level = High
User Input = Low to High, Action #1 is triggered
User Input = High to Low, Action #2 is triggered
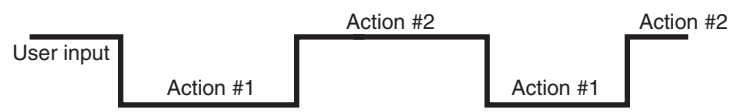
(b) Level = Low
User Input = High to Low, Action #1 is triggered
User Input = Low to High, Action #2 is triggered

Figure 64 — Level Trigger

Level Alternative

When the level is set to High, the Alpha Micro is triggered to perform the next action when the user input changes from Low to High. If the input then changes from High to Low, no action will be triggered because the level is set to High. In other words, only a Low to High user input level triggers an action when Level is set to High. Similarly, when Level is set to Low, the Alpha Micro will trigger an action only with a High to Low user input.
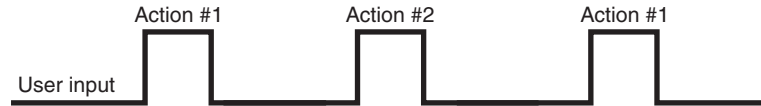
User Input = Low to High, Action #1 is triggered
User Input = High to Low, no action triggered
User Input = Low to High, Action #2 is triggered
User Input = High to Low, no action triggered

User Input = High to Low, Action #1 is triggered
User Input = Low to High, no action triggered
User Input = High to Low, Action #2 is triggered
User Input = Low to High, no action triggered

Figure 65 — Level Alternative

7.   Maintenance

7.1   Updating the Software

The Alpha Micro firmware can be reinstalled or updated to the latest version with this procedure.

If your Alpha Micro is provided with the factory-installed communication module, the firmware upgrade can be done via an intranet or internet connection.

⚠️ **CAUTION!**

Upgrade the firmware on the Ethernet card first to avoid compatibility issues between the FXM Ethernet card and the new FXM firmware you are about to download.

You will need the following items:

- RS-232 connection cable to the Alpha Micro

- **uBug12** software must be installed. It is available for download at www.alpha.ca\downloads.

- Alpha's firmware must be installed. It can be accessed with your computer and downloaded at www.alpha.ca\downloads.

6.11.6   Procedure

1. Switch off the Alpha Micro

2. Connect the RS-232 cable if it is not already connected.

3. While pressing and holding the **SELECT** button, switch on the battery circuit breaker. The LCD panel shows "**Alpha XP ISP**".

```
Alpha XP ISP
V0.0.0.1
```

4. Start **uBug12**.

5. Type (all lower case) **con**(1 space)**1**(or the number of the computer's comm port you are using) and press **ENTER**. The screen shows "connected" when the connection is established.
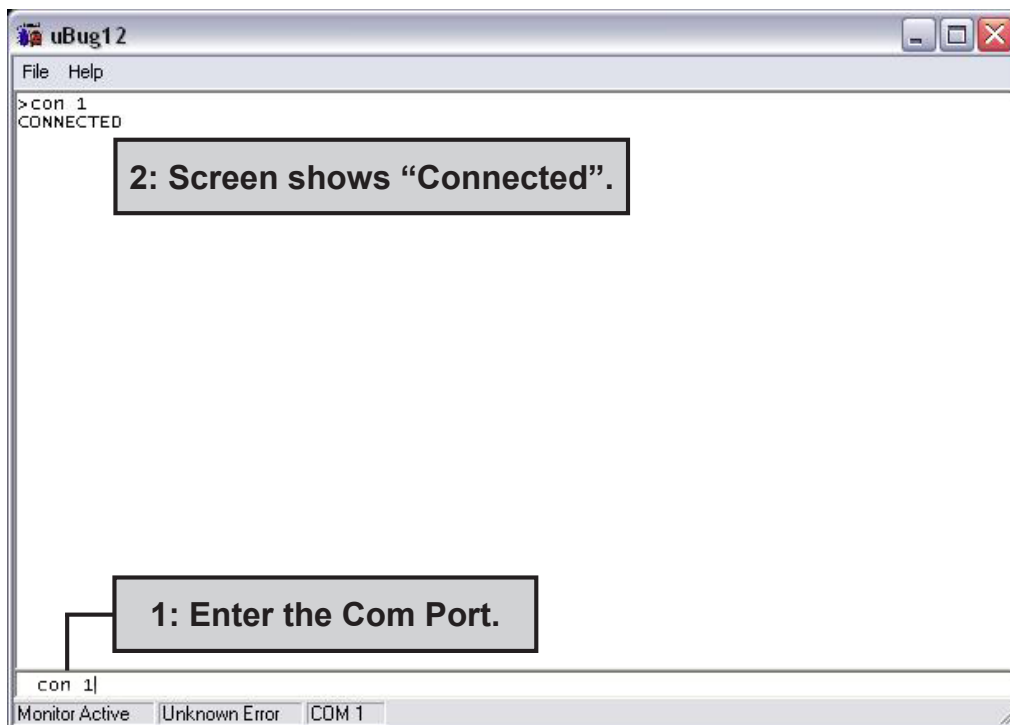
6. In the **uBug12** screen, type (all lower case) **fbulk** and press **ENTER**. The erase pop-up appears. It disappears when the Alpha Micro's memory is erased. If an error message appears, send the **fbulk** command again.

2: Erase pop-up appears.

Message

Erasing...

1: Type fbulk.
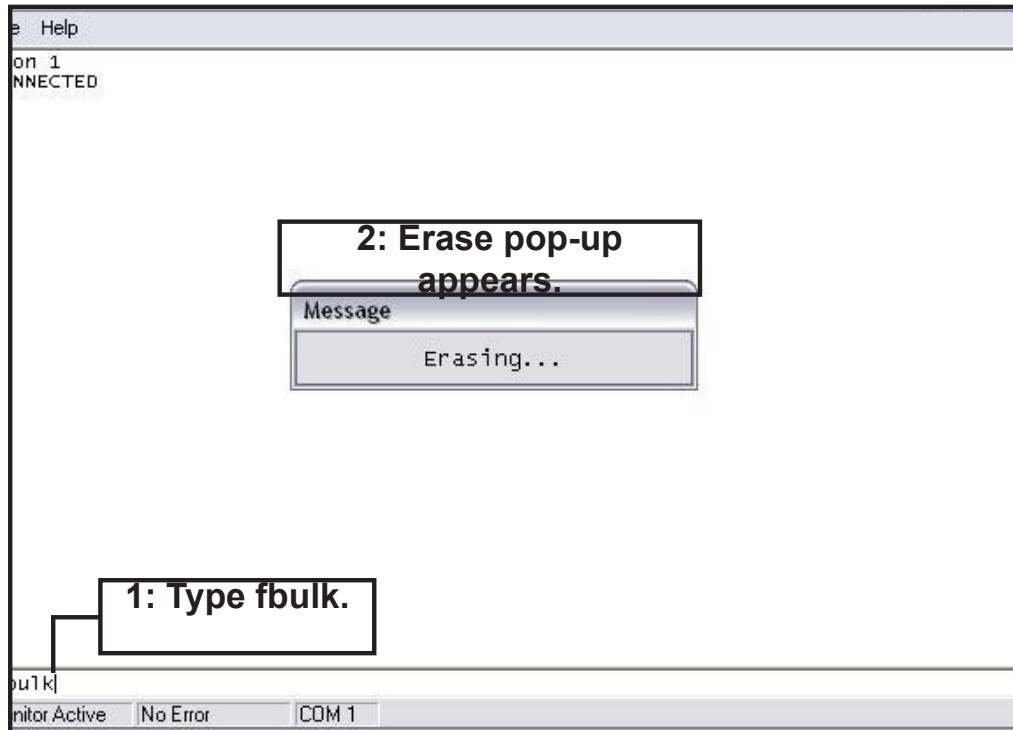
7. In the **uBug12** screen, type (all lower case) **fload**(1 space);**b** and press **ENTER**. A pop-up appears asking you to locate the new firmware. Look for a "**sx record**" (***.sx**). Select this new firmware. The **fload** pop-up appears.

2: Look for a .sx file.

1: Type fload ;b.
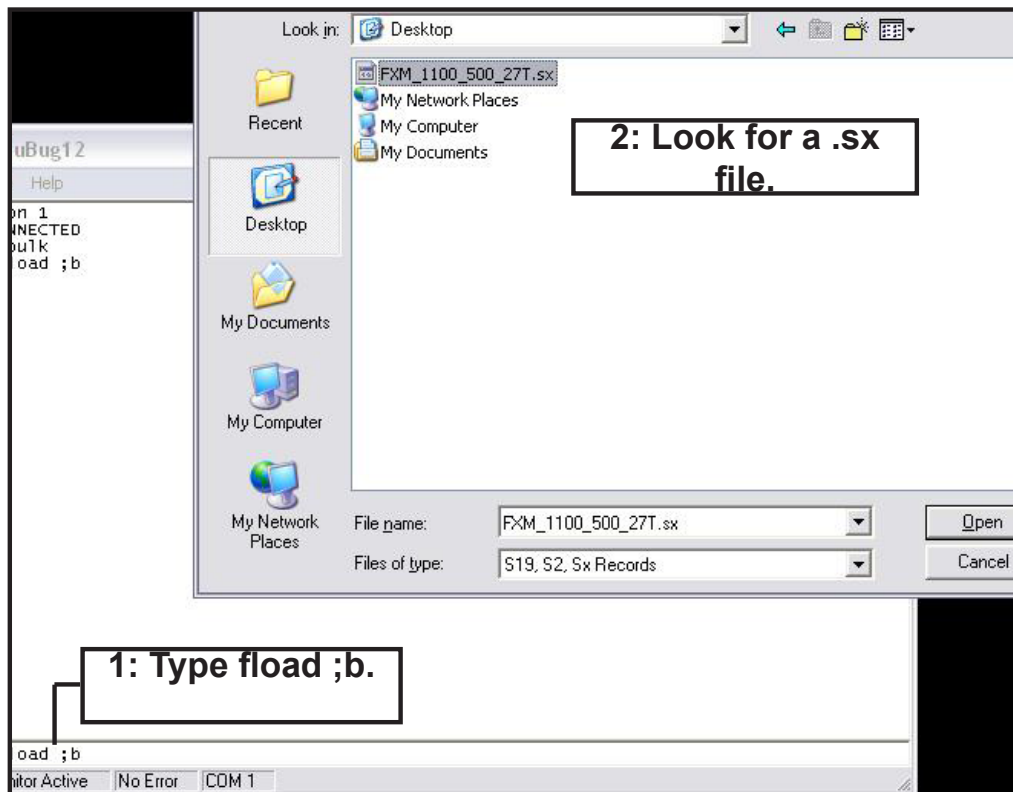
8. When the software has finished loading into the Alpha Micro the pop-up shows "**Loaded OK in (xx) seconds.**" If an error message appears, switch off the Alpha Micro and start over again. It should not take more than one or two restarts to load the software. If problem persists, contact Alpha technical support.
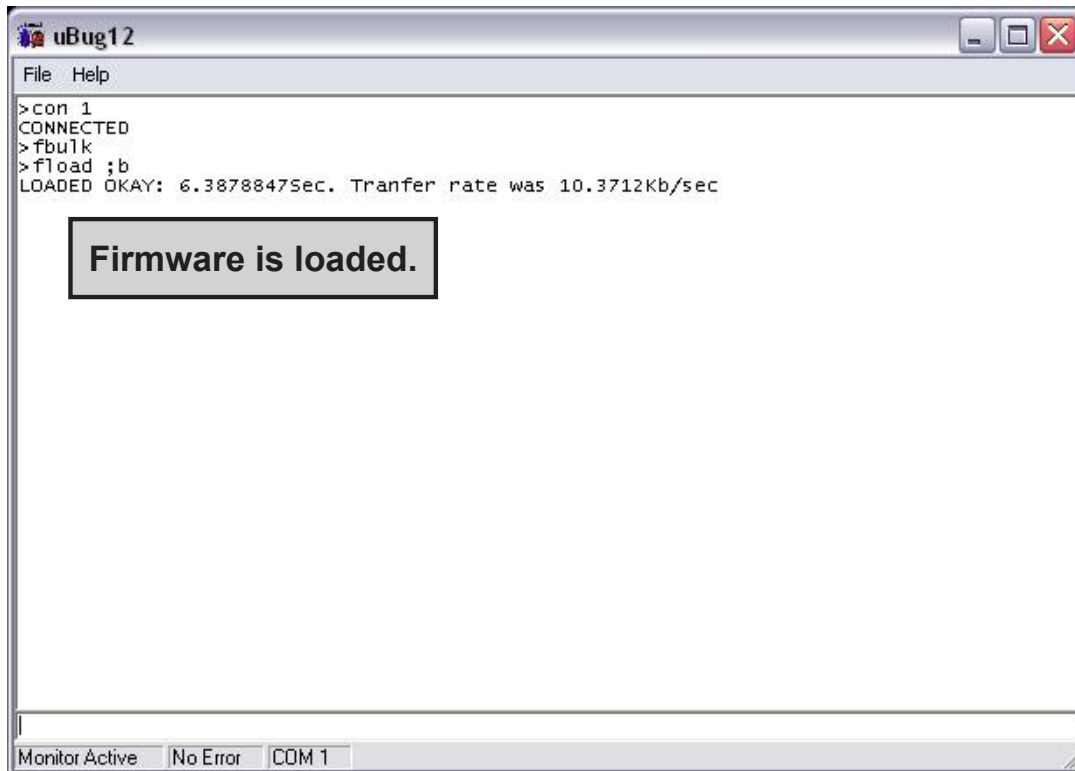
9. Type (all lower case) **exit** and press **ENTER**. The **uBug12** screen disappears.

10. Switch of the battery breaker.

11. To check if the installation was successful, switch on the battery breaker. The LCD's logo screen should appear as follows. If it shows "**Alpha XP ISP**" as shown in Step 3, try installing the firmware again.

```
Alpha            120/60/N
Micro300             LINE
```

7.2 Testing and Replacing the Batteries

7.2.1 Battery life

Batteries lose their ability to store power as they age. Regularly test the batteries to ensure that they can continue providing reliable service. Battery life is reduced by three major factors:

- Temperature – higher ambient temperatures, especially above 25°C, will reduce battery life. For example, an average operating temperature of 27°C will likely reduce the life of the battery by 25%. Ensure that the Alpha Micro and batteries are situated in a well ventilated area with adequate temperature control. A cool environment is preferable.

- Number of discharge cycles – the more frequent the batteries are discharged, the shorter the battery life. Frequent power outages imply the need for more frequent battery replacement.

- Depth of discharge – the longer the batteries are required to provide back up power, the shorter the battery life. Frequent full discharging and the associated recharging of the batteries reduces the life. Shut down the electrical load or return to primary power as soon as possible to extend the battery life.

7.2.2 Battery Run Time

The chart below shows typical run times (time to full discharge) for the standard batteries supplied with this unit. These runtimes are for batteries in new and good condition. The run time performance will deteriorate over time in a progressively decreasing curve.
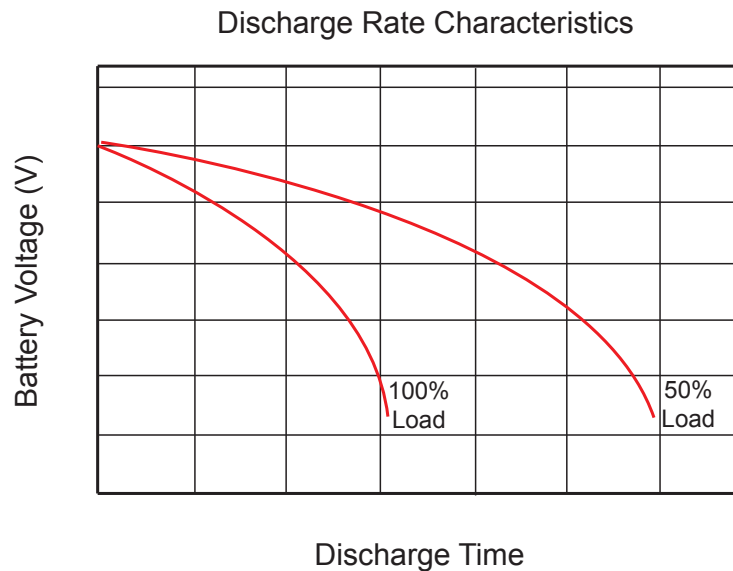
Figure 66 — Typical Discharge Characteristics for Lead Acid Batteries

7.2.3 Battery Maintenance

The batteries supplied with this unit are sealed and maintenance free. Regularly ensure that all connectors are tight and free of corrosion. The presence of corrosion, swelling of the battery case, or distortion in the shape of the case suggests that the batteries need to be replaced.

7.2.4 Battery Conductance Test (Optional)

1. Place the conductance meter probes across Battery #1.

2. Record the voltage and Siemens values in a log book.

3. Repeat for batteries #2, #3 and #4.

A new AlphaCell 180GXL battery has a conductance reference value of 1100 Siemens at 25°C. When this value drops to 550 Siemens or 50% of the new battery reference value, the battery capacity is suspect of being below 80% and should be evaluated further. When the temperature of the batteries is not between 20°C and 30°C, use the following temperature compensation values.

Table R — Battery Temperature Compensation Values		
Battery Temperature	Reference Value New 180GXL	Suspect Value
35°C or higher	1183	592
30°C	1140	570
25°C	1100	550
20°C	1063	532
15°C	1028	514
10°C	995	498
5°C	965	483
0°C or colder	936	468

7.2.5 Replacing the Batteries

Replace the batteries according to the results of the self test or the presence of terminal corrosion, swelling of the battery case, or distortion in the shape of the case. New batteries will normally provide longer run times than older ones. Larger capacity batteries may be available. Contact Alpha Technical Support (1 888 462 7487) to order replacement batteries or to obtain assistance. On-site service may be available in your area.

Tools and Materials Required

- AC/DC voltmeter or multimeter.

- Labels or masking tape and marker.

- Torque wrench.

- Slot head screwdriver to fit the terminal blocks.

- High strength, flame-proof tape such as duct tape.

- Battery terminal corrosion inhibitor (such as NOCO Company's NCP-2 or Sanchem Inc.'s No-Ox ID Grease "A").

WARNING!

Read and understand the battery safety instructions in "Product Safety Information".

CAUTION!

Make sure all the replacement batteries are of the same type and rating. Failure to do so could result in improper charging and damage to the batteries.

The Alpha Micro cannot provide backup battery power while the batteries are being replaced. If the line becomes unqualified while the batteries are being replaced, the Alpha Micro shuts down and no power is provided to the load.

Procedure

1. The Alpha Micro must be in the Line state. If it isn't, wait until the line is qualified before proceeding.

2. Switch the Alpha Micro into the Bypass State by doing one of the following:

    a. From the Logo Screen, press the **SELECT** button once, the LCD shows **CONTROL**.

    Press the **SELECT** button once, the LCD shows **INVERTER**.

    Press the **SCROLL** button once until the LCD shows **INV BYPASS**.

    Press the **SELECT** button once, **OFF** is flashing.

    Press the **SCROLL** button once, **ON** is flashing.

    Press the **SELECT** button once, **ON** is solid.

    b. From the Alpha UPS Monitor main screen, go to the **UPS Maintenance > Unit Configuration** screen. Switch on the **Bypass Mode** by clicking the **ON** button and then the **Update Configuration** button. The Alpha Micro responds by displaying a "Bypass State" alarm. This is normal and does not indicate a problem. It will clear itself when the Bypass state is subsequently disabled.

3. Switch off the battery circuit breaker.

4. Replace the batteries.

5. Switch on the battery circuit breaker.

6. Switch the Alpha Micro out of the Bypass state by switching the **Bypass Mode** OFF.

7.3 Preventative Maintenance

Perform preventative maintenance on the Alpha Micro module every 6 to 12 months. For mission critical applications such as backup traffic intersections, more frequent maintenance should be done. Proper implementation of the following procedure will insure that your system continues to provide reliable backup power in the event of a utility power failure.

7.3.1 Tools and Materials Required

- Wrench set.
- Labels and marker to number batteries.
- Conductance meter for optional conductance test.

7.3.2 Procedure

1. Inspect the Alpha Micro and wiring for any physical damage. Repair or replace as required.

2. Verify that all connections are securely fastened. Tighten if necessary.

3. Inspect the batteries for cracks or swelling. Replace all four batteries if any of the batteries are cracked or swollen. Replace only a faulty battery if an Alphaguard battery balancer is installed.

4. Inspect the battery terminals for corrosions. Clean and apply a corrosion prevention compound such as NOCO Company NCP-2 or Sanchem Inc. NO-OX-ID if required.

5. Re-tighten the battery terminal bolts on Insert Terminal batteries. Re-torque the battery terminal bolts on Flag Terminal batteries to the manufacturers specifications on if required.

6. Label the batteries #1, #2, #3 and #4. The battery negative cable from the Alpha Micro is connected to Battery #1, and the battery positive cable from the Alpha Micro is connected to Battery #4.

7. Verify that the battery temperature probe is securely taped to the side of either battery #2 or #3.

7.3.3 Operational Test

1. Activate the Alpha Micro self-test function.

2. After passing the self-test, disconnect the AC input to the Alpha Micro to trigger the unit into the backup (Inverter) mode.

3. Let the Alpha Micro operate in the backup mode for approximately 10 minutes.

4. Measure the individual battery voltages while the Alpha Micro is operating in the backup mode. There should be no more than 0.6 volts difference between the highest battery voltage and the lowest battery voltage.

⚠️ **CAUTION!**

A battery that measures 2 V lower than the other three batteries in the string probably has a shorted cell. Replace all four batteries.

Three batteries in the string measuring the same voltage and one battery measuring several volts higher indicates an open cell in the battery with the higher reading. Replace all four batteries.

5. Verify that there is no Low Battery Alarm.

6. Reconnect the AC input.

8. Troubleshooting

When the front panel alarm LED is illuminated or flashing, the Alpha Micro has a malfunction. The alarm and fault submenus describe the malfunction. The Alpha UPS Monitor can also be used for troubleshooting.

8.1 Procedure

1. Press the **SELECT** button.

2. The LCD may display one or more conditions in the following table.

3. Press the **SCROLL** button to see if more than one malfunction is present.

4. To clear the malfunction from the screen, press and hold the **SELECT** button for 5 seconds.

Table S — Alarm Submenu		
LCD Shows	**Problem Description**	**What To Do**
Over Load	The Alpha FXM is overloaded.	Remove excess loads.
Batt Temp High	The battery temperature is above the specification limit.	If used, ensure that the battery fan is working. Contact Alpha Technical Support to purchase an upgrade if required.
Batt Temp Low	The battery temperature is below the specification limit.	Use optional battery heating mats or heater. Contact Alpha technical support to place the order.
Batt Low Warning	The batteries are almost discharged. Also see "Adjusting and Controlling the Alpha Micro, #35: Low Battery Warning Voltage".	Ensure that the Alpha Micro charger is working. If the charging voltage is low, the battery may need to be replaced.
FAN Alarm	The fan has failed.	Contact Alpha technical support. The fan is not a replaceable part.
Temp Probe Unplug	The temperature probe is unplugged.	Plug it back into the Alpha Micro or change the probe.
User Input Alarm	When the user input is shorted. See "User Input: S2".	Check the user input parameters.
In Freq Out Of Range	The line frequency is outside of the Alpha Micro's allowable range. The Alpha Micro goes into Inverter mode.	Info only.
Weak Battery	The battery is being monitored continuously in the background in Line mode. This alarm is issued if the battery did not pass the background scan.	Check the battery life and replace the battery if necessary.
Battery Test	The Alpha Micro is performing a battery test.	Info only.
Batt Breaker Open	The battery breaker is opened.	Ensure the battery breaker is functioning.
Wrong_Softwre	The Alpha UPS Monitor is invalid (either version or p/n).	Contact Alpha technical support.
AC_Brkr_Open	The AC breaker is opened.	Info only.

Table T — Fault Submenu		
LCD Shows	**Problem Description**	**What To Do**
Overload Fault	The load draws more power than the Alpha Micro can provide. This can lead to an automatic Alpha Micro shutdown.	Remove excess loads.
Short Circuit	The load has a short.	Check the output. Remove the faulty load if necessary.
Intl Temp Fault	The Alpha Micro's internal temperature is too high and could cause an automatic Alpha Micro shutdown.	Verify that the fan is not blocked and that it is working by performing a battery test. Also See Fan Fail Alarm.
Output Over Voltage	The output voltage is above or below the Alpha Micro's specifications.	Info only.
Output Voltage Low		
Battery Fail	In Inverter mode, the battery voltage has dropped below a specified level. This fault is triggered and the inverter shuts down. This fault is also known as a Low Battery Shutdown or Bad Battery.	Info only. The Alpha Micro will recharge the battery when the Alpha Micro requalifies the line.
Backfeed	A relay inside the Alpha Micro has failed. It cannot be fixed in the field.	**DANGER:** Do NOT touch the AC input terminals. Contact Alpha Technical Support.
Battery Over Voltage	Battery voltage is abnormally high.	Check the voltage at the battery voltage test points. Ensure that the battery is in good working condition. Replace the battery if necessary.
Batt Volt Low	Battery voltage is low and is close to the self-kill level.	Ensure that the Alpha Micro charger is working. If the charging voltage is low, the battery may need to be replaced.

Table U — Problems Not Reported by System		
LCD Shows	**Problem Description**	**What To Do**
No LCD display even when the Alpha FXM is powered on	The LCD may not function below -15°C. This does not affect the normal operation of the Alpha Micro	Bring the operating temperature above -15°C and the LCD display will gradually resume operation.
Date and time reset to 00:01:00 and 00:00:00	The backup lithium coin battery may need to be replaced. This is possible if the Alpha Micro has been in storage or switched off for a prolonged period. The average operating life of the lithium coin battery is about 5 years.	Replace the lithium coin battery. **Caution**: This must be performed by a qualified service personnel. Dispose of used batteries according to your local laws and jurisdictions.

9.   Specifications

Table V — Mechanical Specifications	
Parameter	**Value**
Dimensions H x W x D mm (in)	Std: 19.7 (500) x 14.1 (358) x 11.6 (294). XL: 30.6 (776) x 14.1 (358) x 11.6 (294). XL3: 52.4 (1330) x 14.1 (358) x 11.6 (294).
Weight without batteries kg (lb)	Std: 43.4 (19.7). XL: 49.8 (22.6). XL3: 69.2 (31.4).
Color	White.
Mounting	Pole, wall, or pedestal with optional pedestal mounting kit.
Humidity	Operating: Non-condensing up to 95%. Storage: Up to 95%.
Temperature, °C **Operating** **Storage**	-40 to 50 [1,2]. -40 to 75 [1,2].
Altitude, m (ft) **Operating** **Storage**	Operating: Up to 3700 [3] (12,000). Storage: Up to 4600 (15,000).
AC input and output connectors	Terminal block, Wago p/n 862-0603 or equivalent (max 12 AWG)
Dry contact ATC connectors	Terminal block, mating plug JITE p/n PTB750B-03-1-03-3 or equivalent (max 16 AWG).
RS-232 connector	DE-9 Female.
Ethernet connector	Optional, factory installed RJ-45.
Dry contacts	6 sets of single-pole, double-throw relays located on the front panel. They are rated at 250 VAC, 1A. The factory default settings are: C1: On Battery. C2, C3 [5]: Low Battery. C4: Load Shed Timer1. C5: Alarm. C6: 48/24 VDC for an external fan. It can be factory configured as a dry contact.
User inputs	Three optically-isolated and powered inputs are located on the front panel. When they are shorted, their functions are: S1: Starts the self test. S2: Activates an alarm. S3: Unit shutdown.
User interface	2 x 20 backlit alpha-numeric LCD screen [4]. Three control buttons located below.
Battery	Anderson Power mating part SB50 or equivalent.

1.   Above 50°C ambient, derate output power by 1.1% per °C rise, up to 74°C max.
2.   Capable of operating at 100% of rated full load below 0°C down to -40°C after the Alpha Micro has been stabilized at 0°C for at least 1 hour.
3.   Derate 2°C per 300 m (1000 ft) above 1400 m (4500 ft).
4.   The LCD display may not function below -15°C. It gradually resumes normal operation as the temperature rises above -15°C. This will not affect the operation of the Alpha Micro
5.   CAUTION: Risk of electric shock and fire hazard, replace fuse with the same type and rating.

Table W — Electrical Specifications	
Parameter	**Value**
Input	
Voltage (nominal), VAC	120 or 230 (optional 220).
Frequency, Hz, ±5%	60/50 (auto-frequency).
Current, Amps **(@ full load 10 A battery charger)**	300: 5.4/3.0 @120/230 VAC 1000: 14/7.2 @120/230 VAC
Output	
Voltage (nominal), VAC	120 or 230.
Frequency, Hz, ±5%	60/50 (auto-frequency).
Current, A	300: 2.5/1.3 @120/230 VAC 1000: 8.3/4.3 @120/230 VAC
Power, W/VA	300 1000
Waveform	Pure sine wave
Load Crest Factor	3:1 (load dependent)
Output Voltage Distortion	< 3% THD (resistive load)
Efficiency **Normal Mode** **Backup (Inverter) Mode**	> 92%, @ full load, 25°C. > 72% (for 300), > 83% (for 1000) @ full load, 25°C.
Transfer Time, ms **AVR to Backup** **Backup to AVR**	5 (Typical) 5 (Typical)
Line Qualification Time, s	3 (factory default), user adjustable to 3, 10, 20, 30, 40, or 50.
Battery String Voltage	300: 24 1000: 48
Battery Charger Current, A	300: 3 * 1000: 10* * User adjustable to 3, 6 or 10 A
Battery Charger Temperature Compensation	-5 mV / °C / Cell (factory default), user adjustable to -2.5, -4, -5 or -6 mV / °C / Cell.
Battery size	Standard: 4 x 18 to 2 x 50 AHr XL: 4 x 50 to 2 x 109 AHr XL3: 8 x 50 to 4 x 109 AHr
Other	
Fuse [5] (F1)	T4A 250 V for 24 V battery string voltage T2A 250 V for 48 V battery string voltage

Table X — Boost/Buck/Line Transfer Thresholds				
Parameter	**Value**			
	Model 300		**Model 1000**	
	120 VAC Units	**230 VAC Units**	**120 VAC Units**	**230 VAC Units**
Buck 1 to INV **INV to Buck 1**	151 VAC 146 VAC	N/A N/A	N/A N/A	N/A N/A
Buck 2 to INV **INV to Buck 2**	N/A N/A	325 VAC 314 VAC	169 VAC 162 VAC	325 VAC 314 VAC
Buck 1 to Buck 2 **Buck 2 to Buck 1**	N/A N/A	281 VAC 275 VAC	148 VAC 146 VAC	282 VAC 272 VAC
Line to Buck 1 **Buck 1 to Line**	131 VAC 126 VAC	250 VAC 244 VAC	129 VAC 126 VAC	250 VAC 236 VAC
Boost 1 to Line **Line to Boost 1**	116 VAC 112 VAC	214 VAC 209 VAC	114 VAC 109 VAC	210 VAC 207 VAC
Boost 2 to Boost 1 **Boost 1 to Boost 2**	102 VAC 98 VAC	186 VAC 180 VAC	102 VAC 87 VAC	182 VAC 175 VAC
INV to Boost 2 **Boost 2 to INV**	92 VAC 87 VAC	163 VAC 158 VAC	93 VAC 85 VAC	160 VAC 153 VAC

Table Y — Regulatory	
Parameter	**Value**
Electrical Safety	UL 1778, CSA 107.3, EN 62040-1-2, EN60950-1.
Emission	FCC Part 15, Subpart B, Class A, CSPR22, EN55022 Level A.
Marks	$_c$CSA$_{us}$, CE (230 VAC versions only).
Packaging	Designed to meet requirements for ISTA program.

Radio Frequencies

The Alpha Micro generates, uses and radiates radio frequencies if not installed and tested in accordance with the instructions in this manual. It has been tested and found to comply with the limits established for a Class A computing device pursuant to part 15 of FCC rules and CISPR 22 when it is operated alone. It also complies with the radio interference regulations of DOC which are designed to provide reasonable protection against such interference to radio to TV reception, which is determined by switching it on and off, relocate the equipment or use an electrical circuit other than the one used by the Alpha Micro.

10. Puekert Number and Battery Capacity

10.1 Introduction

The Alpha Micro series UPS units run on batteries when the AC utility power fails. In this mode, the user may want to estimate the remaining time that UPS batteries can supply power to the loads.

The battery run time remaining is calculated based on the Peukert equation. Two critical parameters are required for the equation:

- Peukert number.
- Peukert capacity.

The Peukert number and Peukert capacity depend on the battery characteristics. This document describes the procedures to determine the Peukert number, and Peukert capacity for the selected battery.

Once the Peukert's number and capacity are determined, enter these values in the GUI or web interface. The Alpha Micro will report the remaining battery run time.

The Peukert's equation and the remaining battery run time are estimates only. The actual run time may vary based on various parameters like the age and status of the batteries etc.

10.2 Determining the Peukert's Number and Peukert's Capacity

1. Obtain the data sheet of the selected battery.

2. Calculate the nominal load current for the application.

    Example: If the load is 150 W and the battery string is 24 VDC, the load current is calculated as 150 W / 24 V = 6.25 A.

3. Find the current discharge ratings table in the data sheet. From the table, pick two current discharge values (I1 and I2) that are closest to the calculated load current and look up the two discharge hours (R1 and R2).

4. Use the following formula to calculate Peukert's number and capacity:

$$\text{Peukert's number} = n = \frac{\text{Log}(R_2/R_1)}{(\text{Log}(I_1) - \text{Log}(I_2))} \quad \text{......... (1)}$$

$$\text{Peukert's capacity} = (I_1)^n \times R_1 \quad \text{per battery} \quad \text{......... (2)}$$

10.3 Determining Peukert's Capacity for Series Parallel Combinations

1. For batteries connected in series, the Peukert's capacity for the battery bank is given by the equation:

$$\text{Peukert's capacity}_{\text{Battery bank}} = \text{Peukert's capacity}_{\text{per battery}} \quad \text{Ah}$$
$$\text{(as calculated in equation (2))}$$

2. For batteries connected in parallel, the Peukert's capacity for the battery bank is given by the equation:

$$\text{Peukert's capacity}_{\text{Battery bank}} = \text{Peukert's capacity}_{\text{per battery}} \times N \quad \text{Ah}$$
$$\text{(where N = number of batteries in parallel)}$$

10.4 Example

The following example shows how to calculate Peukert's number and capacity from a configured battery string.

Consider four Alpha 195GXL batteries connected and configured as shown in the figure below. Two of the four batteries are connected in series, and the two series strings are connected in parallel to the 24 V DC output.
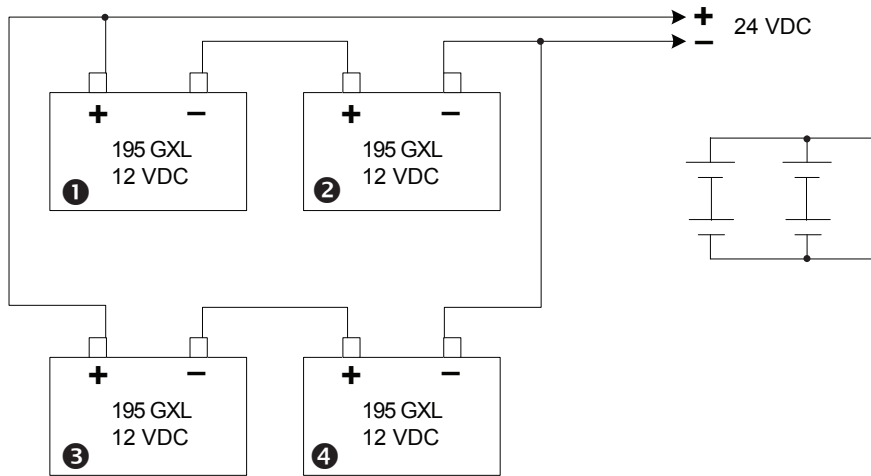

Figure 67 — Battery string example

The Peukert's number and capacity for the above configuration can be determined as follows:

1. Obtain the data sheet of the selected battery. See table below.

2. Find the current discharge ratings table in the data sheet. From the table, pick two current discharge values (I_1 and I_2) that are closest to the calculated load current value. Look up the two discharge hours (R_1 and R_2).

Current Discharge Table in Amps (End Voltage 1.75VPC)												
Hours:	1	2	3	4	6	8	10	12	20	24	48	72	100
195 GXL-FT:	69.2	38	26.8	21.1	15.2	12	9.9	8.5	5.5	4.60	2.31	1.56	1.13
225 AGM-FT:	81	43.1	30.3	23.7	16.7	12.9	10.4	8.9	5.7	4.80	2.43	1.62	1.18

3. From the table, I1 = 15.2A, I2 = 10.8A, R1 = 6 hrs, R2 = 12 hrs.

   From Equation (1) earlier:

$$\text{Peukert's number} = n = \frac{\text{Log}(R_2/R_1)}{(\text{Log}(I_1) - \text{Log}(I_2))}$$

$$n = \frac{\text{Log}(8/6)}{\text{Log}(13.9) - \text{Log}(10.8)} = 1.14$$

   From Equation (2) earlier

$$\text{Peukert's capacity} = (I_1)^n \times R_1 \quad \text{per battery}$$

$$= 15.2^{1.217} \times 6$$
$$= 166.00 \text{ Ah per battery}$$

4. The Peukert's capacity for the series combination (Batteries #1 and #2) is **166.00** Ah.

5. The Peukert's capacity for the parallel combination (Batteries #1, #2 and #3, #4) is 2 x **166.00** Ah = **332.00** Ah.

10.5   Using the Spreadsheet

Download the spreadsheet "Peukert's Parameters Calculator.xls" from www.alpha.ca website.

To determine Peukert's Number and Peukert's Capacity

This spreadsheet assists in determining the Peukert's parameters for a battery string and load. This data will be used by the FXM firmware 1.07 to estimate the battery run time remaining in back up mode (Invert mode)

Enter Battery String Voltage	24	VDC
Enter nominal load on inverter	275	Watts
Calculated nominal current	11.46	ADC

Enter the Battery voltage and nominal load

From the Current discharge table enter the 2 current discharge values (I_1 and I_2) closest to the calculated load current value and look up the 2 discharge hours (R_1 and R_2).

Discharge Current (I_1)	13.9	A
Rating 1 (R_1)	6	Hrs
Discharge Current (I_2)	10.8	A
Rating 2 (R_2)	8	Hrs

From the data sheet of the batteries enter the 2 closest currents and discharge hours

Peukert's Number = n	1.140

Peukert's Capacity per Battery =	120.570

Enter Number of Battery strings in Parallel	2

Enter the number of parallel strings

Peukert's Capacity for the Battery Bank =	241.140

11.   Warranty

Alpha Technologies Ltd. warrants all equipment manufactured by it to be free from defects in parts and labor, for a period of two years from the date of shipment from the factory. The warranty provides for repairing, replacing or issuing credit (at Alpha's discretion) for any equipment manufactured by it and returned by the customer to the factory or other authorized location during the warranty period. There are limitations to this warranty coverage. The warranty does not provide to the customer or other parties any remedies other than the above. It does not provide coverage for any loss of profits, loss of use, costs for removal or installation of defective equipment, damages or consequential damages based upon equipment failure during or after the warranty period. No other obligations are expressed or implied. Warranty also does not cover damage or equipment failure due to cause(s) external to the unit including, but not limited to, environmental conditions, water damage, power surges or any other external influence.

The customer is responsible for all shipping and handling charges. Where products are covered under warranty Alpha will pay the cost of shipping the repaired or replacement unit back to the customer.

11.1   Battery Warranty

Note that battery warranty terms and conditions vary by battery and by intended use. The most common battery warranty provided by Alpha is a two year full replacement warranty with a pro-rated warranty for the following three years. Pro rated warranty provides a credit applicable toward the purchase of new batteries from Alpha. The credit is calculated as the purchase price multiplied by the percentage of the battery life that was not available (in months). Battery warranty coverage is lost where the battery charge is not maintained for 6 months. Contact your Alpha sales representative or the Technical Support team at the above number to understand your entitlements under Battery Warranty.

12. Emergency Shutdown Procedure

The Alpha Micro UPS contains more than one live circuit. In an emergency, line power may be disconnected at the UPS's input, but AC power can still be present at the output.

1. Switch OFF the input circuit breaker.

2. Switch OFF the battery circuit breaker.

3. Disconnect the AC input power.

4. Disconnect the battery string.

Input circuit breaker

Battery circuit breaker
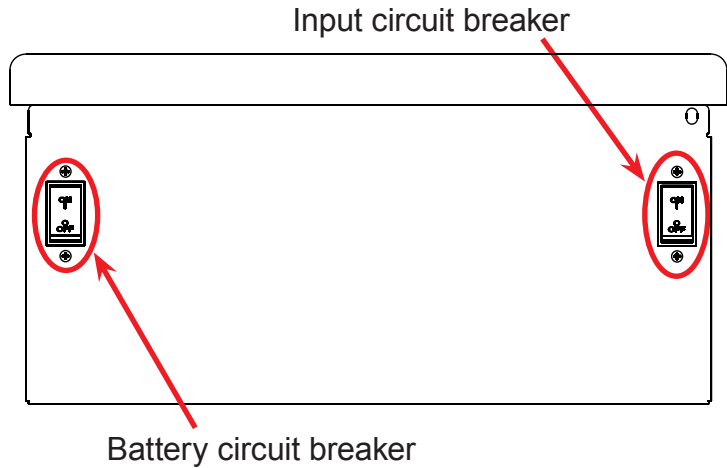
Complete the following for your records:

Serial # _____

Options_____

Purchase Date _____

This unit was purchased from:

Dealer_____

City_____

State/Province_____

Zip/Postal Code_____

Country _____

Telephone # _____

Fax # _____

E Mail Address _____

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Power

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