MYERS
EMERGENCY POWER SYSTEMS

MP SERIES™

Battery Backup System
for
Traffic Signals

MP2000E System

Installation, Operation and Maintenance Manual.

January 2019
Revision 6.0
Serial Numbers: MC14B10820 to present

IMPORTANT

EMERGENCY SHUTDOWN PROCEDURE ON THE INSIDE OF REAR COVER

For service, parts or technical information contact
Myers Emergency Power Systems

TEL: (610) 868-3500

FAX: (610) 868-8686
WEB: www.myerseps.com

SAVE THESE INSTRUCTIONS

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IMPORTANT SAFETY INSTRUCTIONS ARE CONTAINED IN THIS MANUAL

CAUTION

RISK OF ELECTRICAL SHOCK

To reduce the risk of electrical shock and to ensure the safe operation of the MP2000E, the important safety instructions are marked with the symbols as shown below. These symbols are used throughout this manual and wherever they appear, it indicates that the instructions should only be carried out by qualified personnel.

Indicates presence of DANGEROUS VOLTAGE in the area. Extreme caution should be used.

Indicates ATTENTION to Important operating instructions. Follow them as indicated.

DANGER: Do not expose the MP2000E to rain or moisture.

DANGER: Total Earth ground leakage current of loads connected to the MP2000E should not exceed 2.4 mA.

The MP2000E generates, uses and can radiate radio frequencies if not installed and tested in accordance with the instructions contained 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 when it is operated alone. It also complies with the radio interference regulations of DOC, which are designed to provide a reasonable protection against such interference, when this type of equipment is used in a commercial environment. If there is interference to radio or 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 MP2000E.

IMPORTANT SAFETY PRECAUTIONS

Only qualified personnel should service or supervise the service of the MP2000E.

Danger: Sealed lead-acid batteries with high energy and chemical hazards are used. This manual contains important operation and safety instructions.

MP2000E Safety System Checklist

- **Carefully unpack the MP2000E. Report any shipping damage at once.**
- ***Read this manual.*** **If you have any questions about safe installation, operations or maintenance of the system, contact Myers Emergency Power Systems service department.**
- ***Before installation*****, confirm that the voltage and current requirements of the load(s) are compatible with the system's output. Confirm that the line voltage and current is compatible with the system's input requirements.**
- **The system should be installed on a dedicated power circuit.**
- **Place a warning label on the enclosure indicating that a Battery Back-Up (BBS) is located inside, in case of an emergency.**
- **Use proper lifting techniques when moving system.**
- **The MP2000E has more than one live circuit. It is fed from AC as well as battery power. Power may be present at the output(s) even if the system is disconnected from line power.**
- **When installing a system in other than a Myers Emergency Power Systems cabinet, ensure that the environment meets the system specifications shown in Section 1.7, "Specifications" of this manual.**

SAVE THIS MANUAL

It contains important installation and operating instructions.

Keep it in a safe place.

Battery Safety Checklist

- **High & *dangerous voltages* are present inside the system. Only qualified personnel should perform installation and maintenance.**
- **Live battery wires *must not* touch the MP2000E chassis or any other metal objects. *This can cause a fire or explosion.***
- **Inspect the batteries once a year for signs of cracks, leaks, or swelling. Replace as needed.**
- **When batteries are in storage, charge them at least once every three months for optimum performance and to extend their lifetime.**
- **Always replace batteries with the ones of identical type and rating. Never install old or untested batteries. Never mix old with new batteries. Never mix the different amp hour rated batteries within one system.**
- **Use insulated tools during servicing.**
- **Remove all rings, watches, jewelry, or other conductive items before working inside the enclosure.**
- **Follow local regulations for the disposal of batteries. Recycling is the best method.**
- ***Never* burn batteries to dispose of them. *They may explode.***
- **Do not open the batteries. *The contents are toxic.***

Stand-By Generator

Note: If the MP2000E constantly switches between Battery and Line modes because of line fluctuations, the input parameters should be *broadened from Normal to Generator* (see Section 2.2.10 "Sense Type")

In Generator mode, the acceptable range of input frequency and voltage is expanded to accommodate the voltage and frequency fluctuations created by a generator or a power source of such kind.

Use a generator with electronic speed and voltage controls which typically produces the Total Harmonic Distortion in % (THD) to be less than 10%. Generators with mechanical governors can force the system to run continuously in Battery mode.

Before installation, compare the generator's output voltage to the MP2000E's input voltage requirements as listed on both nameplates. To insure the system's smooth operation, use a generator capable of supplying 2X or twice as much power as required by the total load.

UNPACKING AND INSPECTION CHECKLIST

Purpose: Describes the unpacking and inspection procedures.

Carefully remove the MP2000E from its box. Inspect the contents and make sure the following items are included:

- **One MP2000E BBS System.**
- **One plastic bag containing the following:**
- **Temperature sensor probe cable with 3-pin connector.**
- **Installation, Operations and Maintenance manual.**
- **Warranty Card.**

The Power Transfer Switch (PTS) and all the associated wiring & hardware required for installation is supplied in a separate box.

The set of four (4) batteries may be shipped separately, if a large quantity of MP Series systems is supplied.

Tip: If any items are missing or damaged, contact Myers Emergency Power Systems, Inc. and the shipping company at once. Most shippers have a short claim period.

SAVE THE ORIGINAL SHIPPING BOX

When returning the MP2000E for servicing, use the original shipping box with the supplied Styrofoam protectors. Myers Emergency Power Systems. is not responsible for damage caused by improper packaging of returned systems.

READ THE OPERATOR'S MANUAL

Before installation, become familiar with the MP2000E by reviewing the procedures and drawings in this manual. If you have any questions about safe installation, operation, or maintenance, contact Myers Emergency Power Systems. customer service department.

Complete the following for records & future servicing:

Model No.: MP2000E
Serial No.: MCxxxxxxxx

(Above items can be found on the nameplate label attached to the side of the unit)

Myers Emergency Power Systems Order No. _____
MP2000E P/N: G30219CA
Your Purchase Order No. _____

Purchased from: _____

(Following details are for installation location)

Installation date: _____
Installed by: _____
City: _____
State/Province: _____
Zip/Postal Code: _____
Country: _____
Telephone #: _____
Fax #: _____
E-Mail: _____
Street names of location:
Cabinet / controller type:

MP2000E

Battery Backup System

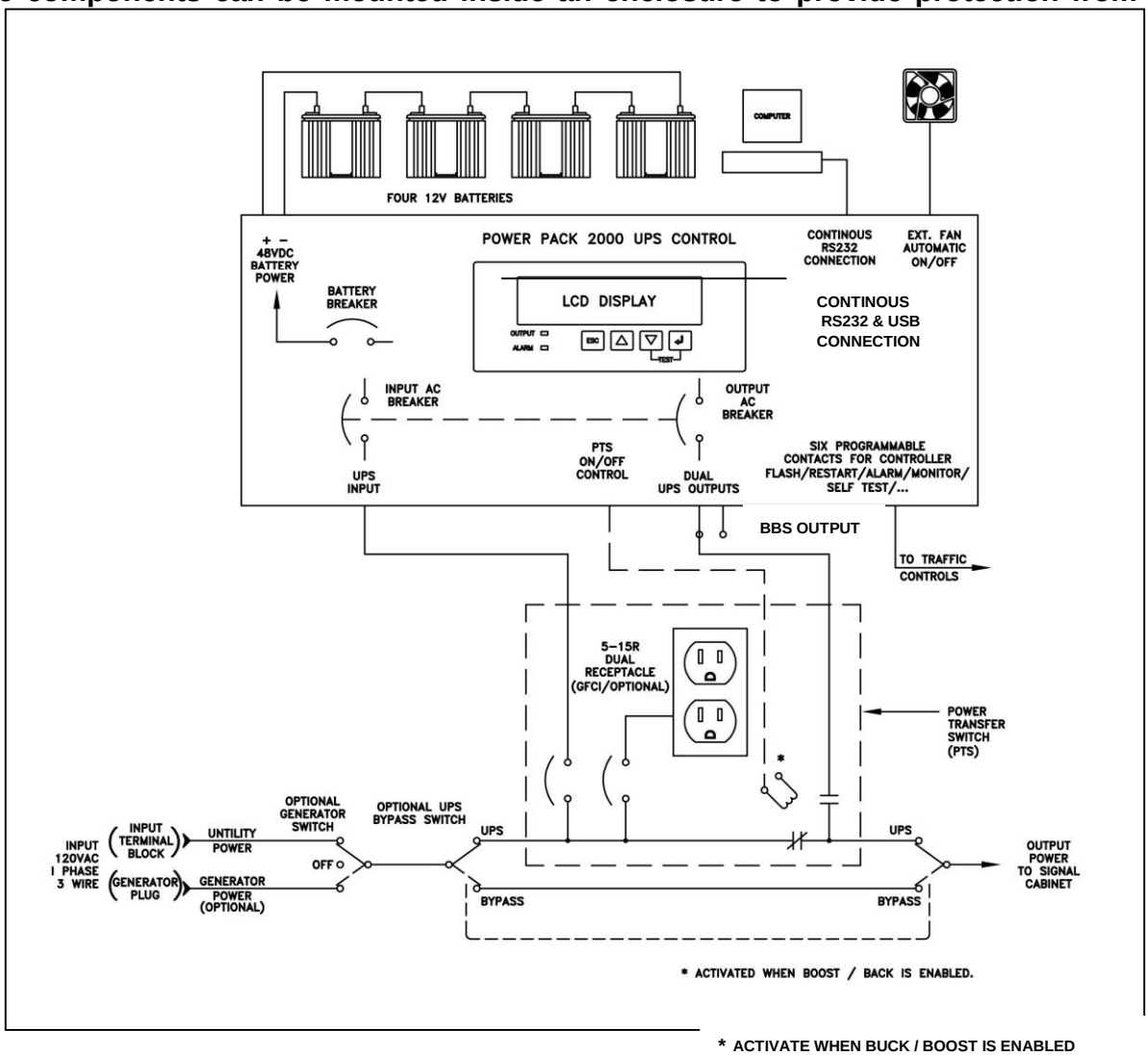
Section 1: Installation & Start-Up Manual

1.1 Description

Purpose: Describes the operation of the MP2000E System (Figure 1, 2 & 3).

1.1.1 System Description

The MP2000E System provides backup power to traffic control signal equipment. It consists of the MP2000E Battery Back-Up (BBS) System, the Power Transfer Switch (PTS), and batteries that provide back up power when the line is unqualified. These three components can be mounted inside an enclosure to provide protection from most weather conditions.



* ACTIVATE WHEN BUCK / BOOST IS ENABLED

Figure 1
Simplified MP2000E System Block Diagram

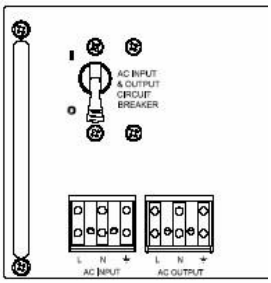
The traffic signal cabinet is powered continuously when a MP2000E system is installed. The system allows connection for the normal utility power using standard terminal blocks or an optional generator power via standard 30 Amp. (optional 50 Amp) generator receptacle. The optional bypass switch redirects utility power to the load and allows the BBS to be removed for service on a temporary or permanent basis without disrupting the operation of the traffic signal.

With a fully functioning BBS system, the PTS allows utility power to flow out to the traffic cabinet, when the utility line is qualified (within the acceptable range as programmed). If the BBS is not functioning, the PTS will bypass the BBS allowing the utility to flow out to the traffic cabinet. The BBS input is protected with one circuit breaker located on the PTS as well as another one located on the BBS module. When the BBS internal BOOST and BUCK is enabled, the PTS is activated allowing BBS to continuously boost the output when input is lower, buck or lower the output when input is higher or run from batteries when input power is outside the specified acceptable range. The PTS has dual NEMA power receptacles for optional battery
heating pads, connecting a vacuum cleaner, or a PC for maintenance.

The smart, temperature compensated internal charger continuously monitors and maintains the batteries in a fully charged state. For the protection of the battery, the charging process is automatically discontinued when the battery temperature exceeds 50°C. When the batteries are fully charged, the smart charger provides a continuously pulsating ON-OFF trickle charge to keep the batteries topped-off or fully charged. When input power is not qualified or is outside the acceptable range, the BBS derives the DC power from the storage tank of four batteries connected in series and maintains output power until the batteries are depleted down to a specified level or the utility power returns within its specified levels. The traffic intersection will continue to operate in full operation AND/OR in flash mode as programmed by the user. Programmable contacts allows the user to place the intersection in flash mode as soon as the input power is lost or after the batteries are depleted down to a certain capacity that is determined and programmed by the user. The amount of back-up time battery power can provide depends on the Amp-hour capacity of the batteries as well as the intersection watt load that requires support.

1.1.2 MP2000E BBS

The MP2000E BBS System shown below provides control functions and backup power as described above. For more information, please see Section 2 of this manual.



Alternate Configuration

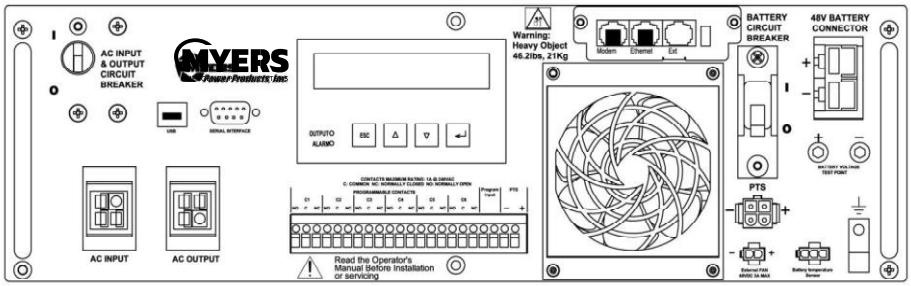


Figure 2
MP2000E BBS Front Panel

1.1.3 Power Transfer Switch

The Power Transfer Switch (PTS) shown below allows the BBS to be removed for service, replacement or maintenance without interrupting power to the traffic cabinet.

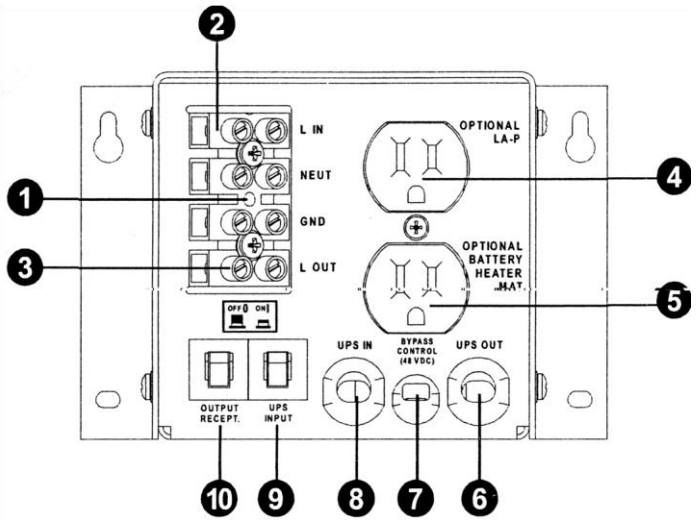


Figure 3
Power Transfer Switch Front Panel

1. **The wires from the neutral and ground bus of the traffic cabinet are connected to this terminal block.**

2. **The Input line power is connected to the terminal block marked “L IN”.**

3. **The Output power is connected to the terminal block marked “L OUT”.**

4. **An optional surge suppressor, external PC or a vacuum cleaner for maintenance may be plugged into this receptacle.**

5. **The optional battery heater mat is plugged into this receptacle.**

6. **The “BBS OUT” cord is plugged into the Quick Connect Connector socket or connected to the AC OUTPUT terminal block on the MP2000E.**

7. **The Black and Red PTS control wires are connected at PTS plug on face of MP2000E Quick Connect Connector.**

8. **The “BBS IN” cord is plugged into the Quick Connect socket or connected to the AC INPUT terminal block on the MP2000E.**

9. **The circuit breaker provides input power protection for the MP2000E BBS.**

10. **The dual receptacles are protected by this circuit breaker.**

1.1.4 Batteries

Different Amp-hour capacities or sizes of batteries can be used in the MP2000E system to provide various backup times. Four batteries are connected in series for the required 48VDC. Contact customer service at Myers Emergency Power Systems. for information on the battery best suited for your application. The battery harness supplied with the system is polarized and equipped with Molex type connectors. The battery harness provides a heavy-duty connection for each battery, so it is possible to unplug or hot swap them. Each of the four batteries may be connected in any order using the provided harness.

1.2 Mounting

Purpose: Describes how to mount the MP2000E System into an enclosure.

The MP2000E system components can be mounted into a single external cabinet or into an existing traffic cabinet.

EXTERNAL MOUNT:

The factory supplied external cabinet can be bolted onto an existing or new traffic cabinet or this external cabinet can be pad mounted on a concrete slab or be pole mounted. The separate base for the cabinet for installation in the concrete slab, bolts & hardware for bolting onto the side of the traffic cabinet, bushing for the wire ducts, brackets for pole mounting and all the required accessories including mechanical hardware and electrical wiring are supplied to make the installation easy for the contractor. External cabinets such as BC100, BC80, etc. are outdoor type, weather proofed provided with internal exhaust fan that is temperature controlled, an intake filter that can be cleaned or replaced, a non-corrosive rubber mat for batteries, 3 point locking mechanism, lockable handle with dual keys and a unique internal keyed lock. The quality of cabinets bears a reputable industry trade name such as MYERS Emergency Power Systems. The factory-supplied cabinet meets or exceeds the requirements of various NEMA classifications.

INTERNAL MOUNT:

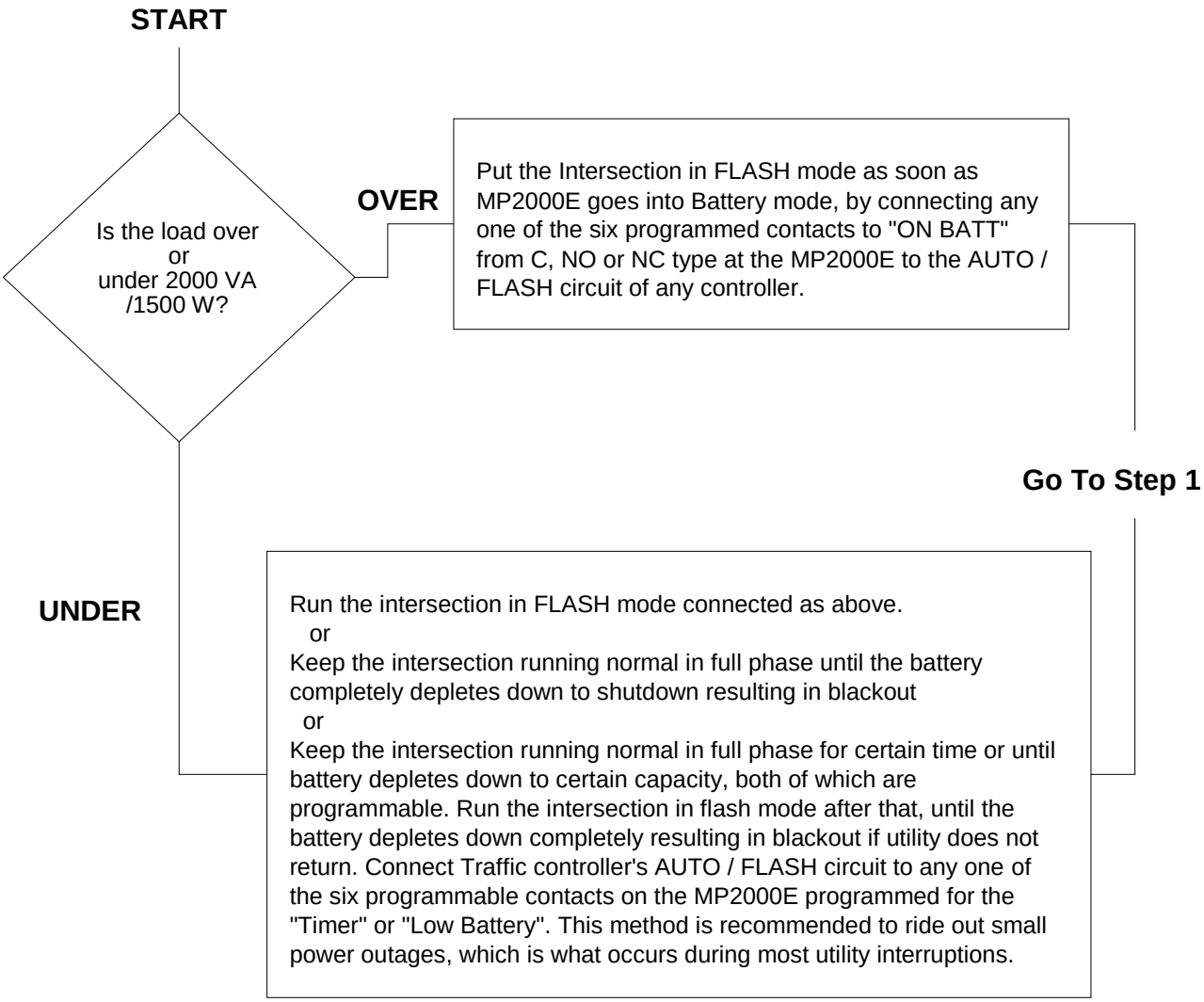
The MP2000E components can also be mounted inside an existing NEMA or 332 or various other traffic cabinets. The special Swing Tray designed to hold the four batteries is easily mounted inside an existing 332 type or other equivalent cabinet using the hardware that is provided, or they can be shelf mounted in a NEMA or equivalent cabinet. The MP2000E can be bolted into an industry standard 19" rack using the supplied ears or brackets, or it can be shelf mounted in a NEMA type enclosure. The PTS supplied with or without optional Generator & Bypass switch comes in many configurations that can be shelf mount, 19" rack mount, back plate mount, etc.

1.3 Wiring

Purpose: Describes how to wire the MP2000E System.

Danger: The utility input power line must have circuit breaker or fuse protection as per the local electrical code. It is referred as "Upstream Circuit Breaker" in this manual.

Before wiring the system, determine the size of the load:



TIP: Each of the six contacts are of form C type, meaning Normally Open (NO), Common (C) and Normally Closed (NC) dry contact rated for 1 Amp at 120VAC. Each of these contacts can be individually programmed to energize and stay latched for ON BATTERY, LOW BATTERY, TIMER, ALARM, FAULT and many other conditions as described in subsequent chapters. The ON BATTERY contact(s) are activated as soon as the MP2000E is transferred to Battery mode. LOW BATTERY contact(s) are activated only in the Battery mode, as soon

as the discharged battery reaches the lower value battery capacity as set by user and remains latched as long as the system remains in Battery mode. The TIMER contact(s) are activated only in the Battery mode after the user-programmed time is attained, that can be set in 15 minutes interval from 15 minutes to 8 hours.

TIP: Verify that all breakers, AC and battery breakers are OFF prior to wiring.

STEP 1: Connect CONTROL Wires

START

Bolt the Battery Temperature Sensor to the anode (+) terminal of the middle battery - Plug the connector on the other end into the MP2000E

Wrap a tie around the strain relief loop and the battery temperature sensor to prevent the connector from disconnecting during an earthquake or other severe vibrations.

Connect the External Cabinet Fan and the RS232/ USB Computer Cable (if used)

Connect the programmable contacts: ON BATT, LOW BATT, TIMER or SELF TEST contacts from MP2000 to traffic cabinet for Flash mode (if used)

TIP: Torque status/self test terminal block to a maximum of 4.4 lb-in (0.5Nm). Maximum wire size is 14 AWG.

Figure 4
MP2000 Front Panel

GO TO STEP 2

TIP: (See Section 2.1.2, Fig. 16) of this manual for details on the layout, operation, and specifications of the Control Terminal Block.

STEP 2: Connect PTS to the MP2000

START

Connect the Black & Red control wires from the PTS to the MP2000E PTS Input Plug

Plug the cord from BBS OUT at PTS into the AC OUT Quick Connect Connection Socket or to the AC OUTPUT terminal block on the MP2000E

Plug the cord from BBS IN on PTS to AC IN Quick Connect Connection Socket or to the AC INPUT terminal block on the MP2000E

GO TO STEP 3
PTS Control

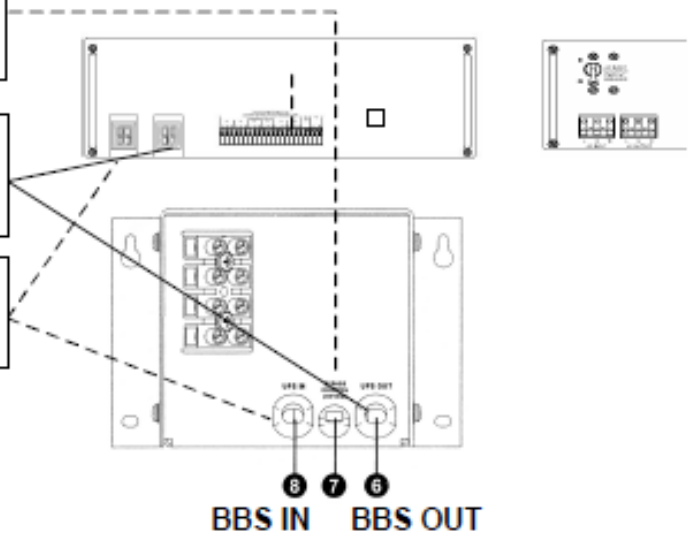


Figure 5
MP2000 Front & Power Transfer Switch

STEP 3: Connect the output or Signal Cabinet and Battery

START

Connect the suppli ed black wire from the L OUT terminal at PTS to the INPUT HOT termin al in the signal cabinet .

Plug the Red & Bla ck Battery connector into the MP 2000 E BBS

GO TO STEP 4

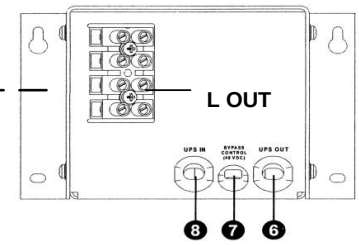


Figure 6
Power Transfer Switch

Figure 7
MP2000E Front Panel

1. **The wires from Ground and Neutral Bus Bars from the traffic cabinet are extended to PTS Terminal Block as shown in step**

2. **OPEN the upstream breaker feeding utility power to the signal cabinet .**

3. **Disconnect the HOT wire (Black) connected**

4. **The cabinet side HOT wire is connected to "L OUT" on the PTS.**

5. **The utility side HOT wire is connected to "L IN" on the PTS.**

6. **Torque the PTS terminal block to a maximum of 10.0 lb-in (1.1 Mm).**

STEP 4: Connect the Utility Input Line Power

DANGER: Make sure the upstream circuit breaker feeding the utility power is OFF before beginning this step. Leave the NEUTRAL and GROUND wires connected from utility to signal cabinet. Extend the NEUTRAL and GROUND wires from their corresponding bus bars in the traffic cabinet to the terminal block on the PTS . between utility and traffic cabinet.

START

Connect the Black & Red control wires from the PTS to the MP2000E Control TB 21 & 22 respectively or plug into PTS connector on face of BBS

Plug the cord from BBS IN on PTS to AC IN Quick Connect Connector on the MP2000E or AC INPUT terminal block

WIRING FINISHED

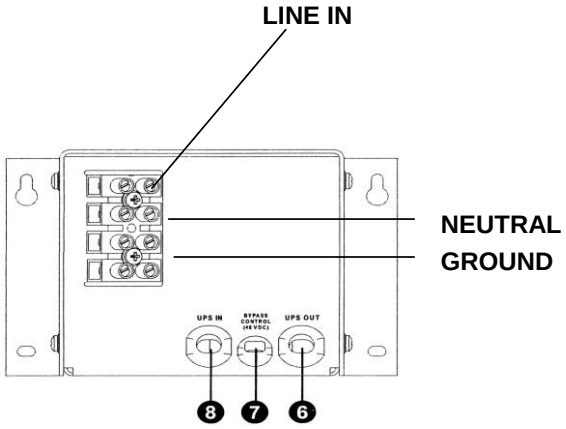
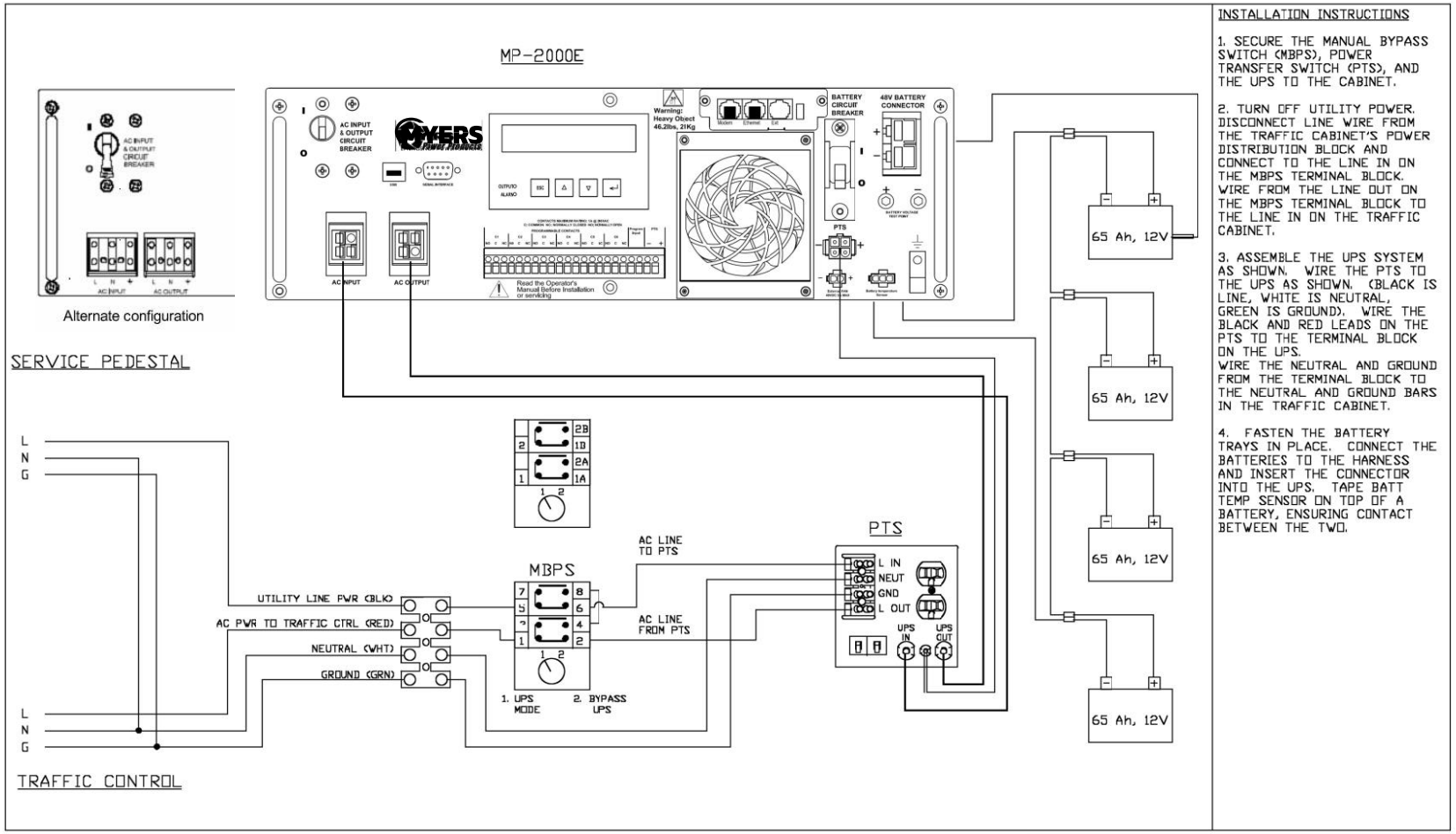


Figure 8
Power
Transfer Switch



INSTALLATION INSTRUCTIONS

1. SECURE THE MANUAL BYPASS SWITCH (MBPS), POWER TRANSFER SWITCH (PTS), AND THE UPS TO THE CABINET.

2. TURN OFF UTILITY POWER. DISCONNECT LINE WIRE FROM THE TRAFFIC CABINET'S POWER DISTRIBUTION BLOCK AND CONNECT TO THE LINE IN ON THE MBPS TERMINAL BLOCK. WIRE FROM THE LINE OUT ON THE MBPS TERMINAL BLOCK TO THE LINE IN ON THE TRAFFIC CABINET.

3. ASSEMBLE THE UPS SYSTEM AS SHOWN. WIRE THE PTS TO THE UPS AS SHOWN. (BLACK IS LINE, WHITE IS NEUTRAL, GREEN IS GROUND). WIRE THE BLACK AND RED LEADS ON THE PTS TO THE TERMINAL BLOCK ON THE UPS.
WIRE THE NEUTRAL AND GROUND FROM THE TERMINAL BLOCK TO THE NEUTRAL AND GROUND BARS IN THE TRAFFIC CABINET.

4. FASTEN THE BATTERY TRAYS IN PLACE. CONNECT THE BATTERIES TO THE HARNESS AND INSERT THE CONNECTOR INTO THE UPS. TAPE BATT TEMP SENSOR ON TOP OF A BATTERY, ENSURING CONTACT BETWEEN THE TWO.

MYERS POWER PRODUCTS
2950 E. Philadelphia St., Ontario, CA 91761

REV.	BY	DATE	DESCRIPTION	REV.	BY	DATE	DESCRIPTION

DR JLT
CK
SCALE
DATE 01/19/07

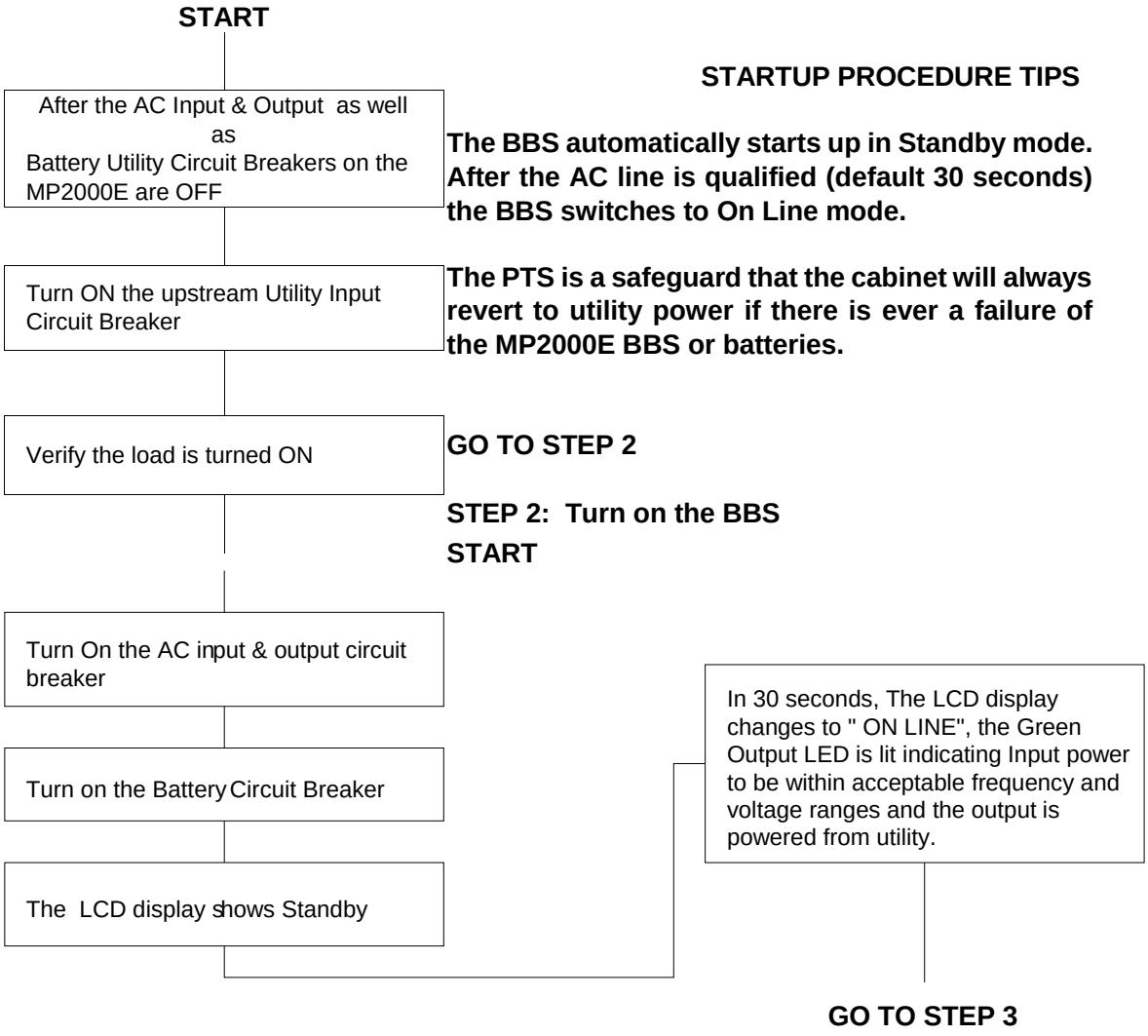
TITLE: UPS/PTS WIRING DIAG.
MATERIAL
DWG. NO. 726011
REV.

1.4 Start-Up and Test

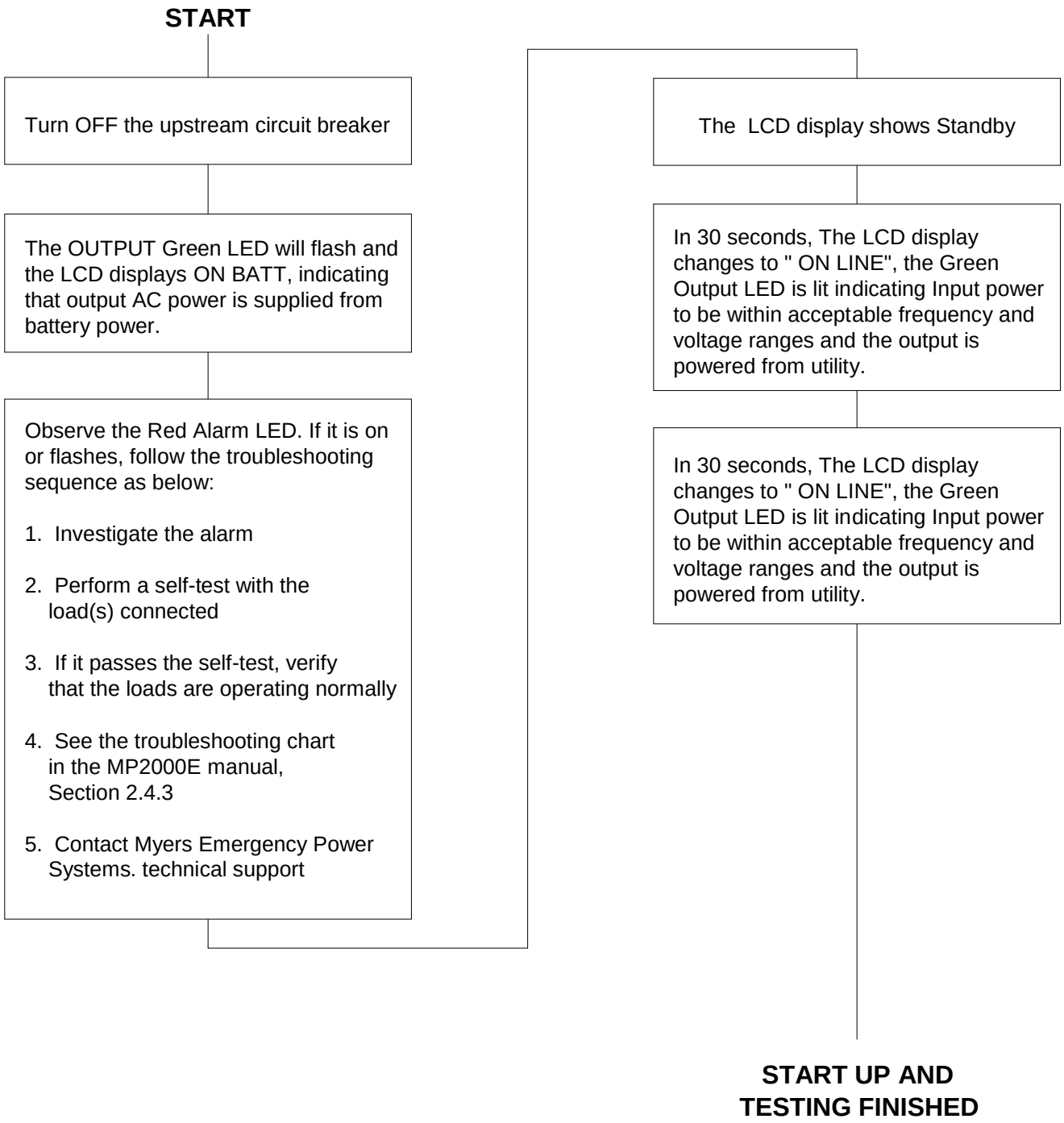
Purpose: Describes how to Start-up and test the system.

TIP: If the system does not perform as described below, see the troubleshooting section in Section 1.6 of this manual.

STEP 1: Turn on the Utility Input line Power



STEP 3: Test the System



TIP: To test the BBS, perform the self-test feature via control submenu (see manual, section 2.2.3, "Self Test")

1.5 Shutdown

Purpose: Describes how to shut down the system components for removal or maintenance.

1.5.1 MP2000E BBS

START

Turn OFF the Battery Circuit Breaker

Turn OFF the AC Input & Circuit Breaker

Unplug the battery connector

Disconnect the AC input Quick Connect plug or disconnect the AC INPUT wires.

Disconnect the AC output Quick Connect plug or disconnect the AC OUTPUT wires.

Disconnect, mark and insulate wires at the Green Control Terminal Block, the plug for Ext. Fan, the plug for battery temperature sensor and the RS232 or USB connector.

Remove and perform the maintenance on MP2000E.

Perform this procedure in reverse order to reinstall the unit.

PROCEDURE FINISHED

DANGER: Shutting down the MP2000E does not necessarily disconnect power to the loads.

Danger: The AC input wires from PTS are still HOT or Live. Insulate the bare wires using wire nuts.

TIP: For additional information on how to operate the MP2000E manual, (see Section 2.2).

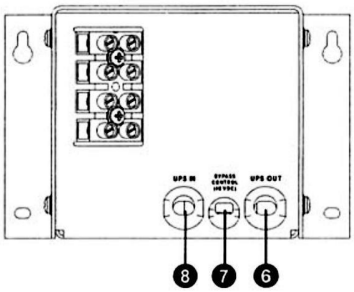
1.5.2 PTS

TIP: Verify that both the AC and Battery Breaker are OFF at the MP2000E.

START

Turn OFF the upstr eam circuit breaker.

Disconnect the BB S OUT Cord at the MP2000E



Disconnect the BBS IN cord at the MP2000E

Disconnect the Red & Black PTS control wires at the MP2000E

Disconnect the wires from L IN, NEUTRAL, GROUND and L OUT from the PTS

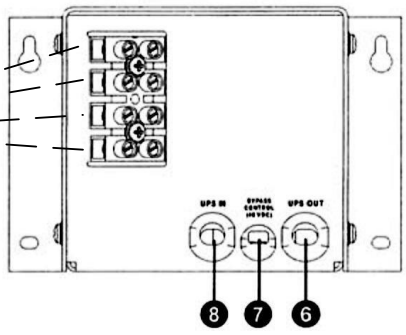


Figure 10
Power Transfer Switch

Remove and perform maintenance on the PTS

Perform this procedure in reverse order to reinstall the PTS

PROCEDURE FINISHED

1.6 Troubleshooting

TIP: For troubleshooting the MP2000E BBS, (see Sections 2.2.3 and 2.4.3) of this manual.

MP2000E System Trouble Shooting Chart		
SYMPTOM	**CAUSE**	**REMEDY**
No Output Available from PTS	Upstream utility circuit breaker or fuse may be OPEN	CLOSE the upstream utility breaker or fuse
	Utility AC Power not available	Check with the AC voltmeter & contact the Utility Company
	Wiring error PTS terminal block	Correct wiring at PTS
	Faulty PTS	If 120 VAC is present at "L IN" and NEUTRAL at the PTS terminal block, replace the PTS
PTS won't allow transfer to Battery mode	MP2000E output power not connected to PTS	Verify that "BBS OUT" cord from PTS is properly connected to the AC OUTPUT Quick Connect socket or terminal block on the MP2000E
	"BBS INPUT" circuit breaker at PTS is open	Reset the breaker & clear the fault
	Black and red control wires from PTS are not connected to the MP2000E	Check the connection at the MP2000E
	48VDC signal missing at PTS connector or TB 21 and 22 of Green Control terminal block at the MP2000E	Refer to Section 2.4.3 of this manual for further trouble shooting
	Faulty PTS	Replace PTS
MP2000E does not return back to input Line mode	Utility input line power is missing	Verify that "BBS IN" cord from PTS is properly connected to the AC INPUT Quick Connect socket or terminal block on the MP2000E
		Verify that the "BBS INPUT" circuit breaker at PTS is closed
		Ensure that the utility input is present

Figure 11
Trouble Shooting Table

1.7 Specifications

SYSTEM TECHNICAL SPECIFICATIONS	
INPUT	
Voltage Range- VAC	100~130VAC (120 VAC Nominal) Prog. 90–150VAC
Frequency	60 +/- 3 Hz
Current	30A (Resistive)
Step Load Response (50% Load Change)	1/2 Cycle Full Recovery (Full resistive load)
Short Circuit Protection	30 A circuit breaker
Battery String Voltage	48VDC (Four 12VDC Battery)
OUTPUT	
Power, VA / W (Line or Inverter mode)	2000VA / 1500W
Power Factor	0.75
Output Voltage, VAC Line and Boost Mode Inverter Mode	100~130 +/- 2 VAC (follows the input voltage) 120VAC +/- 5%
Output Waveform	Sine Wave
Output Waveform THD	< 3% (Resistive load)
Load Crest Factor	3:1 (Max)
Overload Capacity	110% for 3 minutes
PERFORMANCE	
PTS Transfer Time	< 65 ms Buck & Boost mode <10 ms

PTS MECHANICAL	
Dimensions (WxDxH) inch/mm	4.75/ 120.6 (W) 6.5/165 (D) 4.6/116.8
Weight (lb/kg)	7.0/3.2
Mounting	Rack Mount EARS, 4 points Optional 19” rack mount
Input Connection	Terminal block: “L IN”
Output Connection To Loads	Terminal block: “L OUT”
Output Connection To BBS	Line cords ready for plugging in or hard wiring to BBS terminal blocks
Cooling	Convection (Approx 7 W contactor coil dissipation)
DESIGNED TO MEET	
Electrical Safety	UL –1778, CSA-107.1, UL 60950-1
EMI	FCC Class A
Surge Immunity	IEC 1000-4-5, IEEE C62.41

Due to ongoing product improvements, specifications are subject to change without notice.

Note:

1. **Between 55°C ~74°C, the system is de-rated to a maximum rectified-capacitive load of 1500 VA /1200 W.**
2. **De-rate operating temperature above 4900 ft (1500m) by 2°C per 1000 ft (300m).**
3. **Refer to Section 2.4.5 at the end of this manual for additional specifications.**

1.8 EMERGENCY SHUTDOWN PROCEDURE

The MP2000E BBS is connected to more than one energy source. In an emergency, DISCONNECT utility input power, battery power, as well as an optional generator power, if utilized. Disconnecting all the AC and DC power sources will ensure that the output circuit is not live.

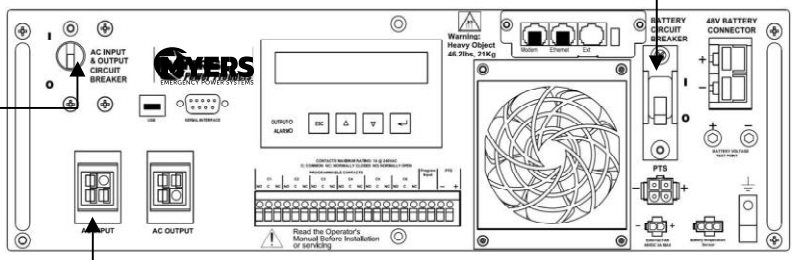
START

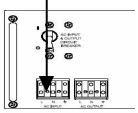
Turn OFF the battery circuit breaker

Turn OFF the AC input & output circuit breaker

Unplug the Line Cord and turn off the Utility line power circuit breaker

EMERGENCY SHUTDOWN





Alternate Connection

Figure 12
MP2000E BBS Front Panel

For Service, Parts or Technical information Contact:

Myers Emergency Power Systems

TEL: (610) 868-3500

FAX: (610) 868-8686

WEB: www.myerseps.com

MP2000E System

Battery Backup System

Section 2: Operator's Manual

2.1 Introduction

This section introduces the various features of the MP2000E BBS System

2.1.1 The Advantages

Advanced Power Protection Technology

MP2000E is a Battery Backup System (BBS) designed for both indoor and outdoor applications. The MP2000E BBS provides continuous power to traffic and signal equipment.

- **Advanced Communications**
  The RS232, USB and/or Ethernet ports allow for local or remote monitoring of the MP2000E.

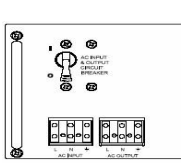
- **Smart Charging**
  MP Series smart charge technology ensures the batteries are always at peak performance.

- **User Friendly Supervision**
  The LCD panel provides "At A Glance" monitoring and control.

- **Service Friendly**
  The batteries can be changed without shutting down the intersection loads or the MP2000E.

2.1.2 A Tour of The MP2000E

***Purpose**: Describes the display, connections and switches on the BBS front panel (Figures 13, 14 &15).*



Alternate
Connection

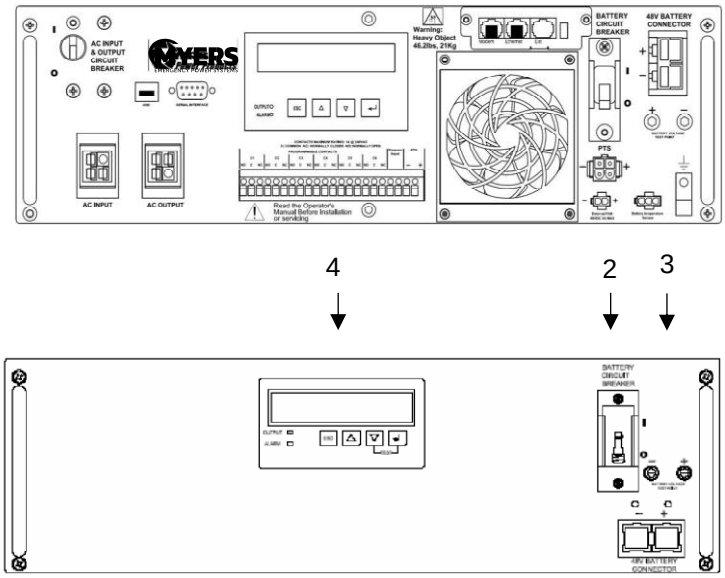


Figure 13
MP2000E Front Panel

1. 48VDC Battery Connector

Connects the battery to the unit. The battery string voltage is 48VDC.

2. Battery Circuit Breaker

Acts as an ON/OFF switch for battery power. Must be in the ON position for normal operation.

3. Battery Voltage Test Points

Battery voltage can be measured at these Test Jacks only when the battery circuit breaker is turned ON.

TIP: TEST JACKS ARE NOT DC POWER OUTLET TERMINALS.

4. Liquid Crystal Display (LCD) Control Panel

The BBS can be controlled and monitored via this LCD panel. See Section 2.2 for further information.

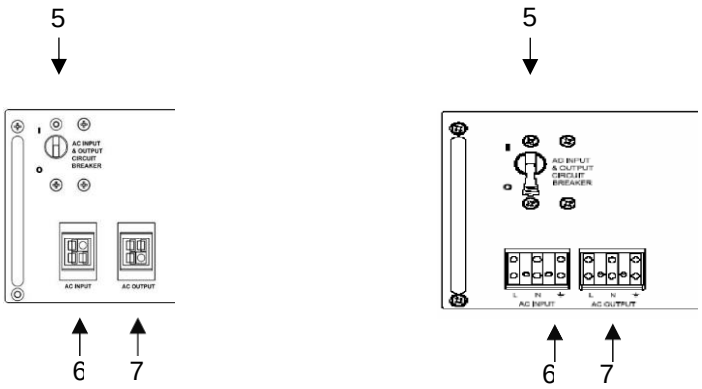


Figure 14
MP2000E Front Panel

Alternate Component

5. AC Input & Output Circuit Breaker

Acts as a line and output power ON/OFF switch to facilitate the unit's maintenance or replacement. Must be in the *ON* position for normal operation.

6. AC Input

Quick Connect socket or Terminal Block for the input line power plug.

7. AC Output

Quick Connect socket or Terminal Block for the output line power plug.

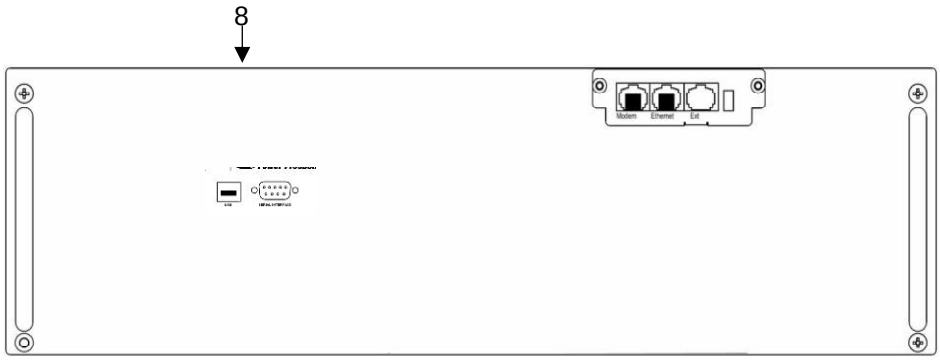


Figure 15
MP2000E Front Panel

8. USB / Serial Interface / RS232 Connector / Ethernet

The USB and /or DB-9 female connector is used to connect the MP2000E to the host computer for remote control, monitoring and calibration via RS232 commands.

For the USB or DB-9 female RS232 connections use computer industry standard computer cable between the computer's USB or RS232 port and the BBS unit's USB or RS232 ports. For Ethernet use CAT5E RJ45 cable.

See Section 2.3 for more details about connection and use.

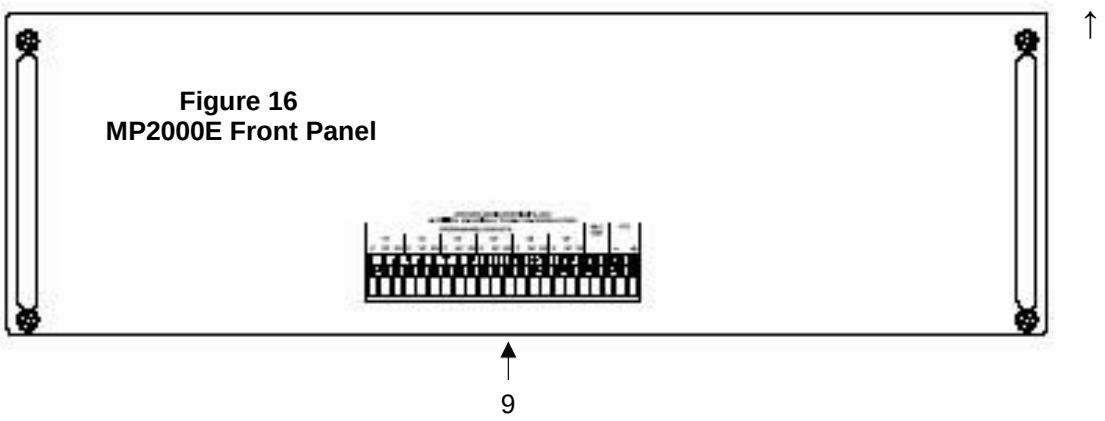


Figure 16
MP2000E Front Panel

9. Green Control Terminal Block

This 22 position terminal block provides communication with the intersection controller, controls the Power Transfer Switch (PTS) and starts the self-test. Figure 17 shows its layout and operation.

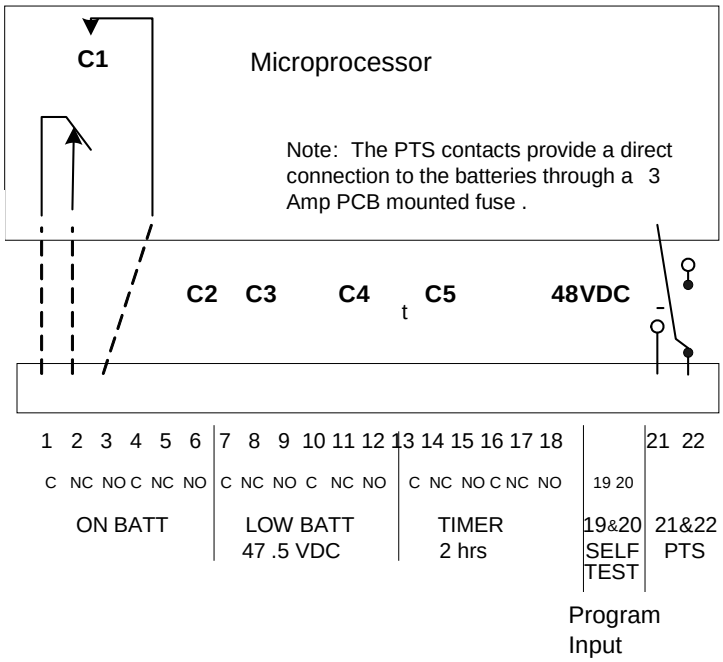
Note: This terminal block is opto-isolated and shares a common ground with the serial interface. Each of the six programmable contacts can be programmed for one or more functions such as: *The Timer*, *Low Battery* and *On Batt. T*he relay contacts are Form C type, i.e. Each of the six programmable contacts has Common (C); Normally Closed (NC) and Normally Open (NO) contact position.

- **On Batt: This relay energizes when Utility Input line power is unqualified.**
- **Low Battery: These relays energize when the battery drops below the programmed battery capacity. The default value is 47.5VDC or 40% battery capacity.**
- **TIP: You can change the preprogrammed value to match the batteries used and the actual operating conditions. See Section 2.3.4.4, "Maintenance" # 35, "Battery Voltage Level @40% of Capacity".**
- **Timer: These relays energize after the unit has been in Battery mode for the programmed time period. The factory default value is 2 hours.**
- **TIP: The time can be programmed to be from 15 min. to 8 hours in 15 minute increments**
- **Self-Test: To initiate self test, jumper the TB 19 & 20 on the Green Control Terminal Block.**
- **Program Input: To enable external input to jumper TB 19 & 20.**
- **PTS: MP2000E sends a 48VDC signal from the batteries to the PTS, which activates the PTS, resulting in transfer from Input power to BBS power. See Section 1.3, Wiring, of this manual for connection instructions.**

MP2000E INTERIOR

Note: These contacts have a maximum rating of 1 Amp at 120V. Only the first On Batt contact is illustrated.

The remaining 5 contacts for Low Battery, Timer, etc., are similar.



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18		21	22
C	NC	NO	C	NC	NO	C	NC	NO	C	NC	NO	C	NC	NO	C	NC	NO	19 20		
ON BATT						LOW BATT 47 .5 VDC						TIMER 2 hrs						19&20 SELF TEST	21&22 PTS	

Program Input

Figure 17
Green Control Terminal Block
Layout and Operation

Note:

1. **Six (6) sets of programmable contacts have the following factory default settings: C1, C2 =“On Batt”**
   C3, C4 =“Low Batt @ 47.5VDC”
   C5, C6 =“Timer @ 2.00 Hours”

2. **User may program each of the six contacts for one or more functions. See Section 2.2 Sub Menus for more detailed information.**

Note:

One (C6) programmable input contact can be programmed by the user. See Section 2.2.10: Settings Menu for more detailed information.

Default for programmable input is SELF TEST. Also available: Ext. Alarm, Ext. Batt Alarm, Ext. Fan Alarm, and Door Interlock.

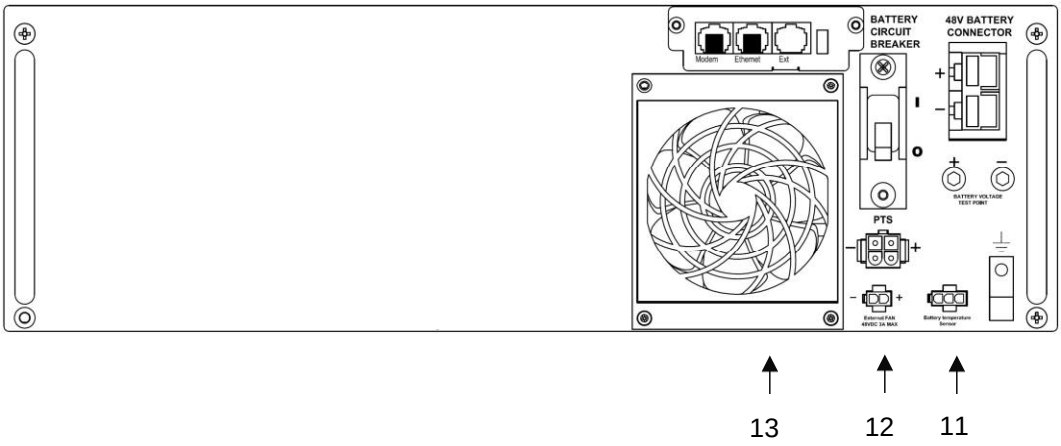


Figure 18

MP2000E Front Panel

10. Battery Temp Sensor

It attaches the battery temperature probe to the unit for monitoring battery temperature. The charging voltage is temperature dependent. The microprocessor of the smart charger adjusts the voltage for optimum charging.

The temperature probe connector must be plugged in for normal operation. The sensor end contains a ring lug and should be secured to the battery terminal.

TIP: If the BBS is not charging the batteries check the temperature probe. To test the temperature probe unplug it from the face of the BBS. Check the resistance of the temperature probe by inserting the probes of an ohmmeter into the top and bottom pins of the connector. The meter should read approximately 12,000 Ohms at 25ºC (77 ºF). If resistance is not in this range, replace temperature probe.

11. Ext Fan 48VDC

Provides DC Power (48VDC, 1 Amp (Max)), which could be used to power an optional 48VDC fan, mounted inside the enclosure for regulation of the interior temperature.

12. Internal Fan

This microprocessor-controlled fan regulates the unit's internal temperature. It must not be blocked. The filter in front of the fan is removable for cleaning.

TIP: Inspect the filter every 6 months, or as often as required. Clean by removing it, running water through the filter and air-drying before reinstallation.

2.1.3 Theory of Operation

The Myers Emergency Power Systems (MPP) battery backup system (BBS) consisting of three main components.

MP2000E BBS module- The BBS component has two main operating modes: On Line and On Battery. When On Line the BBS functions as a line interactive back up system. Line interactive BBS units are designed so that the inverter is always connected to the output of the BBS. When line power is present, the inverter operates in reverse to charge the battery. When utility power fails, the BBS reverses the power flow from the inverter and provides power to the load. This design provides better filtering than a standby unit because the inverter is always connected to the load.

Line interactive MP2000E also incorporates Buck and Boost, an automatic voltage regulator. Buck and Boost allows the BBS to effectively step-up or step-down the incoming line voltage without switching to battery power. This allows the BBS to correct most long term over-voltages or under-voltages without draining the batteries. Another advantage is that it reduces the number of transfers to battery which extends the lifetime of the batteries.

On Battery Mode: The batteries supply direct current to the MP2000E inverter. The BBS filters the DC input through input capacitors and metal oxide silicon field effect transistors (MOSFET) that feeds a transformer that steps the voltage up to 120 VAC. The 120VAC, 60Hz waveform generated by the MP2000E inverter is a pure sine wave.

Full Intersection Operation: The MP2000E is designed to supply full backup power within the BBS rating.

Red Flash Intersection Operation: By wiring and programming any one of the six dry contacts on the MP2000E to the traffic signal controller red flash circuit , see Figure 15.

The terminal block is opto-isolated and shares a common ground with the serial interface. Each of the six programmable contacts can be programmed for one or more functions such as: *The Timer*, *Low Battery* and *On Batt.* The relay contacts are Form C type, i.e. Each of the six programmable contacts has Common (C); Normally Closed (NC) and Normally Open (NO) contact position.

On Batt: This relay energizes when Utility Input line power is unqualified.

Low Battery: These relays energize when the battery drops below the programmed battery capacity. The default value is 47.5VDC or 40% battery capacity.

Timer: These relays energize after the unit has been in Battery mode for the programmed time period. The factory default value is 2 hours.

On Line Mode: The utility power (120VAC, 60Hz) is fed through the MP2000E. The BBS module senses and qualifies the external utility power. The inverter is switched off and the battery charger is switched on. All loads attached to the MP2000E AC output terminal will operated directly on the external utility power.

The Manual ByPass Switch module (MBPS)- This is the second component in the BBS system. The switch is rated at 120VAC and 40 amps. This stand-alone switch is used to manually isolate the MP2000E BBS module from utility power and the intersection controller during maintenance and BBS replacement operations without turning off power to the loads.

The Power Transfer Switch (PTS) is the third module in the BBS system. The PTS is rated at 120VAC and 40 amps. MP2000E sends a 48VDC signal from the batteries to the PTS, which activates the PTS, resulting in transfer from Input power to BBS power. The PTS ensures that a continuous flow of power reaches the traffic controller cabinet. In the event of a battery failure the 48 VDC is absent from the PTS. At that point the relay automatically switched to the utility position. Upon restoration of utility power the external power will flow to the traffic cabinet.

Section 2.2 Operation

This section describes how to start, shutdown and operate the MP2000E:

2.2.1 LCD Panel

When the Output LED is:
ON, the line is qualified and the input power flows to output.

FLASHING, the unit is in Battery mode.

OFF, the output is OFF, Input line is not qualified or the unit detected a fault.

If both LEDs are OFF and the LCD is BLANK, the unit is shut off.

When the Alarm LED Is:
ON, the unit detected a Fault.

FLASHING, the unit detected an Alarm.

Pushing the ENTER button displays the problem.

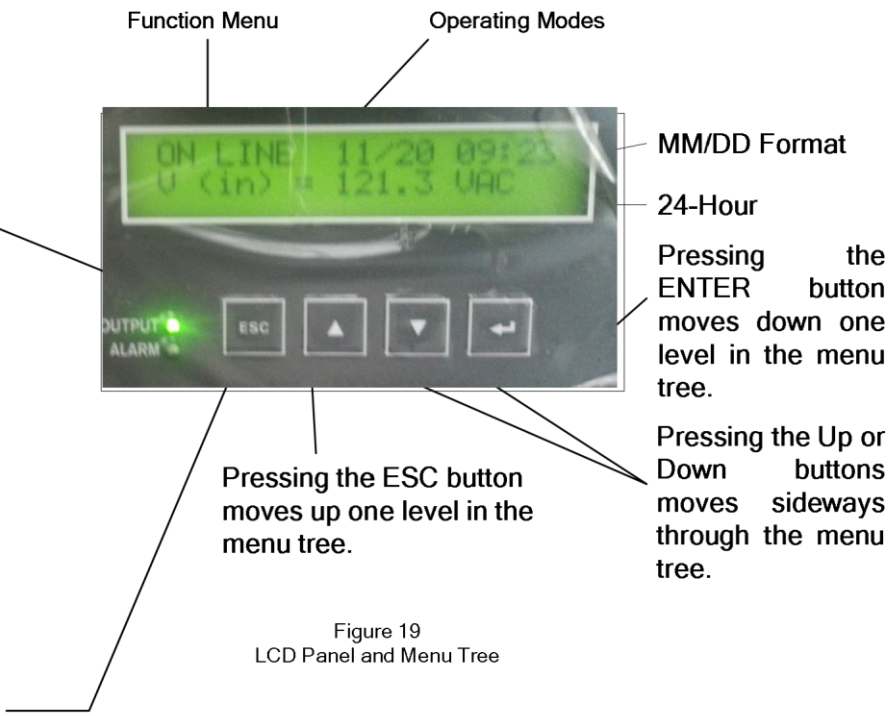


Figure 19
LCD Panel and Menu Tree

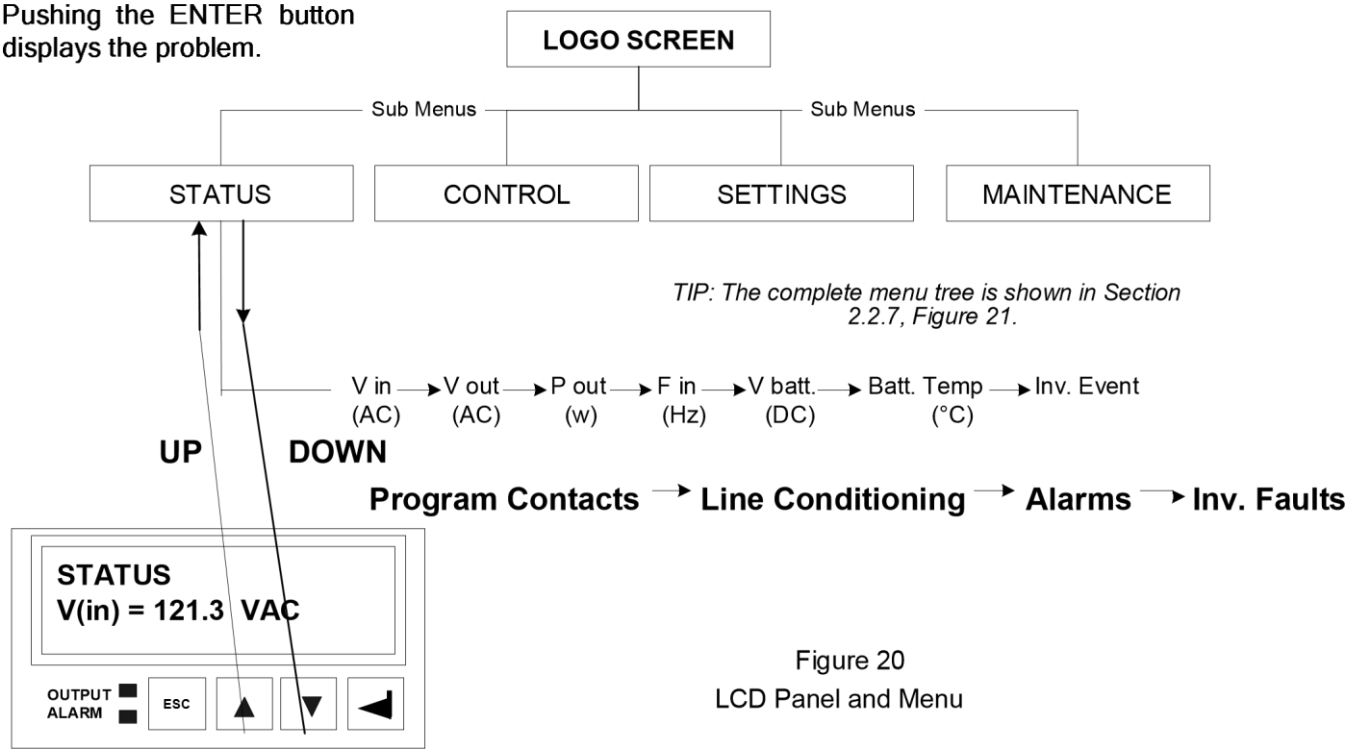


Figure 20
LCD Panel and Menu

V(in) → V(out) → P(out) → F(in) → V batt → Batt Temp → Inv Events → Inv Timer → Buck Events → Buck Timer → Boost Events → Boost Timer → C1, C2, C3 Status → C4, C5, C6 Status → Software Version → Program IP Contacts → Program Contacts → Line Conditioning → Alarms → Faults

2.2.2 MP2000E Operating Modes

Purpose: Describes the Operating modes.

TIP: The LCD automatically displays the following modes when they change.

LCD Shows	Explanation
STANDBY	This mode is displayed when the unit is first turned on. The inverter remains off and the MP2000E does not provide output power to the loads. If input line power is qualified, it automatically switches to line mode. To provide battery power to the loads, use the manual on function (see Section 2.2.9)
ON LINE	The normal operating mode. Input line power is provided to the loads, the batteries are charging and the MP2000E is ready to provide backup power
BOOST*	The unit automatically transfers to BOOST mode to raise the lower input line voltage when output drops below the user programmable preset limit
ON BATT	The unit automatically transfers to battery when input line power is unqualified or not present. The batteries provide power to the loads
BUCK*	The unit automatically transfers to BUCK mode to reduce the higher input line voltage when output raises above the user programmable preset limit
SELF TEST	When “Self Test” mode is active, the unit will enter “Battery Mode” automatically to test or check if output voltage and waveform is correct. After the programmed duration, the unit returns back to “Line Mode”. Users may use “Maintenance Mode” to configure a longer time for self-test. Default time for self-test is 1 minute.
LOW BATT "Low Bat"	When the unit is in “Battery Mode” the batteries begins to discharge. If the battery voltage falls below the user programmed (40% default setting) of its capacity, warning appears.

*** When enabled**

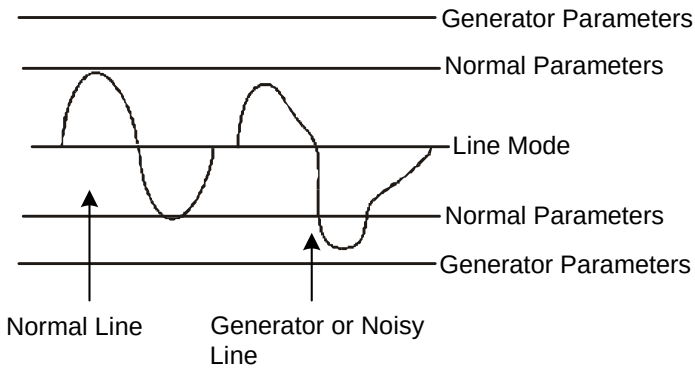
The following mode may be programmed by the User (see Section 2.2.10)

Sense Type (Generator / Normal Mode)

This is used to broaden the input parameters to accommodate the voltage fluctuations created by a backup generator or a noisy line.

The factory default setting is normal, where the unit runs on normal parameters. Switching to Generator makes it run on noisy generator parameters.

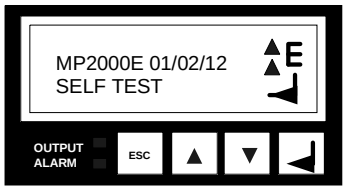
If the unit constantly switches between line and battery modes due to a noisy line, select generator mode to



Normal and Generator Parameters

2.2.3 Self Test

***Purpose**: Describes the Self-Test.*



Caution: This procedure should not be performed when critical loads are running that depend on the unit for backup power.

The Self Test confirms that the unit can transfer into and out of Battery mode while supporting the output load at the same time.

START

TIP: The duration of self-test can be adjusted via RS232 / USB menu (see Section 2.3.4.4, Maintenance Menu # 30, Battery Test Options).

Is the unit in Line Mode?

NO — **Do Not Proceed until the Input Line is stable.**

YES

Activate the Self Test mode in LCD display, under CONTROL menu.
OR
Jumper TB 19 & 20 of Green Control terminal block
OR
Use Menu # 301 via RS232 / USB (Section 2.3.5)

The Output Green LED stays lit during the self-test as long as the input AC stay qualified.

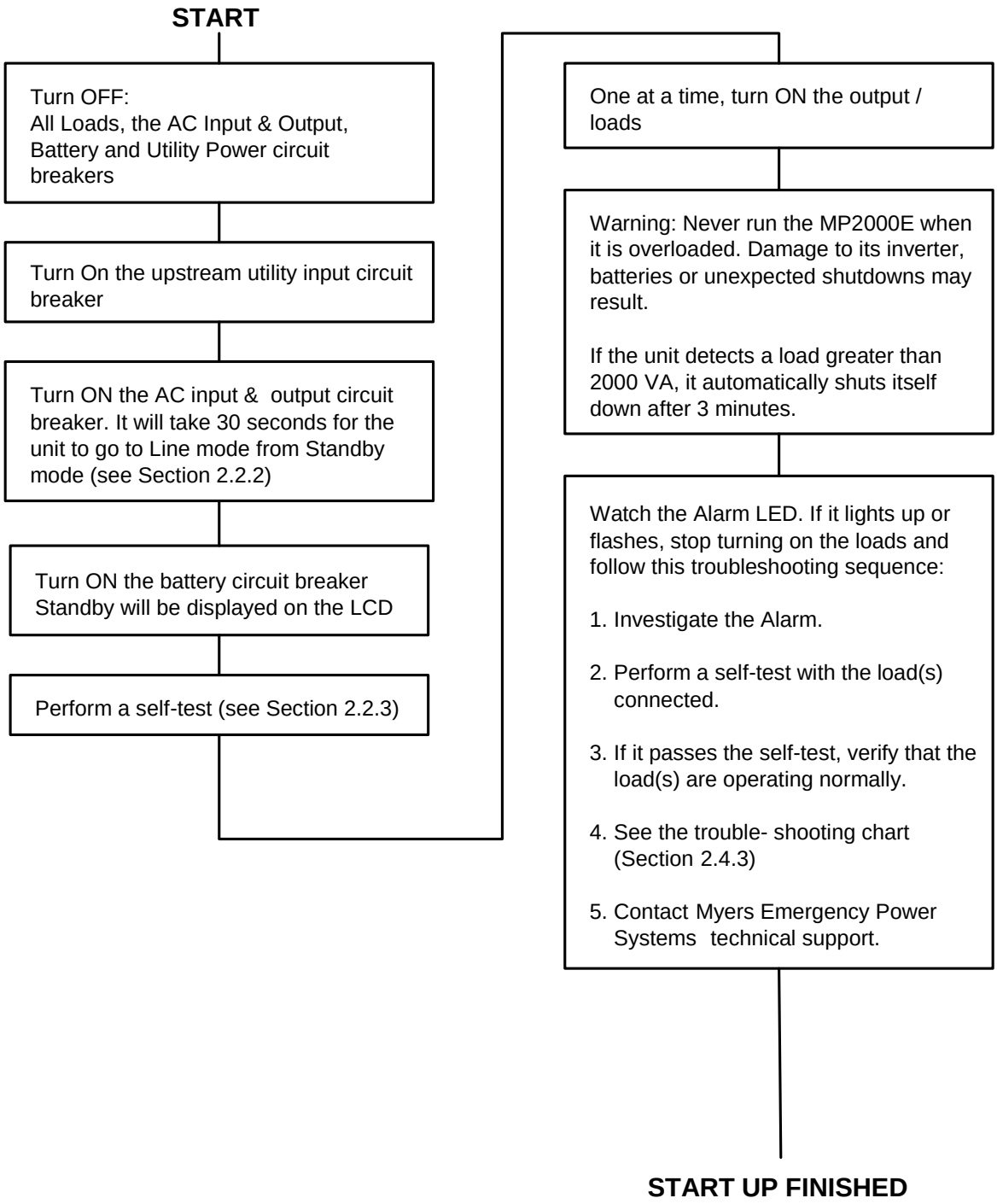
After approximately one minute (default time), if no problem is detected, the BBS will return to the mode it was in before the self-test was started.

If a problem is detected, the red ALARM LED will turn on solid or flash (See Sections 2.2.12 & 2.2.13) the counter will increment by one and the timer will accumulate the run time.

Self-Test Finished

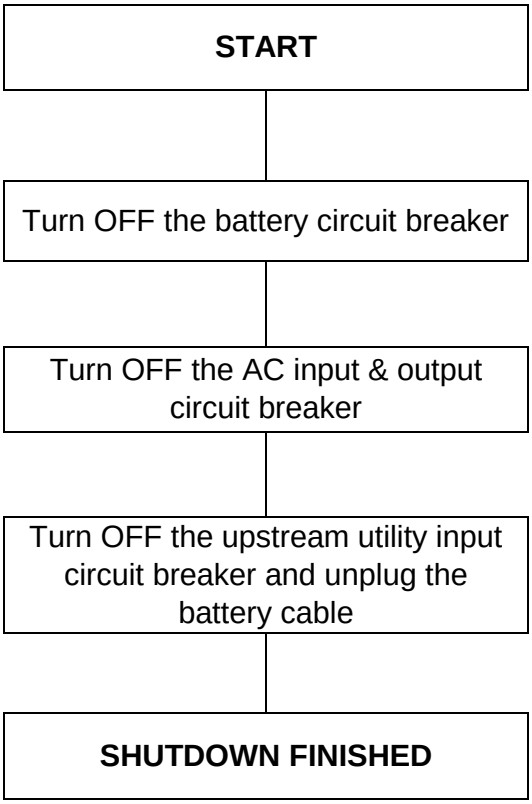
2.2.4 Start Up

Purpose: Describes the Start Up procedure.



2.2.5 Shutdown

Purpose: Describes the shutdown procedure.



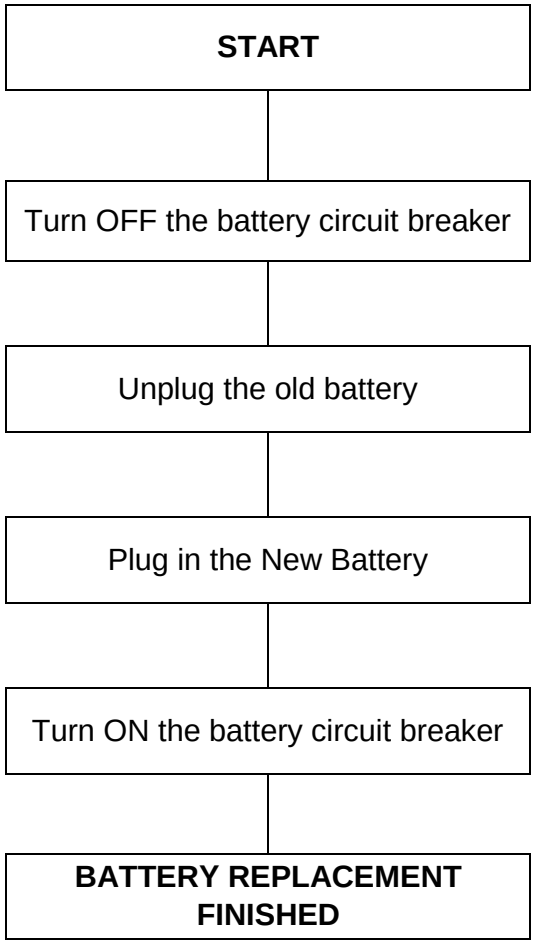
2.2.6 Battery Replacement

Purpose: Describes how to change the battery.

Caution: While the battery is being changed, the MP2000E cannot provide backup power. This procedure should not be done while critical loads are running that depend upon the MP2000E's backup power.

BATTERY CHANGING PROCEDURE

NOTE: The ALARM LED remains ON during this procedure.



2.2.7 LCD Menu Tree

Purpose: Shows the Menu Tree (Figure 21).

TIP:

- **The Alarm and Fault submenus alert the operator of a problem with the MP2000E. When the alarm LED is ON or FLASHING, press the ENTER button. One of the conditions described in Section 2.2.12 or 2.2.13 appears on the LCD screen.**

- **The status submenu provides measurements of important MP2000E inputs, output, and other parameters via the LCD screen (Section 2.2.8).**

- **The control submenu allows the operator to manage the MP2000E (Section 2.2.9)**

- **To learn the value of a specific measurement, when it appears on the LCD screen, press the ENTER button.**

- **To start a command, when it appears on the LCD screen, press the ENTER button.**

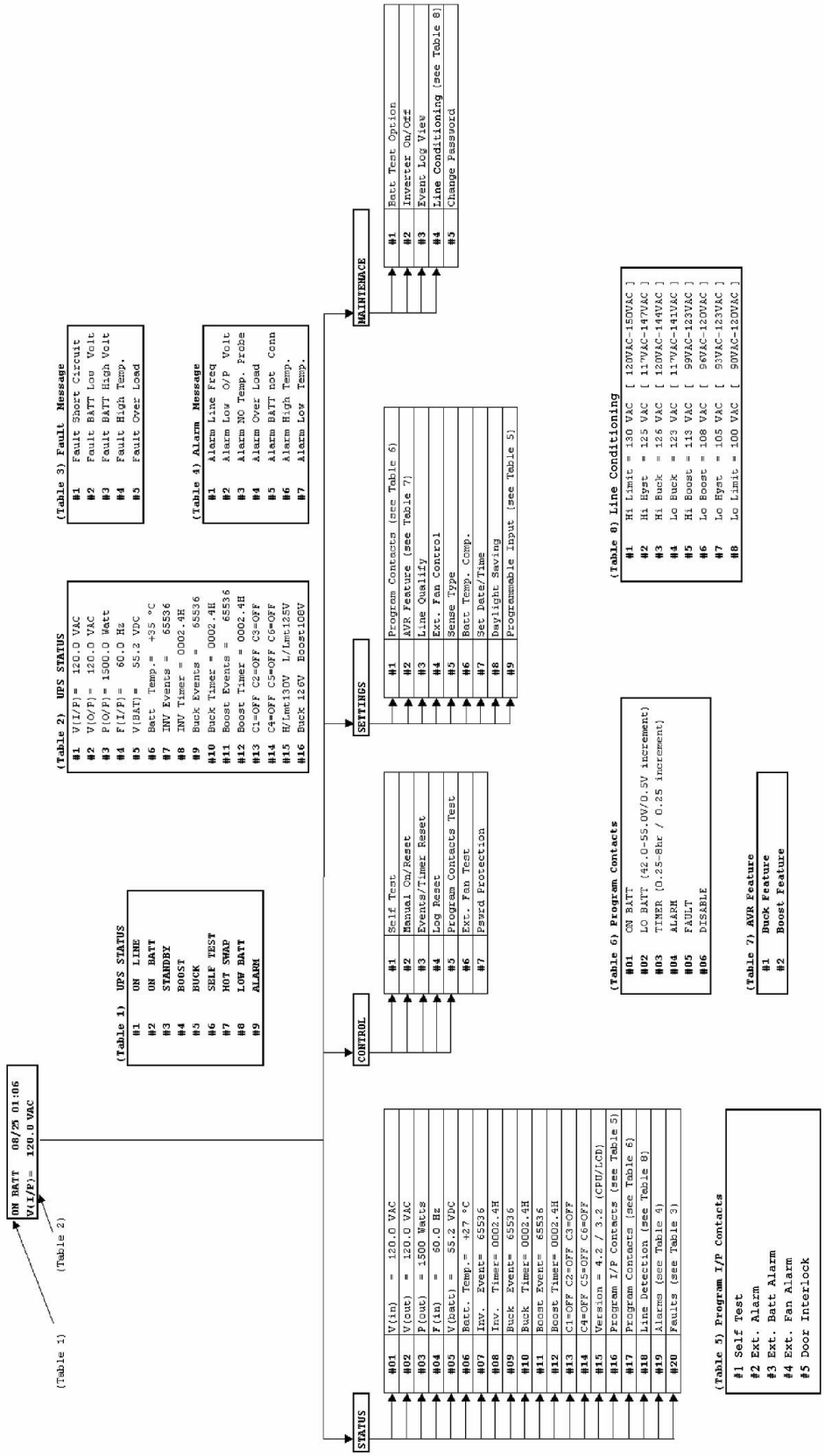
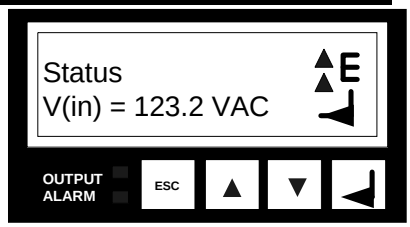


Figure 21

Note: (See Section 2.2.14) For details on Event Log View under Maintenance submenu.

2.2.8 Status Submenu

Purpose: Describes how to use the Status Submenu to measure the input and output parameters.



Procedure: When the desired item appears on the LCD screen, press ENTER to measure it.

To see the updated reading, press ENTER again.

ITEM	LCD SHOWS	DESCRIPTION
Input Voltage	STATUS V(in) = 123.2 vac	The utility input line voltage
Output Voltage	STATUS V(out) = 123.2 vac	The output voltage (true RMS)
Output Power	STATUS P(out) = 1340 Watt	The output power (watts)
Input Frequency	STATUS F(in) = 59.3 Hz	The utility input line frequency
Battery Voltage	STATUS V(batt) = 55.3 VDC	The average combined battery voltage
Battery Temperature	STATUS Batt.Temp= =21°C	The temperature of the battery case
Inv. Events	STATUS Inv.Events=00025	
Inv. Timer	STATUS Inv.Timer=0242.9h	The Total amount of time the unit has been in Battery Mode since the last reset. Each decimal indicates 6 minutes (0.1 x 6 minutes). The decimal increments by 2 or every 12 minutes. For example, displayed 1.4 hours indicates that since the last reset, MP2000E has been in Battery mode for a total of 1 hour and (0.4 x 60) min = 1 hour and 24 minutes
Buck Events	STATUS Buck Event=00000	The number of times unit has been in Buck Mode
Buck Timer	STATUS Buck Timer=0000.0	The Total amount of time the unit has been in Buck Mode since the last reset. Each decimal indicates 6 minutes (0.1 x 6 minutes). The decimal increments by 2 or every 12 minutes. For example, displayed 1.4 hours indicates that since the last reset, MP2000E has been in Battery mode for a total of 1 hour and (0.4 x 60) min = 1 hour and 24 minutes

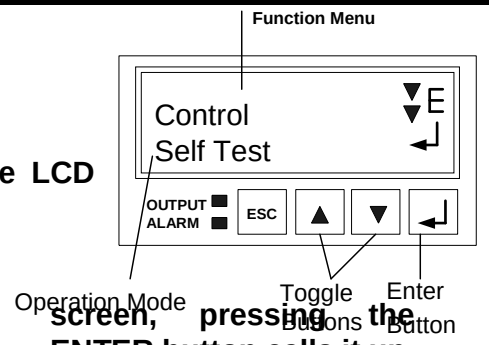
2.2.8 Status Submenu - CONT'D

ITEM	LCD SHOWS	DESCRIPTION
Boost Events	STATUS Boost Events=00025	The total number of times the unit has been in Boost Mode.
Boost Timer	STATUS Boost Timer=00000	The total amount of time the unit has been in Boost Mode since the last reset. Each decimal indicates 6 minutes (0.1 x 6 minutes). The decimal increments by 2 or every 12 minutes. For example, displayed 1.4 hours indicates that since the last reset, MP2000E has been in Boost mode for a total of 1 hour and (0.4 x 60) min = 1 hour and 24 minutes
C1 - C3 Status	STATUS C1=off C2=off C3=off	Indicates the current Status of C1 through C3 programmable contacts.
C4 – C6 Status	STATUS C4=off C5=off C6=off	Indicates the current Status of C4 through C6 programmable contacts.
Version Number	STATUS Version No.=2.2/2.1	The software version used in this unit. 1.0D Control Board, 1.0D LCD Board
Program I/P Contact	STATUS Program IP Contacts	Indicates Program Value of the input contact
Program Contacts	STATUS Program Contacts	Indicates Programmed values of all 6 contacts
Line Conditioning	STATUS Line Conditioning	Indicates Programmed values of all input Line Detection parameters & warning levels
Alarms	STATUS Alarms	Indicates Alarms (see Section 2.2.12)
Faults	STATUS Faults	Indicates Faults (see Section 2.2.13)

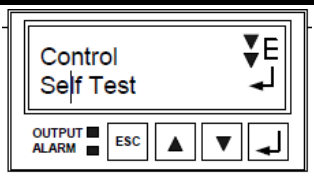
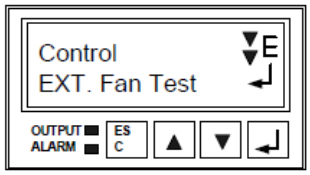
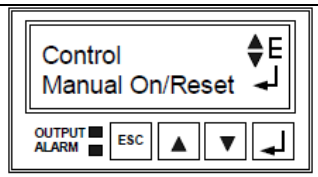
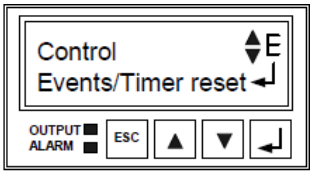
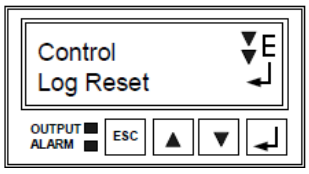
2.2.9 Control Submenu

Purpose: Describes how to use the control submenu to operate the unit.

Procedure: When the desired function appears on the LCD screen, pressing the ENTER button calls it up.



Many functions have more than one option available. Scroll through them by pressing the toggle buttons. When the desired option appears pressing the ENTER button switches the unit to the new option.

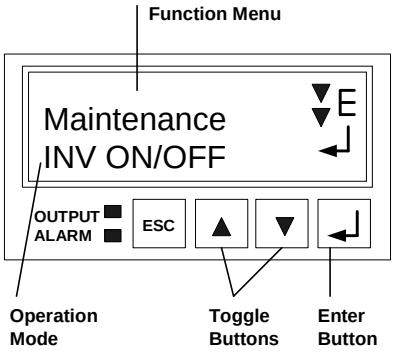
FUNCTION	ACTION	LCD SHOWS
SELF TEST	Pressing ENTER starts the self test [Section 2.2.3] CAUTION: The unit must be in Line Mode before starting the self-test	
PROGRAM CONTACTS TEST	Pressing enter will toggle the six programmable output contacts. A status will show wheter the inputs are all on or all off. NOTE: For proper operation make sure the contacts are in the off state prior to leaving the test.	
EXTERNAL FAN TEST	Pressing enter will toggle the external fan output. A status will show wheter the fan is on or off. NOTE: For proper operation make sure the fan contact is in the off state prior to leaving the test.	
MANUAL ON / RESET	This function is available only when the unit is first turned on and the LCD shows Standby. Pressing ENTER manually starts the unit and the battery supplies the output power	
EVENTS / TIMER RESET	Press ENTER when the LCD displays the message *This resets the event and timer counters to zero*	
LOG RESET	Press ENTER when the LCD displays the message *This clears all the messages from the Event Log*	
PASSWORD	Enable / Disable Password Protection	

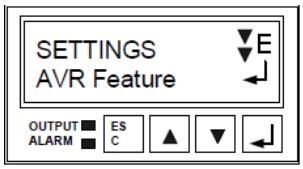
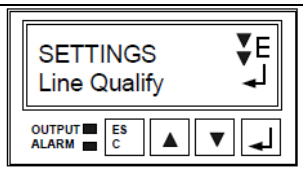
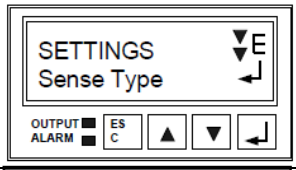
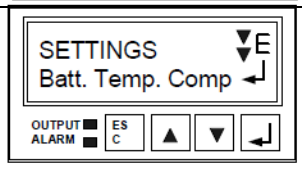
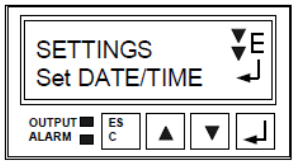
2.2.10 Settings Menu

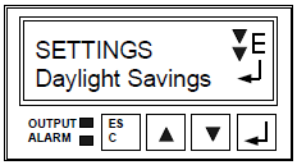
Purpose: Describes how to access and program various critical parameters.

Procedure: When the desired function appears on the LCD screen, pressing the ENTER button calls it up.

Many functions have more than one option available. Scroll through them by pressing the toggle buttons. When the desired option appears, pressing the ENTER button switches the unit to the new option.



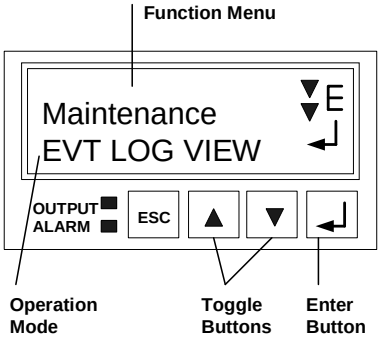
FUNCTION	ACTION	LCD SHOWS
Program Contacts	Indicates Programmed values of all 6 contacts and allows values to be changed	
AVR Feature	Allows the user to enable or disable Buck & Boost mode	
LINE Qualify	Indicates the setting for AC recovery time. The selection options are: 3 sec, 10 sec, or 30 sec. Default recovery time is 30 sec.	
EXT. FAN Control	Indicates temperature setting to turn on fan inside the cabinet.	
Sense Type	Toggle between Generator [Generator parameter] and Normal [Normal parameters]. This broadens the unit's input parameters to accommodate the fluctuations created by a generator or noisy line.	
Batt Comp	This adjusts the battery charging temperature compensated voltage to -2.5 / -3 / -4 / or -5 mV/°C/ Cell Consult the manufacture's specifications to find out which setting is best suited for your batteries. The factory default setting is -3 mV/°C/ Cell.	
Set DATE/TIME	To set BBS date and time	

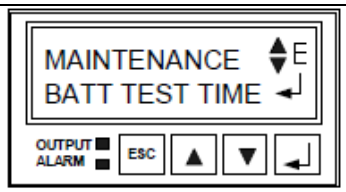
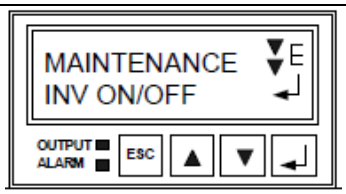
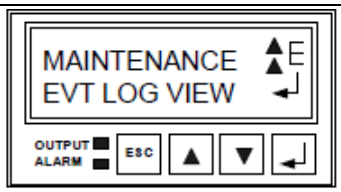
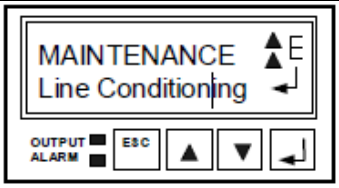
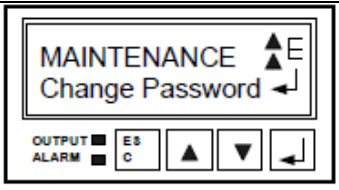
Daylight Saving Time	Turns on and off daylight savings time to adjust the internal clock.	
Programmable INPUT	Sets the function that is executed when the programmable input is activated.	

2.2.11 Maintenance Menu

Purpose: Describes how to access, and view and modify various parameters for the maintenance.

ONLY trained and qualified personnel normally use this menu, consequently the password protection option is provided to access this Menu.



FUNCTION	ACTION	LCD Shows
PASSWORD ACCESS	If a Password access is Enabled in CONTROL Menu, then it must be entered here before the Maintenance Menu can be accessed. Use the UP / DOWN arrow key with ENTER keys to enter a correct Password. Reentry is required if an error is made entering a Password	
BATT TEST OPTION	Battery Test Option can be verified here. Battery Test period of 1 to 255 minutes can be selected here in 1-minute increments. The MP2000E can be tested to run on battery for Maintenance purposes.	
INV ON / OFF	Inverter can be turned ON or OFF. This option is available ONLY when the MP2000E is in Battery or Standby Mode	
EVENT LOG VIEW	The Event Log with Date & Time is viewed here in Binary digital format. See Section 2.2.14 for details.	
LINE CONDITIONING	Allows setting of line detection parameters.	
CHANGE PASSWORD	The Password for the access of the Maintenance Menu is changed here. Use the UP / DOWN arrow key with ENTER keys to enter a correct Password. Reentry is required if an error is made entering a Password.	

2.2.12 Alarm Menu

Purpose: Describes the Alarm Submenu and how to use the LCD for troubleshooting. (Figures 22, 23 and 24)

Procedure: When the Red ALARM LED is FLASHING, the unit has an alarm, indicating a condition not serious enough to stop it from providing output power. Press ENTER to see the alarm.

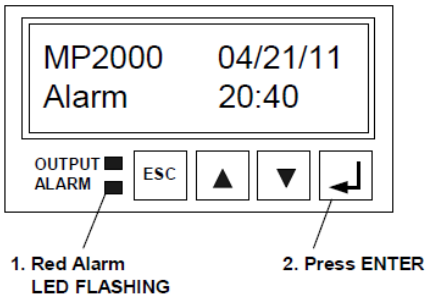


Figure 22
LED Shows Alarm

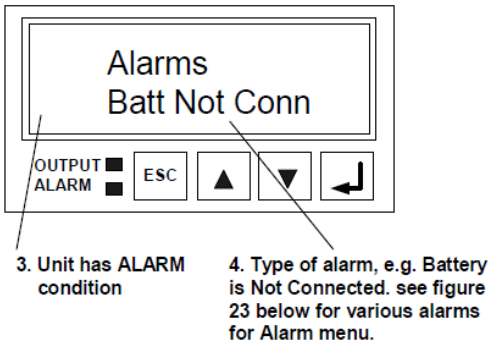


Figure 23
LED Displays the Alarm

LCD SHOWS	ALARM	DESCRIPTION
Line Freq	Line Frequency	The Input frequency is fluctuating & out of tolerance
Low O/P Volt	Low Output Voltage	The output voltage is low, but still usable
No Temp. Probe	Temperature Probe Unplugged	The battery temperature probe is unplugged or damaged. When the unit detects the probe is unplugged, it will continue to operate but the charger voltage will automatically be set to the lowest value
Over Load	Overload	The loads are drawing more power from the MP2000
Batt Not Conn	Battery Not Connect	The Battery is not connected
High Temp	High Temperature	The battery temperature is high
Low Temp	Low Temperature	The battery temperature is low
Alarm	Ext Alarm Battery Alarm Fan Failure Door Interlock	This alarm will be signaled by closure on pin 19 and pin 20 on the green coated terminal block.

Figure 24
Alarm Table

Note: The alarms are self-resetable. After the alarm condition is removed, the unit automatically returns to Line mode if the line is qualified, or battery mode if the line is unqualified.

2.2.13 Fault Menu

Purpose: Describes the Fault Submenu and how to use the LCD for troubleshooting. (Figures 25, 26 and 27)

Procedure: When the red ALARM LED is continuously ON, the unit has a fault, indicating a condition where backup power is unavailable. Press ENTER to display fault description.

TIP: When the unit has a fault and line power is qualified and available, the output loads are directly connected to the Input line with no line conditioning or backup power provided.

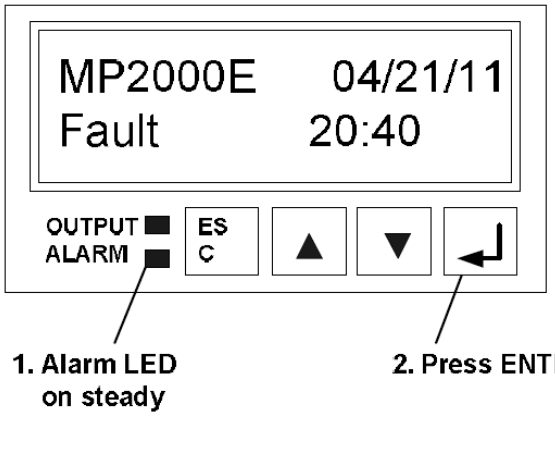


Figure 25
LED Shows a Fault

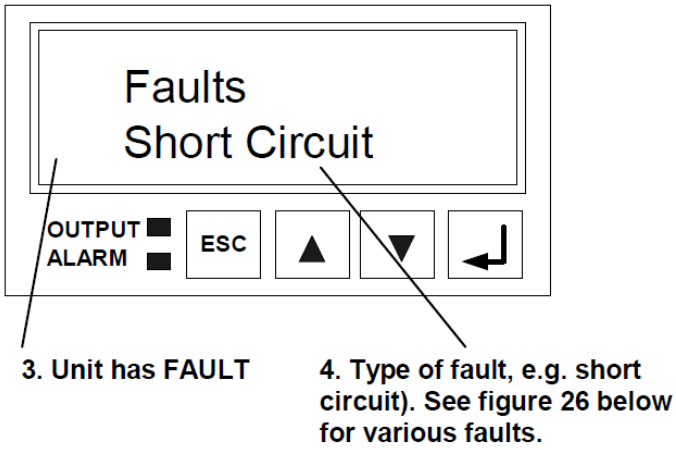


Figure 26
LED Displays Fault

LCD SHOWS	FAULT	DESCRIPTION
Short Circuit	Short Circuit	The load is short-circuited or the inverter did not start
Batt. Low Volt	Low Battery Voltage*	The battery's output voltage is low
Batt. High Volt	High Battery Voltage	The battery's output voltage is high
Temp High	High Temperature*	The battery's temperature or the MP2000 internal temperature is high
Overload	Overload	The loads are drawing more power than the MP2000 can provide

Figure 27
Fault Table

***These faults are self-resetable. After the fault condition is removed, the unit automatically returns to Line mode if the line is qualified or Battery mode if it isn't. For the other faults, the unit is reset by shutting it down and restarting, using AC & battery breakers. The faults can also be reset in the Control Menu of the LCD display.**

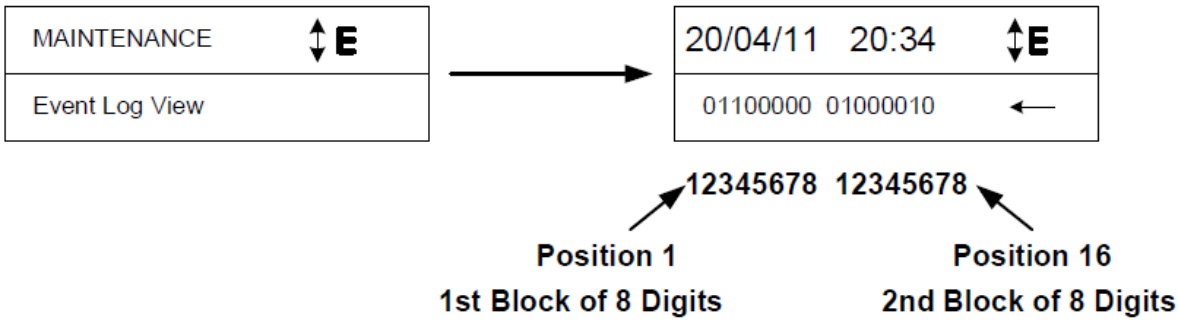
2.2.14 Event Log View

Purpose: Describes how to view and interpret the Event Log or Alarm Log.

Procedure: In the LCD panel, scroll down to the Maintenance Menu. Enter the password, using up / down arrows, to access the Maintenance Menu. The password is required only when the access to this menu is password protected in the control menu. The factory default password is 1111. Consult the factory if the programmed password is lost or forgotten. The last item in the Maintenance Menu is the EVENT LOG VIEW. The LCD screen displays the information in digital binary form. The full descriptive details can be seen using your PC in RS232 / USB mode.

ALARM IS DISPLAYED IN THE DIGITAL BINARY FORM
Two blocks of numbers appear on the second line of the LCD screen. Each block has 8 digits, for a total of 16 digits. The position of each one of the 16 digits indicates a unique Event. A value of 1 indicates the presence of an event represented by the position of that digit, while a value of 0 indicates an absence of that event. The assignment of events for each of these 16 digits is identified below.

Example



At the Event Log view menu press ENTER to access the Event Log View function. The first line indicates the date (DD/MM/YY) and time (HH:MM) of the event occurrence. The second line shows Events in BBS. Pressing UP allows to the next event, pressing DOWN allows to view the previous event.

1st Block of 8 Digits:

1	2	3	4	5	6	7	8
AC High	AC Low	Black-Out	Over Load	Hi Temp.	Batt Hi Volt	Batt Lo Volt	Short Circuit

2nd Block of 8 Digits

9	10	11	12	13	14	15	16
Batt Low	Freq Low	Freq High	AC Fail	Reserved	Batt Temp Over Range	No Temp Probe	Batt Not Conn

2.2.15 Low Battery Mode

Purpose: Describes the various states of the Low Battery Mode (Figure 28).

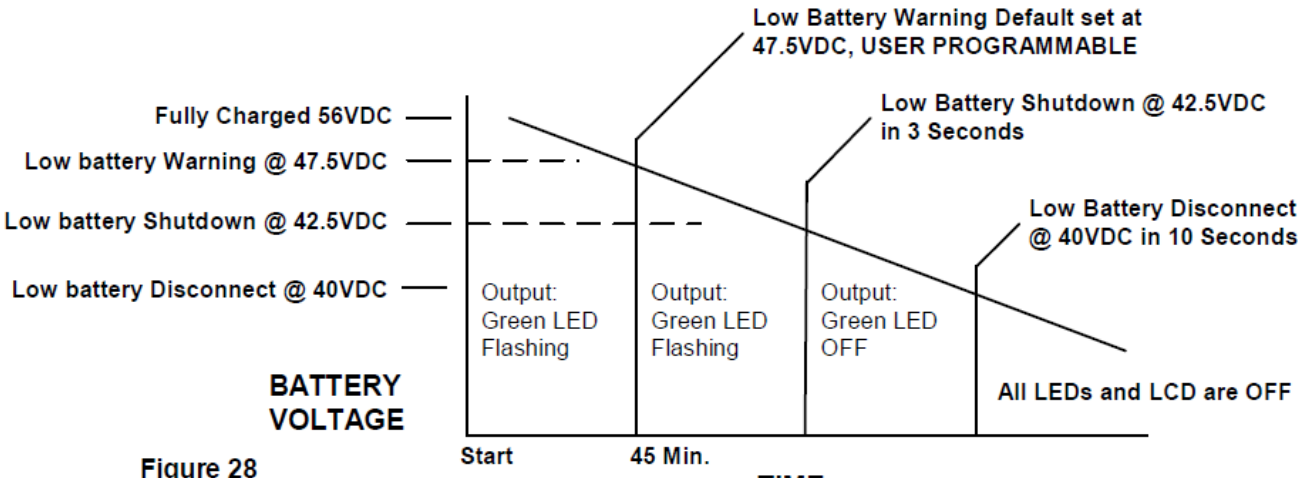


Figure 28
Low Battery Modes Status

Note: Not to scale. All values are shown for illustrative purpose only and will charge under different operating and battery conditions. Actual times will be different. Perform a run time test (Section 2.4.1) for application specific operating conditions.

Low Battery Warning

The batteries will continue to power the load, but they are almost discharged and cannot provide power much longer.

TIP: The operator should shut down unnecessary loads to extend battery backup time.

Low Battery Shutdown

When the battery decreases to 42.5VDC for 3 seconds, the unit automatically shuts output OFF and goes into SLEEP mode waiting for input power to return. The batteries are considered fully discharged and can no longer support the load, but they have enough power to keep the unit's monitoring and control circuits active. The housekeeping power supply is kept alive.

Low Battery Disconnect

When the battery discharges to 40VDC for 10 seconds, the unit automatically goes into this mode. The batteries are disconnected from the unit to protect the batteries from being damaged by a deep discharge. Both the LED and LCD shut OFF, showing the unit is shut off. The unit stays off until line power or a backup generator is available or fresh batteries are connected. To prevent battery damage, if the BBS is to remain in a low battery disconnect state for an extended period. The BBS and battery circuit breakers must be switched OFF and the manual bypass switch must be switched to the Bypass position. For additional protection disconnect the Quick Connect style battery connector from the BBS.

⚠	**Note: only authorized personnel should perform all parameter changes, as it may affect the performance of the traffic intersection**

2.2.16 Adjustments

The MP2000E does not have any hardware adjustments. All of the adjustments are controlled through software parameters that are set either through the front keypad or the RS232 port.

1. **Contrast Adjustment – The LCD display has a contrast adjustment that is set by holding the ESC button on the front panel and depressing the ENTER button. Adjust the contrast by using the Up/Down arrow keys. Pressing the ENTER button again will save the current contrast setting. This function is not available through the RS232 port.**
2. **Line Detection Adjustments – Line detection settings are used for two purposes. The first purpose is to allow the BBS to transfer to and from the battery. The second purpose is to Buck or Boost the input to maintain output voltage in tolerance, in the event that the input voltage drops or rises. There are four adjustments that set up the transfer to battery function and four adjustments that set up the Buck and Boost function. These adjustments are made through the keypad by entering the Settings Menu, then the Line Detection Menu, entering the correct password, and then selecting the parameter listed below for adjustment. The same adjustments can be made in the RS232 Menu by entering the parameter value below from the Main Menu screen and then entering the proper password.**

   Note: Certain line detection parameters are dependant on other line detection parameters. This inter-relationship is provided to minimize incorrectly setting parameters. A brief explanation:

   <u>Transfer to Battery Adjustments</u>
   Parameter 40 – Slow Detect Hi Lmt – When the input utility line exceeds this voltage setting the BBS will transfer to Battery Mode from Line Mode or Buck Mode.
   Parameter 42 – Slow Detect Hi Hyst – When the input utility line drops below this voltage setting the BBS will transfer to Line Mode or Buck Mode from Battery Mode.
   Parameter 41 – Slow Detect Low Lmt – When the input utility line drops below this voltage setting the BBS will transfer to Battery Mode from Line Mode or Boost Mode.
   Parameter 43 – Slow Detect Low Hyst – When the input utility line exceeds this voltage setting the BBS will transfer to Line Mode or Boost Mode from Battery Mode.

   The Buck and Boost adjustments require the Buck or Boost feature to be enabled.

   <u>Buck Adjustments</u>
   Parameter 46 – Slow Detect Buck High – When the input utility line exceeds this voltage setting the BBS will transfer top Buck Mode when enabled. Parameter 47 – Slow Detect Buck Low – When the input utility line drops below this voltage setting the BBS will transfer to Line Mode from Buck Mode.

   <u>Boost Adjustments</u>
   Parameter 45 – Slow Detect Boost Low – When the input utility line drops below this voltage setting the BBS will enable Boost Mode.

Parameter 44 – Slow Detect Boost High – When the input utility line exceeds this voltage setting the BBS will transfer to Line Mode from Boost Mode.

3. **Line Qualify Adjustment – This adjustment sets the time duration the line must be qualified prior to transferring to line mode. The setting can either be 3, 10, or 30 seconds. This adjustment can be made by entering the Settings Menu, then the Line Qualify Menu, and selecting the desired set point. The same adjustments can be made in the RS232 Menu by entering 34 from the Main Menu screen and then entering the desired time.**

4. **Ext Fan Control Adjustment – This adjustment allows the user to set the temperature above which the 48VDC power will be provided for the external fan. The setting is adjusted from 20ºC to 55ºC in 1ºC increments. The adjustment can be made by entering the Settings Menu, then the Ext Fan Control, and selecting the desired set point. The same adjustments can be made in the RS232 Menu by entering 39 from the Main Menu screen and then entering the desired temperature.**

5. **Battery Charging Temp Comp – This adjustment allows the user to set the temperature compensation for the battery charger. The setting is adjusted to either 2.5, 3, 4, or 5mv/ºC. This adjustment can be made by entering the Settings Menu, then Batt. Comp, and selecting the desired set point. The same adjustments can be made in the RS232 Menu by entering 38 from the Main Menu screen and then entering the desired set point.**

Section 2.3
Communication

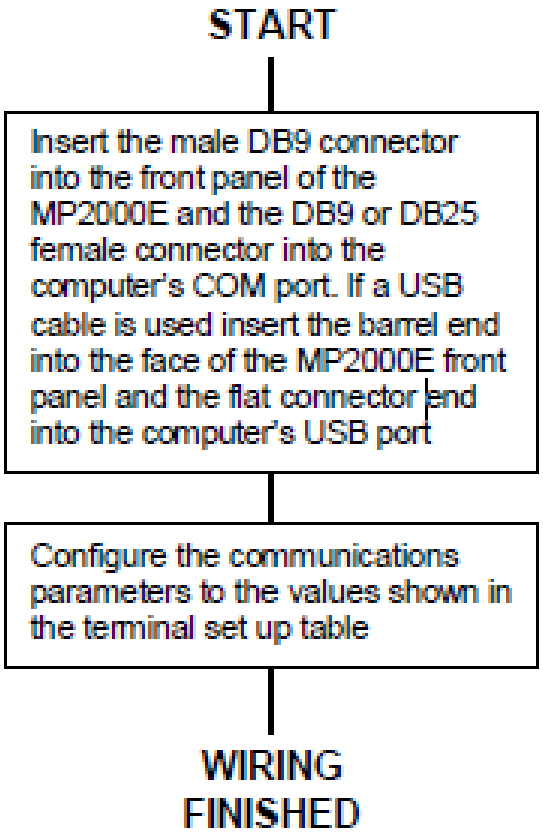
This section describes how to communicate with MP2000E using any Personal computer via RS232 USB communications:

2.3.1 RS232/USB Set-Up

Purpose: Describes how to set-up communication between any PC and the MP2000E using the RS232 or USB port. The MP Series BBS uses a standard DB-9, RS232 cable or USB cable.

When the DB-9F, (female connector) on the front panel is connected to a PC with Windows 3.1, 9X, 7, XP terminal emulation software, the MP2000E can be remotely monitored, controlled and calibrated using RS232 ASCII commands.

2.3.1.1 Wiring Set-Up Procedure



TERMINAL SETUP TABLE	
Emulation Type	VT 100 or Compatible
Duplex Mode	Half Duplex
Xon/Xoff Flow Control	NONE
RTS/CTS Flow Control	OFF
Line Wrap	ON
Screen Scroll	ON
CR Translation	CR
Back Space	N/A See Note)
Break Length	N/A
Inquiry	N/A
COMMUNICATION PARAMETERS	
Handshaking	Software Handshake
Baud Rate	2400 bps
Data Format	8 Bit Data, No Parity, 1 Stop Bit

TIP: The program ignores the Backspace and Delete keys. If a command is wrong, press Enter and retype the command.

TIP: In Windows the path is: Start/Programs/Accessories/Communication/HyperTerminal

For a tutorial on how to connect the unit with Window's HyperTerminal, (see Section 2.3.2), "HyperTerminal Set Up."

NOTE: The Ethernet card loses communication with the BBS during RS232 communications.

2.3.2 HyperTerminal Set Up

Purpose: **Describes how to set up MP2000E's RS232 / USB port using Windows HyperTerminal program**
(see Figures 29 to 36)

The following HyperTerminal setting is recommended for local or remote communication between MP2000E & PC. For this tutorial, Com 1 is used. Verify the designation of COM port, where RS232/USB cable to PC is connected such as COM1, COM2, etc. For the USB communications please contact the factory to download the device driver.

Step 1: The path is: Programs/Accessories/ Communications/HyperTerminal as shown in Figure 29.

Figure 29
Hyper Terminal Selection Screen

Step 2: Click on the HyperTerminal icon. The Connection Description screen (Figure 30) appears as shown. Enter a name and icon for your unit and click OK

Figure 30
Connection Description
Screen

2.3.2 HyperTerminal Set Up (Continued)

Step 3:

The Connect To screen (Figure 31) appears.

Select the COM port from the drop down menu as shown, that will be used

Click OK

Figure 31
Connect To Screen

Step 4: The *COM Properties* screen appears (Figure 32). Select the port settings as shown.

Step 5: Click the Advanced button

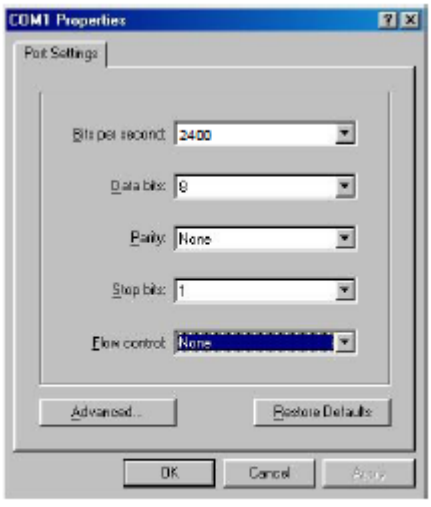


Figure 32
COM Properties

2.3.2 HyperTerminal Set Up (Continued)

Step 6: In the *Advanced Port Settings* screen (Figure 33), Select the fields as shown.

NOTE: The Use FIFO buffers only applies to computers with 56Kbs modems or faster. For slower connections, leave box unchecked.

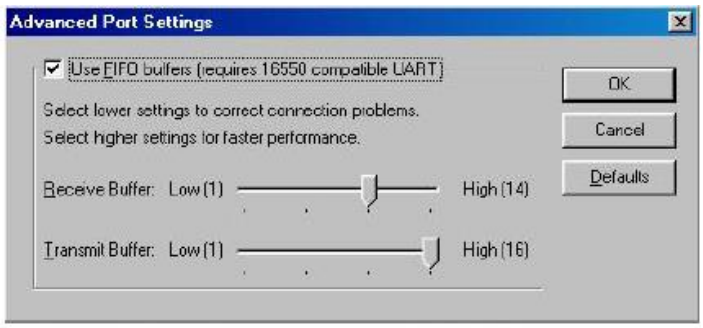


Figure 33
Advanced Port Settings Screen

Click OK

The COM Properties Screen reappears (Figure 32). Click OK.

Step 7: A blank window with the entered file name appears (Figure 34).

In the File menu, go to Properties and Click.

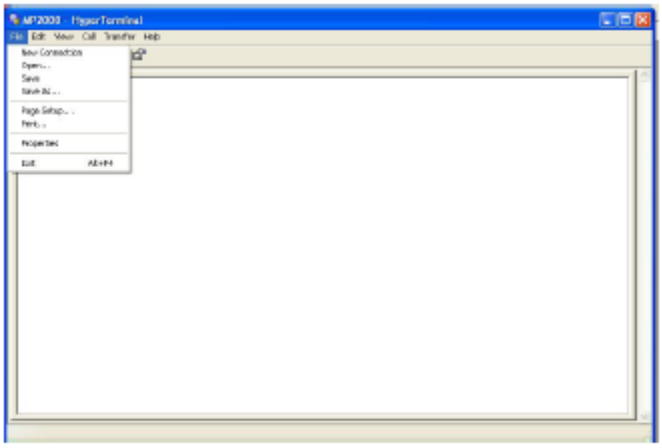


Figure 34
MP2000E HyperTerminal Screen

2.3.2 HyperTerminal Set Up (Continued)

Step 8: The *[Name of Unit]* Properties screen appears (Figure 35)

Click on the *Settings* Tab. Select the fields as shown.

Step 9: Click the ASCII Setup button

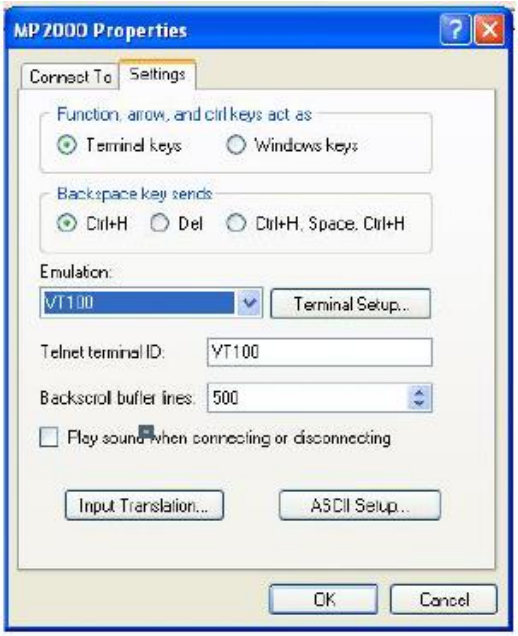


Figure 35
Properties Screen

Step 10: Select the fields in the *ASCII Setup* screen (Figure 36) as shown.

Step 11: Click OK. The *[Name of Unit]* properties window (Figure 35) reappears.

Step 12: Click OK

HyperTerminal setup is completed.

Press Enter to go to MP2000E screen (Figure 34).

Press Enter to access the unit via RS232 / USB communications.

The Main Menu (Figure 37) appears.

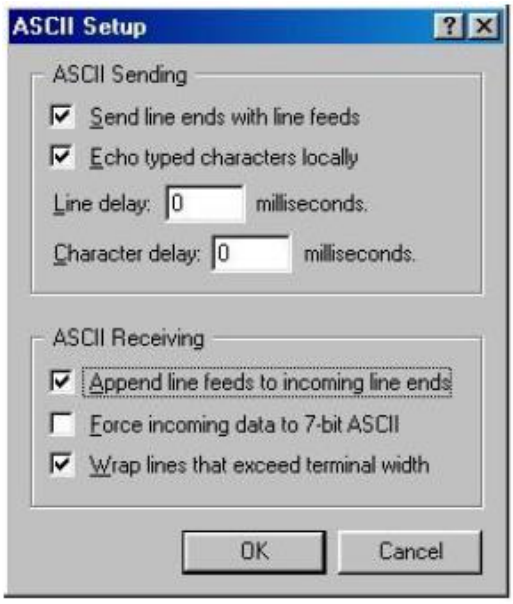


Figure 36
ASCII Setup Screen

2.3.3 Main Menu

Purpose: Describes the Main Menu (Figures 37 to 40).

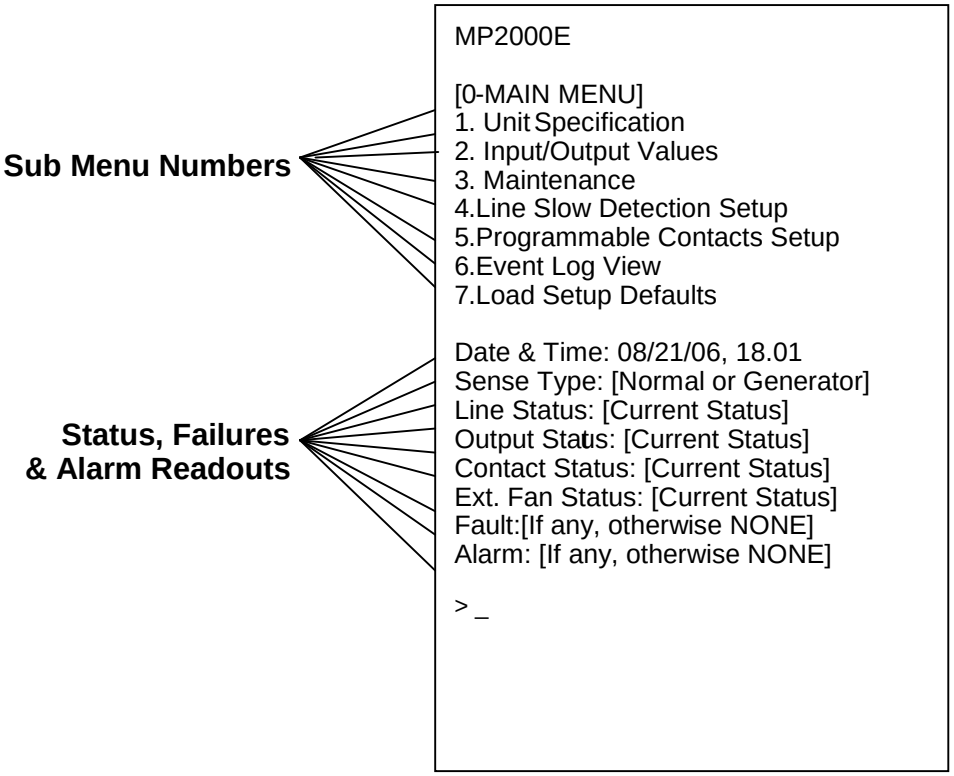
The RS232 / USB menus are hierarchical. Press ENTER to access the top-level menu (Figure 37).

Figure 41 shows the menu tree.

The main menu displays the sub menu numbers, the line status, the unit's output status and any faults or alarms that may be present.

TIP: The factory set default password 1111 is required to access and set many functions, such as in menu 34 & menu 35.

Procedure:
To access a particular sub menu, type in the sub menu number and press Enter. To update the screen, press Enter.

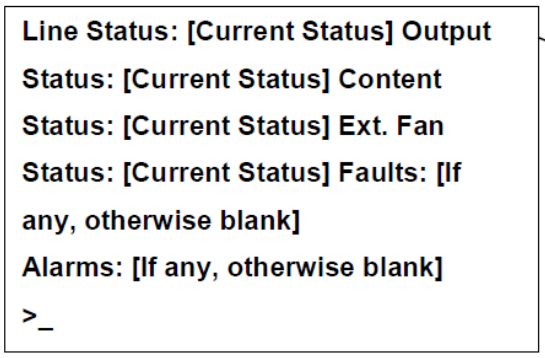


TIP: The Status, Faults, and Alarms readouts are not automatically updated. Press ENTER to obtain the up to date status.

Figure 37
Main Menu Screen

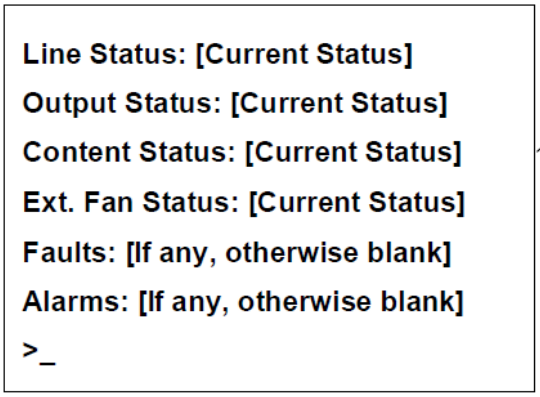
2.3.3 Main Menu

Tabulation of various items that appears under the Line Status, Output Status, Faults and Alarms are shown in Figures: 38, 39 and 40.



LINE STATUS	
Normal	Input power is normal
Boost	Input power is out of tolerance. Boost mode is activated
Buck	Input power is out of tolerance. Buck mode is activated
Blackout	Input voltage is not available
Low	Input voltage is lower than
High	Input voltage is higher than
Freq Low	Input frequency is too low (<55Hz)
Freq High	Input frequency is too high (>65Hz)

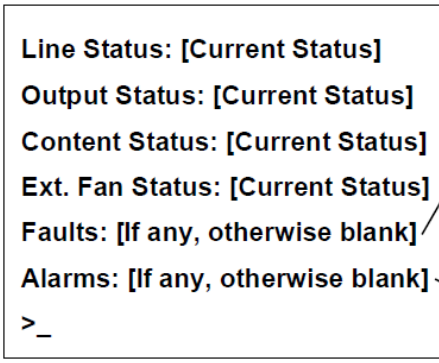
Figure 38
Line Status Displays



OUTPUT STATUS
Line mode
Inverter mode
Inverter mode, Low bat. warning
Inverter mode (testing battery)
Boost mode
Buck mode
Hot swap mode
Shutdown due to fault
Shutdown due to low battery
Shutdown due to no line

Figure 39
Output Status Display

2.3.3 Main Menu



FAULT DISPLAYS	
Short Circuit	Output Short Circuit
Vout_Hi	Output Voltage High
Vbat_Hi	Battery Voltage High
Vbat_Lo	Battery Voltage Low
Temp_Hi	Ambient Battery Temperature High or Internal Temperature High
Lout_Hi	Output Current High
EEPROM_ERROR	Error Reading EEPROM
Wout_Hi	Output Power High (Overload)
Bad_Battery	Bad Battery
ALARM DISPLAYS	
Vout_Lo	Output Voltage Low
Lout_Hi	Output Current High
Overload	Output Overload
Temp_Hi	Ambient Battery Temperature High
Temp_Lo	Ambient Battery Temperature Low
Pll	Phase Lock Loop Cannot Lock with Input
Line_Freq	AC Line Frequency High or Low
Tmp_Probe_Disconnect	Temperature Probe uninsyalled or disconnected
Batt_Brk_Off	The Battery Breaker is off or the batteries are discharged

Figure 40
Fault and Alarm Displays

2.3.4 Menu Tree & RS232 / USB Sub Menus

Purpose: Describes the RS232 / USB Menu Tree that include: Unit Specifications, Input/Output Values, Maintenance and Line Slow Detection Setup Sub Menus (Figures 41 to 46)

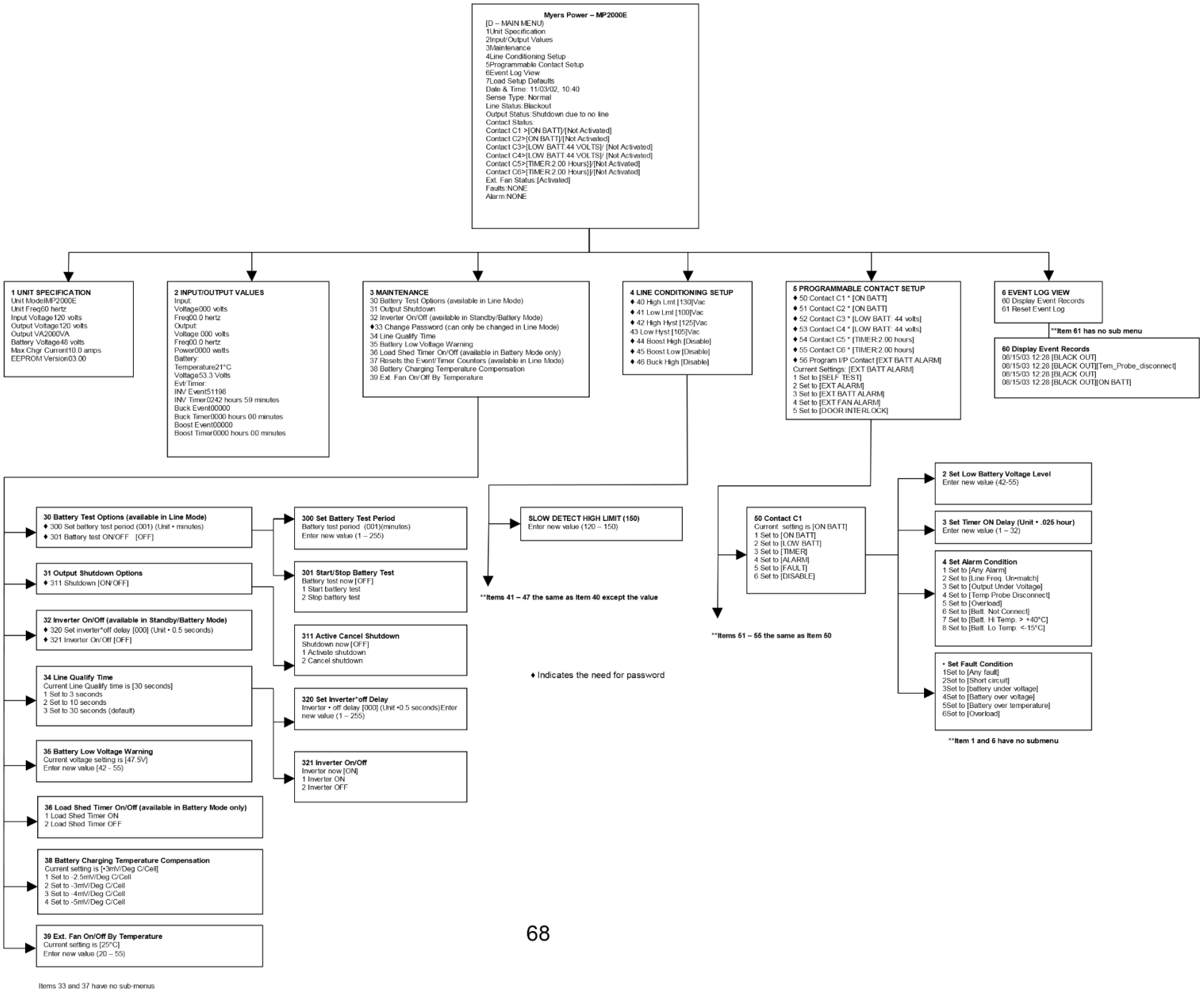
2.3.4.1 RS232 / USB Menu Tree

The complete MENU Tree is shown on the next page with all default values.

Press ENTER to go back to the Main Menu

TIP: To access any item from the Main Menu. Type in the function number and press ENTER.

2.3.4.1 RS232/USB Menu Tree



2.3.4.2 Unit Specifications, Input/Output Values

Menu 1 below (Figure 42) lists the MP2000E's specifications.

Procedure: At the main menu, type 1 and press Enter. The screen displays the Unit Specifications as shown below. To return to the main menu, press Enter.

[1-Unit Specifications]		
Unit Model	MP2000	The model name
Unit Freq	60 hertz	Nominal operating frequency
Input Voltage	120 Volts	Nominal Input voltage
Output Voltage	120 Volts	Nominal output voltage
Output VA	2000VA	The output VA capacity
Battery Voltage	48 Volts	Nominal battery voltage
Max Charge Current	10 amps	MAX charge capacity
EEPROM Version	1.2	EEPROM version of the MP2000

Figure 42
Unit Specifications Menu

2.3.4.3 Input / Output Values

Menu 2 below (Figure 43) lists the actual measurements of various input / output parameters.

Procedure: At the main menu, type 2 and press Enter. The screen displays the Unit

[2- Input/Output Value]			
INPUT	Voltage	120 Volts	The Input voltage
	Freq	60.1 Hertz	The Input frequency
OUTPUT	Voltage	120 Volts	The output voltage
	Freq	60.1 Hertz	The output frequency
	Power	0000 Watts	The output power in watts
BATTERY	Temperature	25 °C	The ambient temperature of the battery case as read via attached temperature probe
	Voltage	53.8 Volts	The battery DC Voltage
EVENT TIMER	Inv Event	00004	The numbers of Input Power Failures
	Inv Timer	0001 Hour 36 Min	Total time that the battery was discharged since last RESET
	Buck Event	00004	The number of times the BBS has entered Buck Mode
	Buck Timer	0001 Hour 36 Min	Total time that the BBS entered Buck Mode since last RESET
	Boost Event	00004	The number of times the BBS has entered Boost Mode
	Boost Timer	0001 Hour 36 Min	Total time that the BBS was in Boost Mode since last RESET

Figure 43
Input/Output Values Menu

Specifications as shown below. To return to the main menu, press Enter.

2.3.4.4 Maintenance

Menu 3 below (Figure 44) lists the various maintenance options.

Procedure: At the main menu, type 3 and press ENTER. The Maintenance Menu shown below is displayed. To return to the main menu, press ENTER.

3-Maintenance	
30 BATTERY TEST OPTIONS	The start-stop for the Battery Test/Self Test is initiated here. The test duration is user programmable in 1 minute intervals from 1 to 255 minutes. The factory default setting is 1 minute. (Tip: The time duration can be changed only when BBS is in Line Mode.)
31 OUTPUT SHUTDOWN	This allows output to be switched OFF or Shutdown. MP2000 switches to STANDBY mode when this option is activated.
32 NVERTER ON/OFF	1. During the BATTERY or STANDBY mode, this option allows the inverter to be switched OFF or turned ON after the user-programmable delay time. 2. The delay can be user-programmable in 0.5 second steps from 0 to a maximum setting of 255 steps (128 seconds). The delay is only available in BATTERY or STANDBY modes. When the unit returns to LINE mode, the delay resets back to a default of 0 seconds. Thus, during a battery discharge or ON BATTERY mode, operator can stop the inverter immediately after user programmable delay time of 0 seconds to a maximum of 300 seconds, prior to making the intersection dark.
33 CHANGE PASSWORD	This options allows for the change of password. The factory set default password is 1111. (Tip: The password can only be changed in LINE mode.)
34 LINE QUALIFY TIME	When the input power returns and it is qualified, I.e. it is within exceptable range, the transfer from BATTERY mode to LINE mode is delayed by user programmed 3/10/30 seconds herein that allows the returned utility power to settle down. The factory set default value is 30 seconds.
35 BATTERY VOLTAGE LEVEL % Capacity Remaining	The level for the LOW BATTERY ALARM is set here. The VOLTAGE level is user programmable in 0.5VDC incements from 42VDC to 55VDC. (The factory default setting is 47.5VDC or 40%.) The relationship between remaining % capacity of battery and its DC Voltage depends on the characteristics of the batteries used.
36 LOAD SHED TIMER ON/OFF (Available in Battery Mode only)	The programmable timer contacts are manually activated/deactivated ON DEMAND using this option. Certain loads/signals connected to this timer can be shed or dropped earlier to extend the backup time. This function is available only in BATTERY mode.
37 RESET THE EVENT/TIMER COUNTERS (Available in Line Mode)	Resets EVENT to 0 Resets TIMER to 0
38 BATTERY CHARGING TEMPERATURE COMPENSATION	Temperature compensated smart charger is utilized in MP2000. The rate of charging is adjusted here based on the battery case temperature. The factory default value is set at -3mv/°C. It can be configured to -2.5 with -3, -4, & -5mV/ºC.
39 EXT. FAN ON/OFF BY TEMPERATURE	Set the temperature in Celsius, above which the 48VDC power will be provided for external cooling fan. The temperature can be set in 1° increment from 20° to 55°C. The factory default temperature is set at +25°C.

Figure 44
Maintenance Menu

*Password Changing Procedure

1. **Go to Menu 33.**
2. **Type the current password (the factory set password is 1111) and press Enter.**
3. **The words "Enter New Password" appears on the screen. Type the new password (any combination of 4 digits) and press Enter.**
   NOTE: The password can ONLY be four numeric digits – NO ALPHA CHARACTERS.
4. **The words "Re-enter New Password" appear on the screen. Retype the new password and press Enter. If the wrong password is retyped, the screen displays "Error in entering data… please try again." Type the correct password and press Enter.**

If the retyped password is correct, the screen returns to the main menu.

For a tutorial on how to use the menu screens, (see Section 2.3.5).

2.3.4.5 Line Slow Detection Parameters

This option allows user to change various detection and warning levels for input AC voltages, qualified and unqualified values, Transfer & Retransfer set points for going in & out of Battery mode / Boost / Buck modes. The factory set default values concur with those specified by major DOTs (Department of Transportations). See Figure 46 for a description of each parameter.

> **CAUTION: Improperly set parameter values can cause permanent damage to the unit. Changes should only be made by Myers Emergency Power Systems trained personnel.**
> ***Contact Myers Emergency Power Systems. before making any adjustment.***

2.3.4.5.1 Parameter Change Procedure

1. Go to the Menu 4.

2. "Enter Password" appears (the factory set password is 1111), Type the password and press Enter.

If the wrong password is typed, the screen displays "Error in entering data… please try again." Type the correct password.

3. The Parameter Change Screen appears (Figure 45). Type the new value that is within the range of acceptable parameter limits and press Enter.

The screen returns to the Line Conditioning Screen. For example:

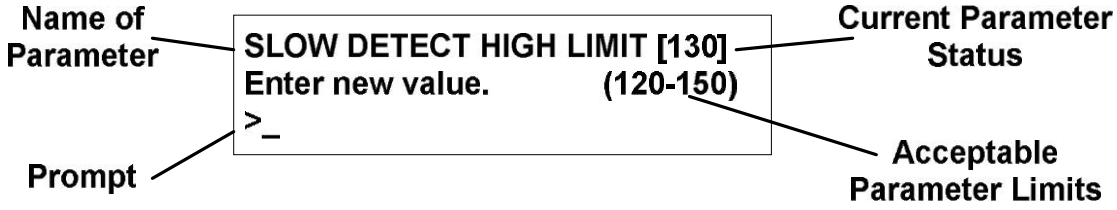


Figure 45
Parameter Change Screen
(Slow Detect High Limit Screen Shown)

For a tutorial on how to use the menu screen, see Section 2.3.5

–

2.3.4.5.2 Parameter Descriptions (All levels are user programmable)

Setpoint	Description/Remarks	Default Settings	Settings Range
40 Hi Lmt	On Battery Mode Line/Buck to Battery Detect Hi Lmt and Transfer to Battery Mode from either Buck Mode (when enabled) or Line Mode when line voltage exceeds setting.	Buck Off 130 VAC Buck On 150VAC	120~150 VAC
46 Buck Hi	Line to Buck Activate Buck Mode (when enabled) when line voltage exceeds setting, reducing the output.	130 VAC	120~144 VAC
42 Hi Hyst	Battery to Line Detect High Hyst when input voltage returns below this level; transfers back to Line Mode from Battery Mode.	Buck Off 125VAC Buck On 145 VAC	Auto Auto
47 Buck Lo	Buck to Line Detect Buck Low when input voltage returns below this level; releases the Buck Mode (when enabled) and transfers back to Line Mode.	125VAC	Auto
Normal		120 VAC	
44 Boost Hi	Boost to Line Detect Boost High when input voltage returns above this level; releases the Boost Mode (when enabled) and transfers back to the Line Mode.	107 VAC	Auto
45 Boost Lo	Line to Boost Detect Boost Low when input voltage is reduced below this level; transfers unit to Boost Mode (when enabled) increasing the output.	102 VAC	96~120 VAC
43 Lo Hyst	Battery to Line Detect Low Hyst when input voltage returns above this level; transfers unit back to Line Mode from Battery Mode.	Boost Off 105 VAC Boost On 95 VAC	Auto Auto
41 Lo Lmt	Line/Boost to Battery On Battery Mode Detect Low Lmt when input voltage is reduced below this level; transfers unit to Battery Mode from either Boost Mode (when enabled) or Line Mode.	Boost Off 100 VAC Boost On 90VAC	90~120 VAC
48 Hi GAP	User settable GAP (3-7 VAC) between selectable values of High Hyst and High Limit	005 VAC	3~7 VAC
49 Lo GAP	User settable GAP (3-7 VAC) between selectable values of Low Hyst and Low Limit	005 VAC	3~7 VAC

2.3.5 Menu Tutorial

Purpose: shows how to use the menus (Figures 47 to 50)

This tutorial shows how to change the Battery Test Options. The other menus function in the same manner.

1. At the main menu (Figure 37), type 3 and press Enter.

The Maintenance Menu 3 appears as below (Figure 47).

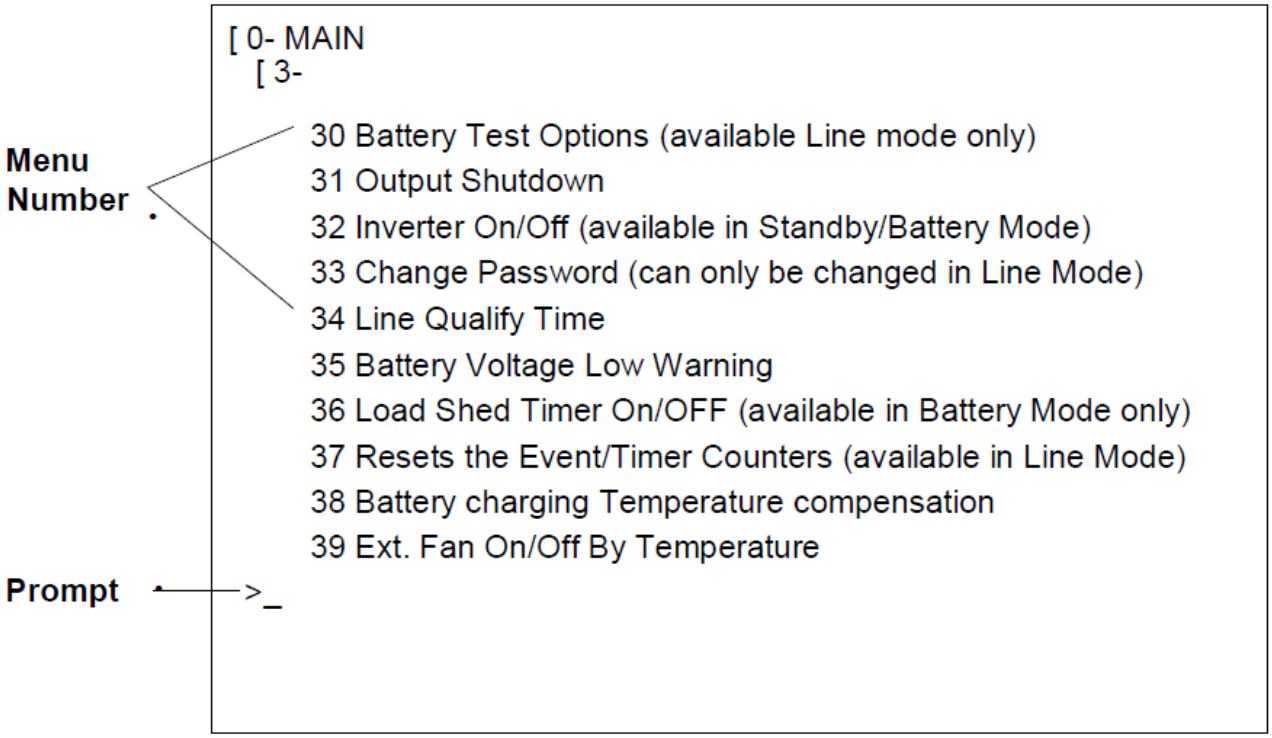


Figure 47
Maintenance Menu Screen

To the left of each maintenance option is a Menu number. Typing 30 and pressing Enter calls up the Battery Test Options screen (Figure 48).

2. Numbers or words inside square brackets show the present status value of that menu item.

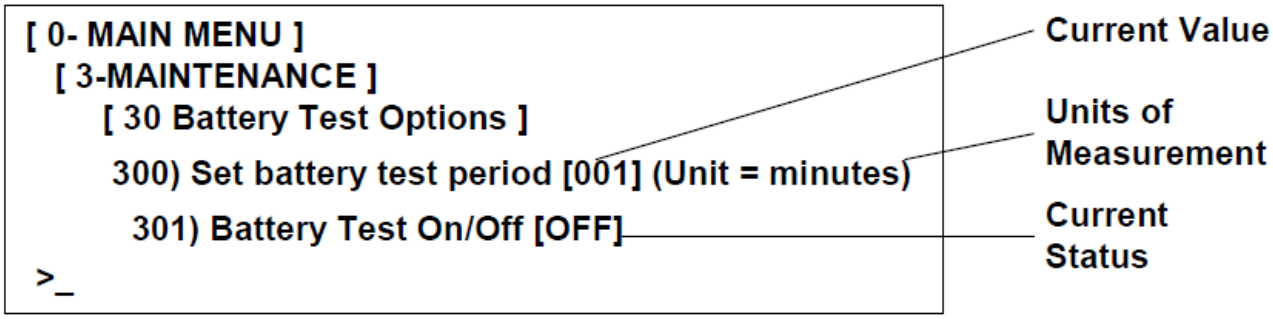


Figure 48

To calculate the Test Period: Test

Period = Current Value X Units
Example: Test Period = 001x 1 Minute = 1 Minute

3. To change the battery test period, type 300 and press Enter.

The words "Enter Password" appear on the screen. Type the password (the factory set password is 1111) and press Enter. If the wrong password is typed, the screen displays "Error in entering data… please try again." Type the correct password and press Enter.

The Set Battery Test Period screen appears as below (Figure 49).

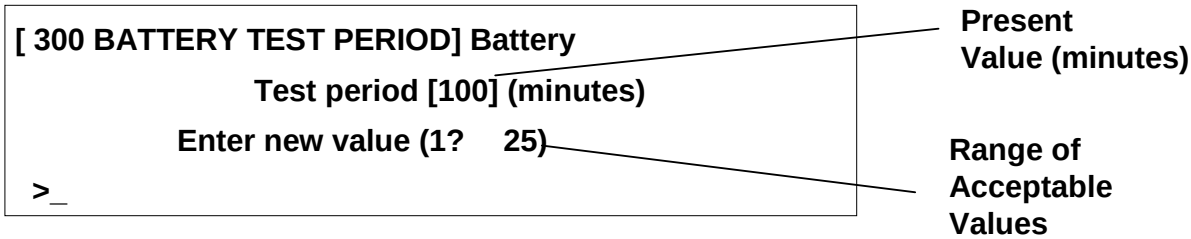


Figure 49
Set Battery Test Period Screen

Type in the new value within the acceptable range and press Enter to change the test period and go back to the maintenance menu screen.

4. To change the Battery Test On/Off status, type 301 and press Enter.

The words "Enter Password" appear on the screen. Type the password and press Enter.

The battery Test Screen appears (Figure 50).

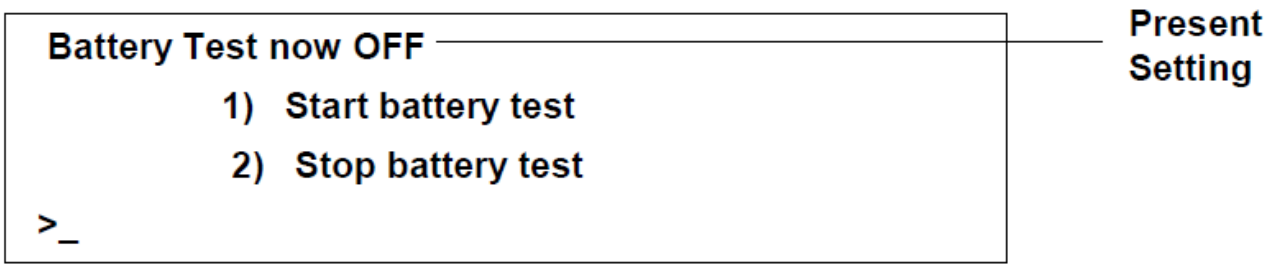


Figure 50
Battery Test Screen

Type 1 to start the battery test, or 2 to stop the battery test, and press Enter. This will change the battery test status and return you to the maintenance menu screen.

Note: After "2) Stop battery test" there will be the (default 30 seconds) line qualify time.

2.3.6 Ethernet Modem

MP2000E models with serial numbers that begin with MC (e.g. MC18E16553) have either an embedded HTML Ethernet card or an Ethernet-to-serial adapter card (or no Ethernet card).
The HTML Ethernet card, shown in Figure 6-38, interfaces with a web browser.

Yellow LED flashing indicates the card is booting up
Yellow LED steady indicates boot up complete
Red LED flashing indicates serial communication loss between the card and the MP2000E
(Any RS232/USB connection to the MP2000E front panel directs serial communication
from the HTML card to the MP2000E front panel RS232/USB connection. Recovery is automatic once the RS232/USB connection is undone.)
Red LED steady indicates the HTML card is in alarm
Green LED steady normal operation.

The Ethernet RJ45 Connector features a green LED auto-sense 10 / 100 Mbps Indicator and yellow LED link indicator and uses CAT5E cabling.

Figure 6-38: NetAgent Embedded HTML Ethernet Card Front Panel

The Ethernet-to-serial-adapter, shown in Figure 6-39, interfaces with a terminal emulator
(such as Hyperterminal) and with Myers MEMS software.

Figure 6-39: Ethernet-to-Serial Adapter Card Front Panel.

The Ethernet RJ45 Connector features a green LED auto-sense 10 / 100 Mbps Indicator and yellow LED link indicator and uses CAT5E cabling.
Interior views of each card type are shown in Figure 6-40. These are as follows:

- **Left: NetAgent HTML Ethernet Card. This card is used with MP2000E models with serial numbers that begin with MC. The coin battery maintains the Ethernet card clock.**

- **Center: Serial-to-Ethernet Adapter Card (long version). This card is used with MP2000E models with serial numbers that begin with MC.**
- **Right: Serial-to-Ethernet Adapter Card (short version). This card is used with MP2000E models with serial numbers that begin with MD.**

Figure 6-40: HTML Ethernet and Ethernet-to-Serial Adapter Card Interior Views

2.3.6.1 NetAgent Ethernet Card Default IP / Default Logon

The procedures described in this section restore the factory default Ethernet card settings.

Figure 6-41: NetAgent HTML Ethernet Card Front Panel

HTML Ethernet Card

Default IP:	**192.168.1.51**	**The MP2000E LCD Status menu displays the IP address, Subnet Mask address, and Gateway address of the HTML Card**
Subnet Mask:	**255.255.255.0**	
Default Login:	**admin**	
Default Password:	**user**	

The default login & password is the same for a web browser and for Telnet.

NOTE THESE SETTINGS ARE FOR THE NETAGENT HTML CARD.
FOR THE ETHERNET-TO-SERIAL ADAPTER CARD SEE THAT SECTION ELSEWHERE IN THIS MANUAL

2.3.6.2 Making the IPV4 Ethernet Connection

For the initial connection, use the Netility.exe program (on the accompanying DVD) OR a direct PC (web browser) to Ethernet card connection using an RJ45 cross-over cable.

2.3.6.3 Using a Direct PC to Ethernet Card Connection with RJ45 Cross Over Cable

IMPORTANT NOTE…FOR A DIRECT (PC TO ETHERNET CARD RJ45 CROSS OVER CABLE
CONNECTION) YOU MUST BE LOGGED INTO THE PC UNDER THE PC'S NAME, NOT e.g. LOGGED IN UNDER A NETWORK NAME…otherwise a web browser will not find
the HTML Ethernet card.
YOU MUST HAVE ADMINISTRATOR'S ACCESS TO THE PC.

- **Set the PC for a fixed IP address 192.168.1.xxx (xxx = 0 to 255 except 51) (UPS Ethernet card at default 192.168.1.51)**
- **Set the PC's subnet mask for 255.255.255.0.**
- **Go to the PC's Network Connections to access the LAN configuration screens as shown in Figure 6-42.**
- **The Internet Protocol Connection Authentication Box shown in Figure 6-43 will appear.**

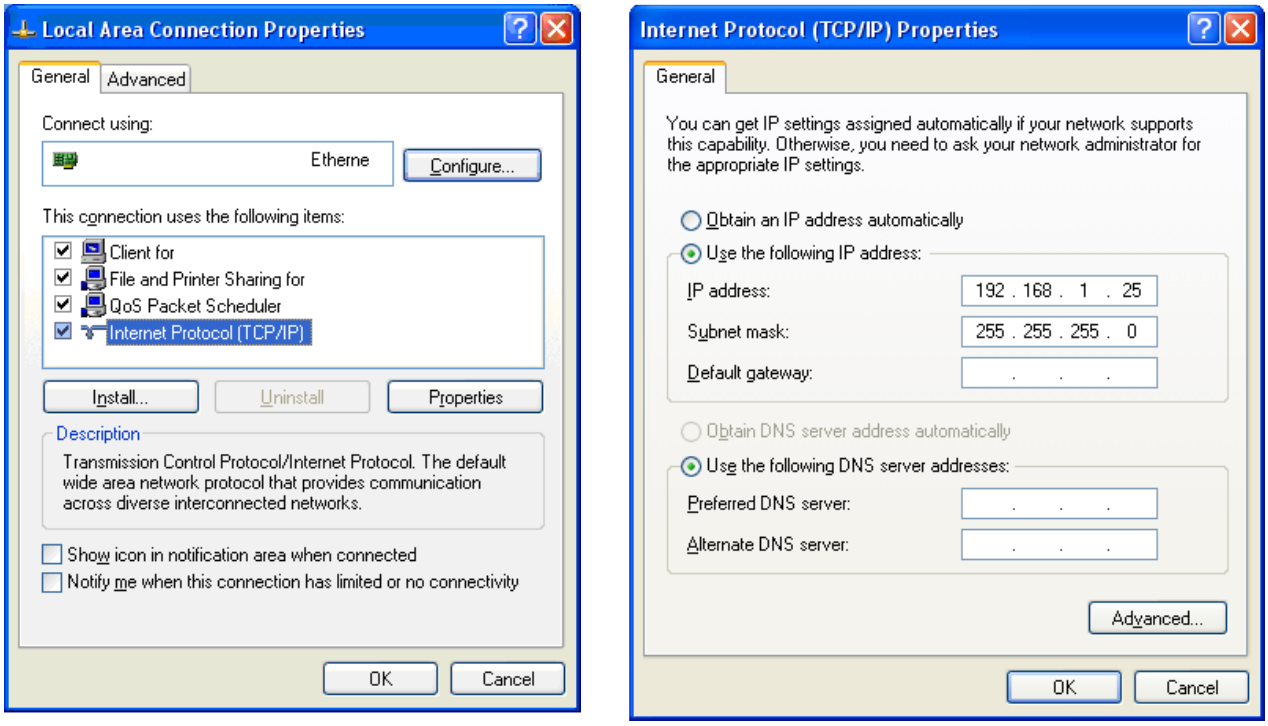


Figure 6-42: LAN Configuration Screens

⚠	**Note: You must have administrator's access to the PC to access these screens.** **Some older PC operating systems require reboot for the changes to take effect. You can verify by running command line "ipconfig"…C:\>ipconfig.**

Enter the Ethernet card default IP address 192.168.1.51 in the web browser URL.

- **In the Authentication Box, enter the following credentials using all lowercase letters:**
  - **User Name: admin**
  - **Password: user**

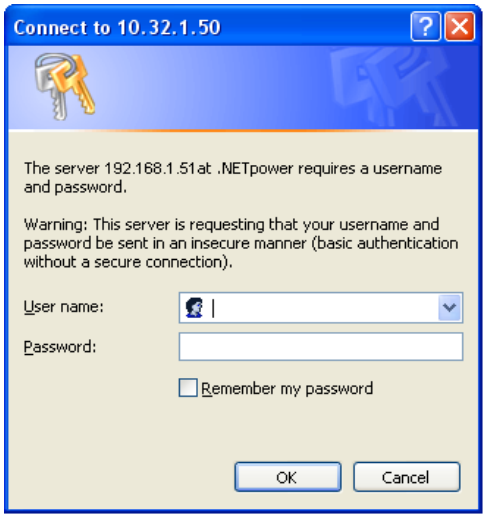


Figure 6-43: Internet Protocol Connection Authentication Box

The NetAgent Interface screen shown in Figure 6-44 will appear.

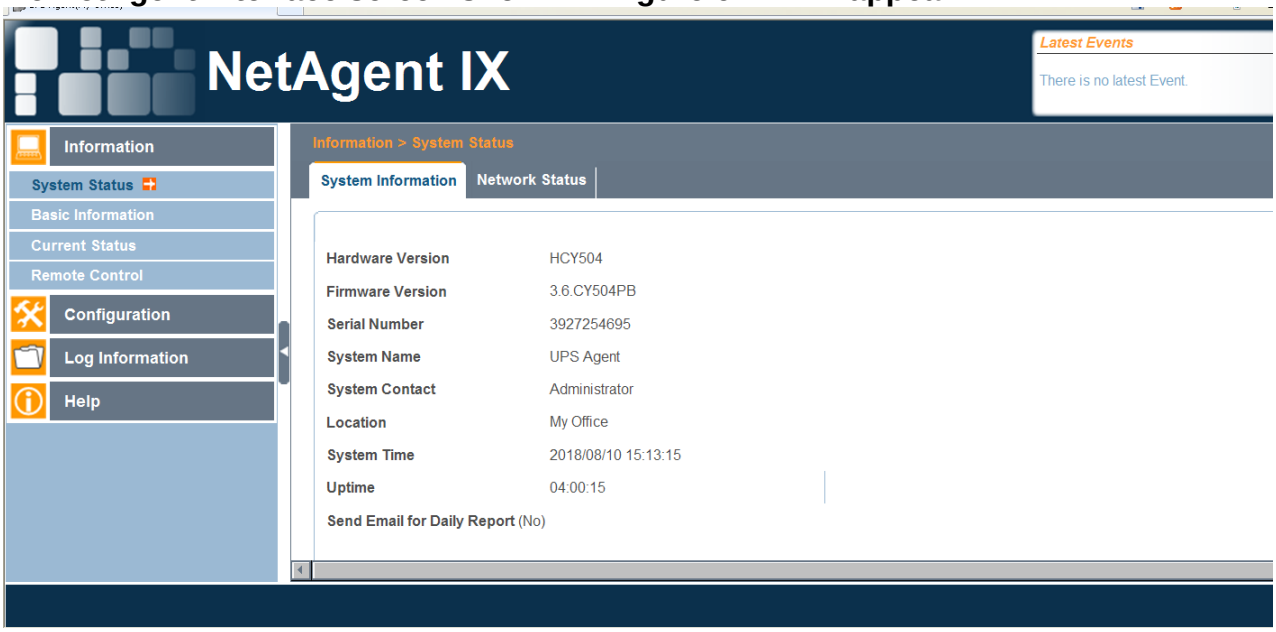


Figure 6-44: NetAgent Initial Browser Screen

2.3.6.4 Making the Ethernet Connection Using Netility.exe

(from the accompanying DVD)

Using Netility.exe finds the HTML Ethernet card on a network by the card's MAC address.

Upon running, Netility immediately searches for any NetAgent cards on the network.

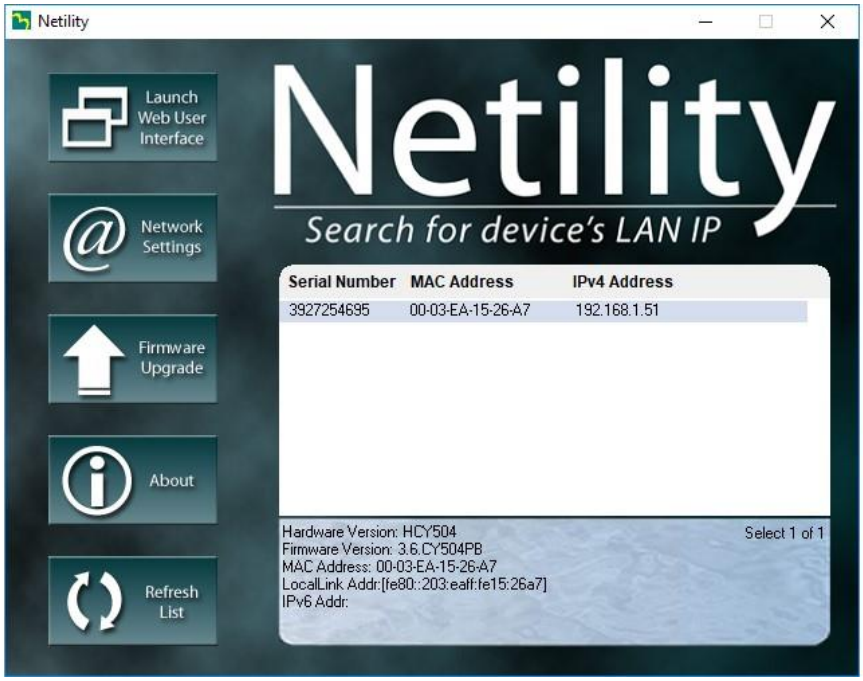


Figure 6-45: Netility Initial Screen

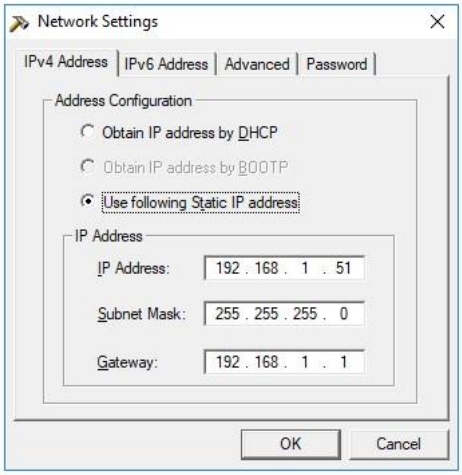


Figure 6-46: Netility Network Settings Box (Default Settings Shown Here)

These IPV4 settings also appear in the MP2000E LCD Status menu.

Enter a static IP address or choose DHCP.

Open a web browser and enter the Ethernet card IP address in the web browser URL. Figure 6-47 will appear.

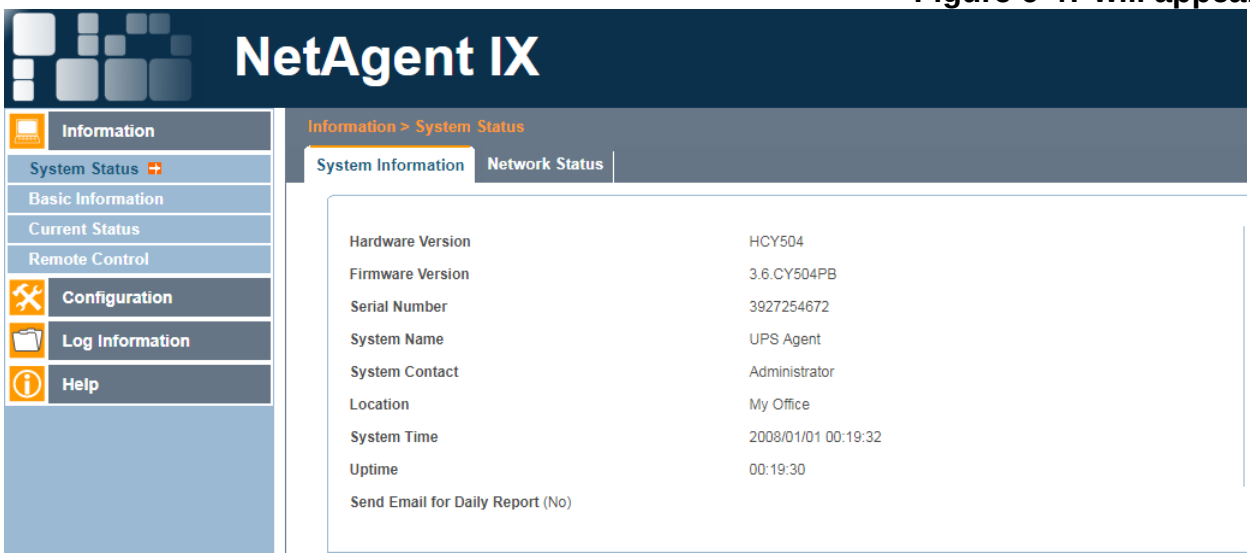


Figure 6-47: NetAgent Initial Browser Screen

2.3.6.5 Making Changes to Settings on Information Tab

Upon opening, NetAgent IX will display the Information tab. The Information tab allows users to view the following sets of information:

- **System Status**
- **Basic Information**
- **Current Status**
- **Remote Control**

Use the smaller tabs between the larger tabs to navigate between tabs.

2.3.6.6 System Status

Upon opening, the Information tab will display the first item in the middle menu, System Status, as shown in Figure 6-47.

The System Status tab then also has two smaller tabs to the right. The first tab is System Information (Fig. 6-47). The second tab is Network Status (Fig. 6-48).

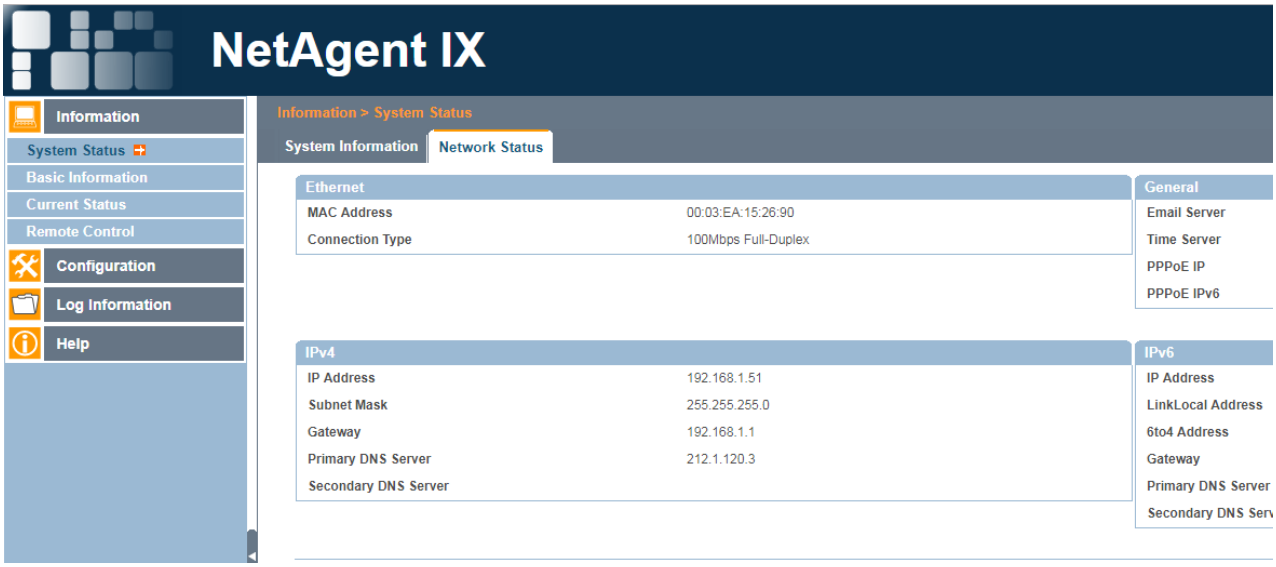


Figure 6-48: System Status / Network Status on Information Tab

2.3.6.7 Basic Information

The Basic Information tab, shown in Figure 6-49, indicates the VAC input level at which the UPS transfers to battery backup. The values in these fields are rated indications rather than measured readings. Explanations of each field are as follows:

- **Low Voltage Transfer is (default) 100VAC with AVR Boost feature OFF.**
- **Low Voltage Transfer is (default) 90VAC with AVR Boost feature ON.**
- **High Voltage Transfer is (default)130VAC with AVR Buck feature OFF.**
- **High Voltage Transfer is (default) 150VAC with AVR Buck feature ON.**

See Configuration – Transfer Point for all AVR (Automatic Voltage Regulation) settings.

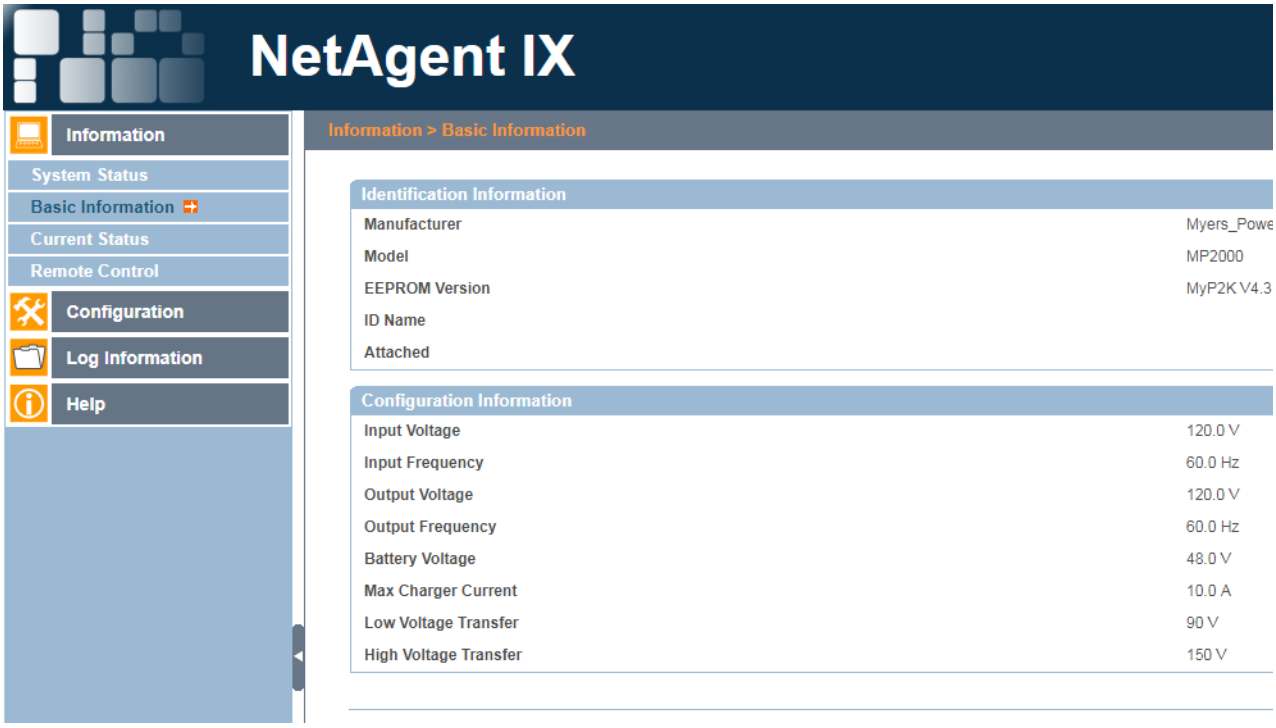


Figure 6-49: Basic Information on Information Tab

2.3.6.8 Current Status

As shown in Figure 6-50, the Current Status screen displays actual input, output, and battery voltages, temperature, summary contact states, and timers for various events. These can all be viewed by mousing over the upper tabs. Current Status refreshes every 10 seconds (unless changed at bottom of the screen). Temperature UPS is measured from the battery temperature probe. The Summary and Contact Status tabs, shown in Figure 6-50, displays the status of inputs, outputs, faults, alarms, contacts, and other components. Additional detail on each field is as follows:

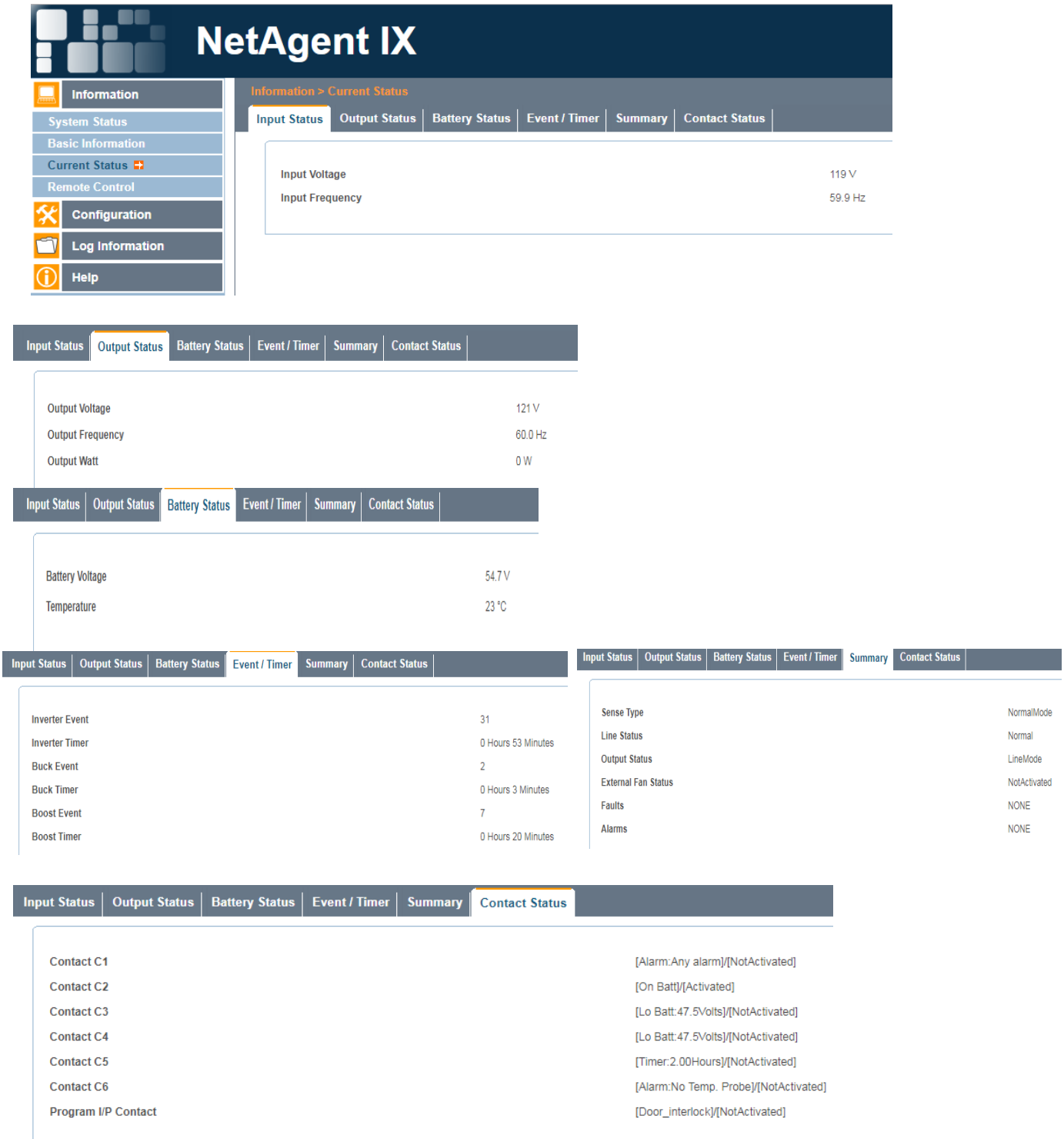


Figure 6-50: Current Status on Information Tab

- **Sense Type can be Normal (commercial power) or Generator. The Sense Type is set in the MP2000E front panel LCD Settings menu.**
- **The External Fan turns ON/OFF according to the battery temperature reading. The default setting is 25°C.**
- **Contact C1 thru C6 are the isolated 1-form C contact closures on the MP2000E front panel.**

- **Program I/P Contact is the programmable input contact closure on the MP2000E front panel.**
- **Contact C1 thru C6 and the Program I/P can be configured in Control – Contacts; the RS232 Hyperterminal menus and in the MP2000E front panel LCD Settings menu.**

2.3.6.9 Remote Control

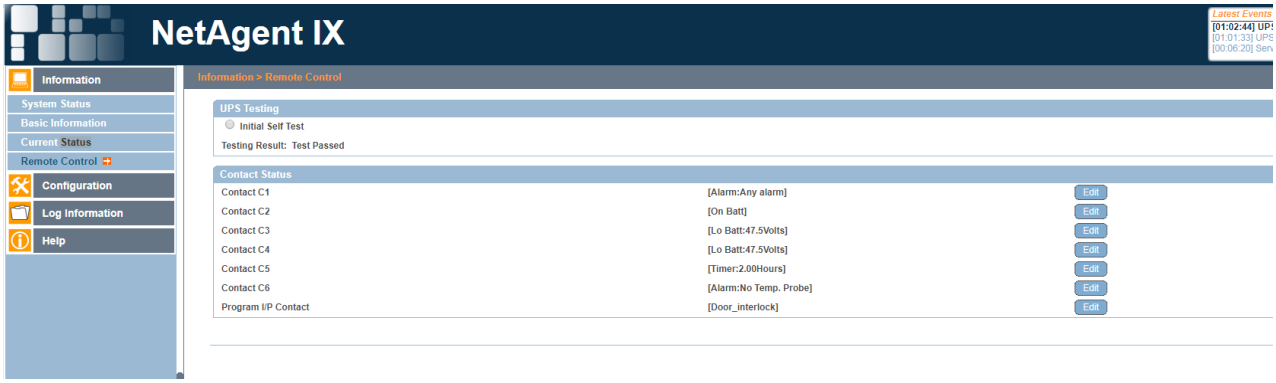


Figure 6-51: Remote Control on Information Tab

The Remote Control tab is where you can initialize a Self Test or configure the Contacts. To conduct a Self Test, click the "Initial Self Test" check box in the UPS Testing box, then click "Apply" button in the lower right. After the test is completed, the results (passed or failed) will display in the field below the button. (Use Figure 6-51&52 for reference)

Figure 6-52: UPS Testing & "Apply" Button

Self Test runs for the period set in
Configuration – UPS Configuration – Maintenance – Battery Test Options

2.3.6.10 Contacts

The MP2000E front panel terminal block features six 1 Form-C isolated contact closures
as well as
a Program I/P (Input) Contact Closure. These are edited and programmed through the Contacts screen, which is shown in Figure 6-51.

The Contact Status screen lists each of the contacts and their assigned functions. To edit any of the Form C contact functions, click the "Edit" button to the right of the function description. Doing so will cause the Contact Control box to appear in a pop-up window. This is illustrated in Figure 6-53.

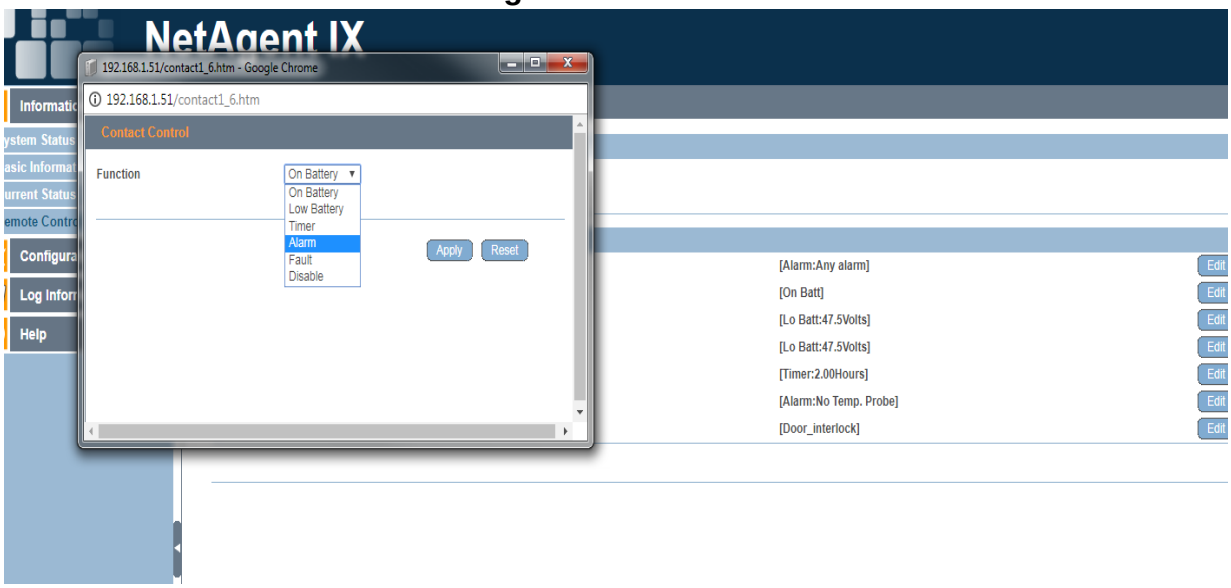


Figure 6-53: Edit Form C Contacts Function

As shown in Figure 6-53, there are six assignable functions for these contacts. Functions may be selected through the drop down menu.
Similarly, the parameters associated with each function can be selected through a drop down menu associated with this field. This is illustrated in Figure 6-54.

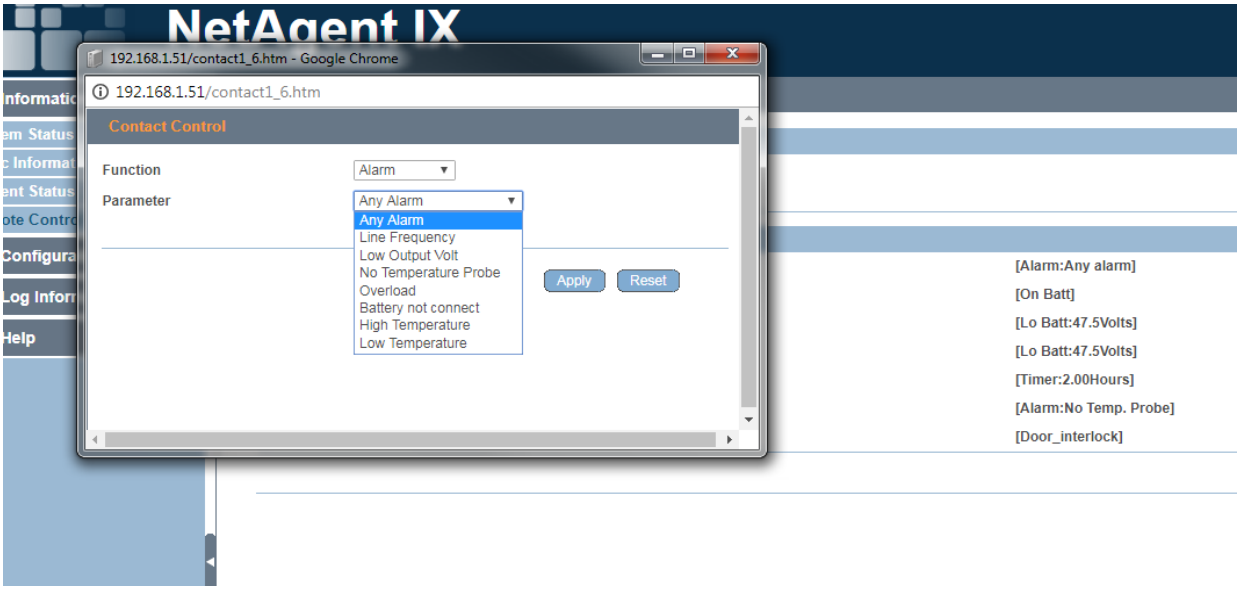


Figure 6-54: Edit Form C Contacts Parameters

To program the I/P Contact, click the edit button next to the function displayed for it. This will cause the Contact Control box for this contact to open, as shown in Figure 6-55. To choose a function for the contact, make a selection from the drop down menu.

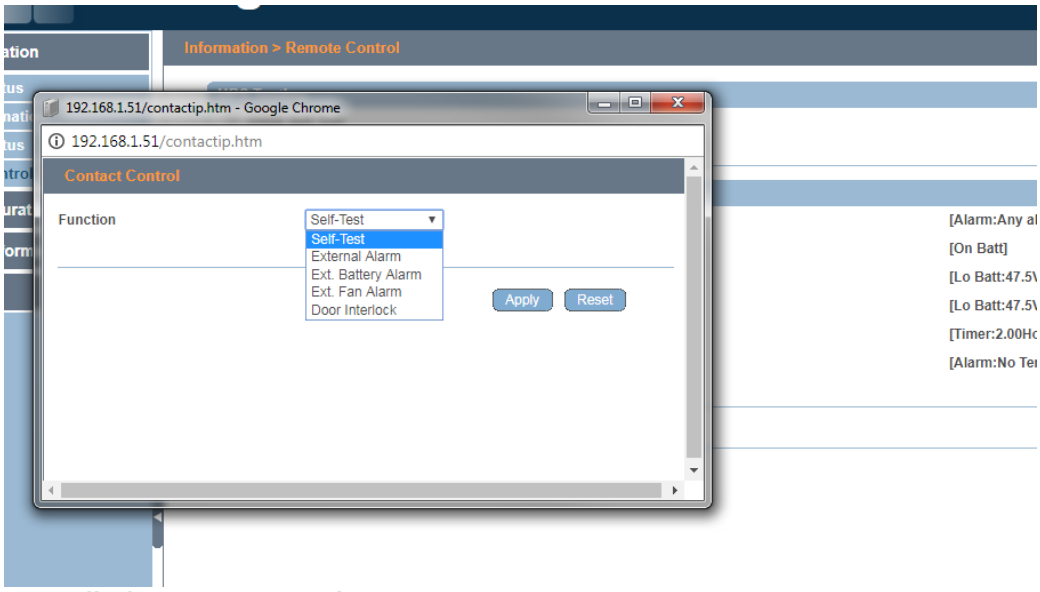


Figure 6-55: Edit I/P Contact Function

2.3.6.11 Making Changes to Settings on Configuration Tab

Click on the Configuration tab to open it and access its settings. The Configuration tab allows users to change the following sets of information:

- **UPS Configuration**
- **Network**
- **SNMP**
- **Email**
- **SMS**
- **Web/Telnet/ FTP**
- **System Time**
- **Language**

To navigate between items, use the tabs on the left.

2.3.6.12 UPS Configuration

Upon opening the Configuration tab the first item in the left menu, UPS Configuration, is automatically displayed, as shown in Figure 6-56. The MP2000E is designed for 120VAC, 60Hz.

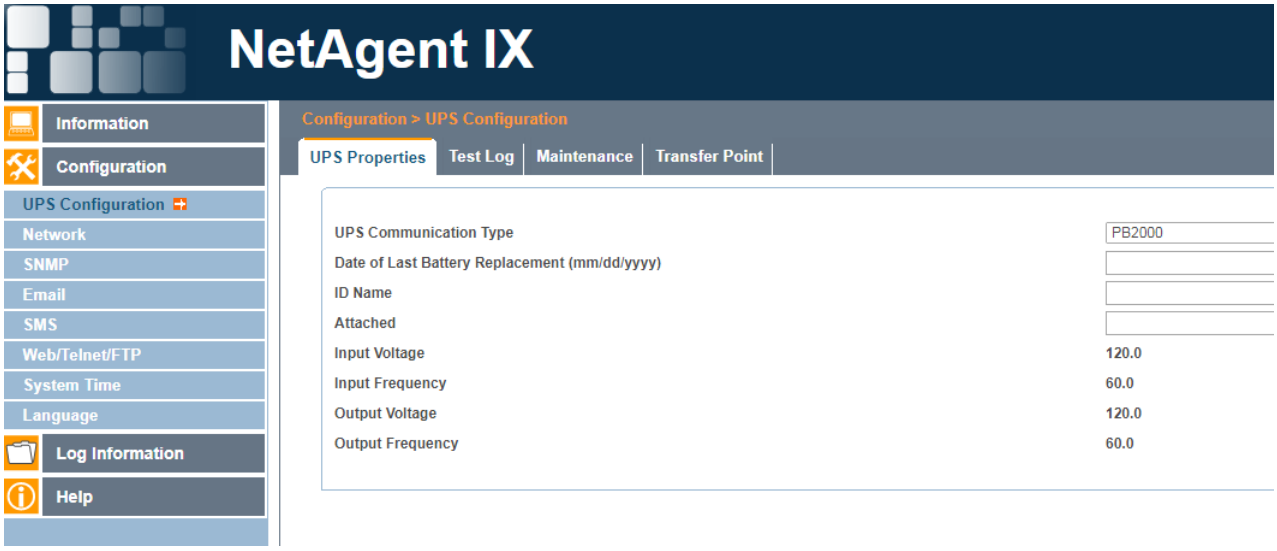


Figure 6-56: UPS Configuration on Configuration Tab

UPS Configuration's upper tabs include Properties, Test Log, Maintenance, and Transfer Points.

2.3.6.13 Test Log

The Test Log tab is used to set the time intervals at which the UPS logs data.

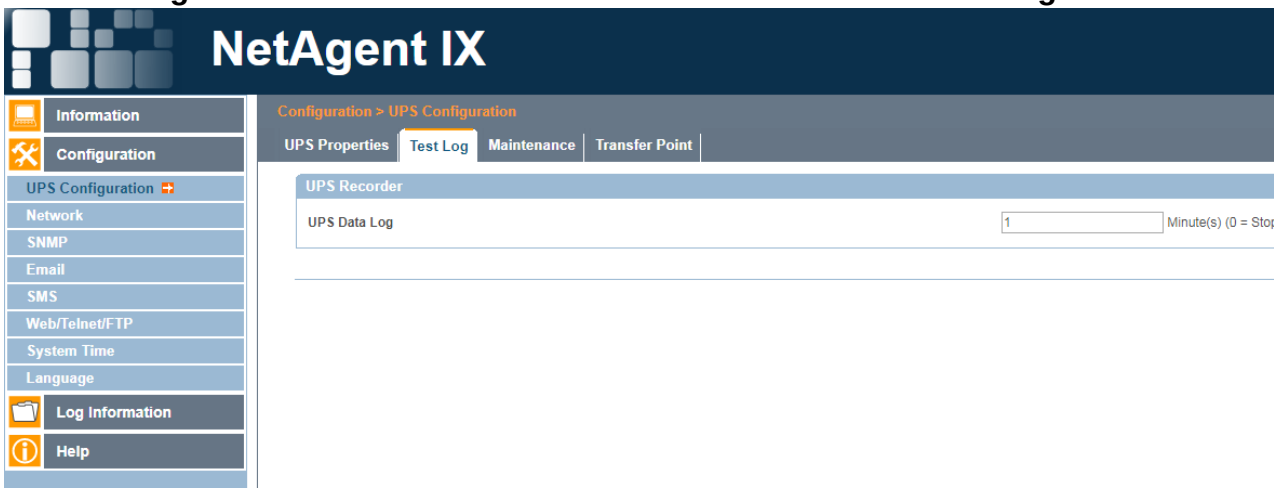


Figure 6-57: UPS Configuration/Test Log on Configuration Tab

2.3.6.14 Maintenance Configuration

The Maintenance Configuration displays and allows users to modify options related to maintenance. Figure 6-58 details the fields in the form.

FIELD	DETAILS
Line Qualify Options – Line Qualify	This amount of time (in seconds) the MP2000E will remain in standby after VAC (utility) power input while the line is qualified for On Line operation. The default is 30 seconds. Other options are 3 seconds and 10 seconds.
Battery Charging Temperature Compensation	Battery temperature compensation (BTC) is a lead-acid battery charge maintenance function. It is the amount of battery charge voltage rise or fall caused by the battery temperature as determined by the battery temperature probe. Warmer temperatures lower the battery charge voltage and cooler temperatures raise the battery charge voltage. The default value is -3.0 mV / degree Celsius / per (battery) cell. Other options are -2.5mV, -4.0mV, or -5.0mV. Obtain the BTC setting from the battery OEM specification.
Battery Low Voltage Warning	The point at which the system issues a low voltage warning. The default is 47.5 VDC. Values can be selected from the drop-down menu. Note this setting is separate from the Low Battery Contact Closure settings

Figure 6-58: Maintenance Form Fields

FIELD	DETAILS
External Fan On / Off By Temperature	The temperature at which 48VDC (battery voltage) is put to the External Fan connector on the MP2000E front panel. This is typically an exhaust fan to draw air out of an enclosure housing the MP2000E and other equipment. The temperature is determined by a reading taken from the battery temperature probe. The default setting for this function is 25ºC.
Battery Test Options	The number of minutes to test run on batteries.
Inverter On / Off	This function allows the inverter output from the batteries with no VAC input to the UPS. Note the VAC breaker must be ON to get the inverter VAC output. The VAC breaker turns ON / OFF both the VAC input and VAC output simultaneously.
Reset the Event / Timer Counters	Returns the event counters and the timers to zero.
Change Password	Allows the users to reset the MP2000E front panel interface password from the factory default of 1111. Passwords may contain numeric characters only.

Figure 6-58: Maintenance Form Fields (continued)

Figure 6-59 shows the Maintenance Form.

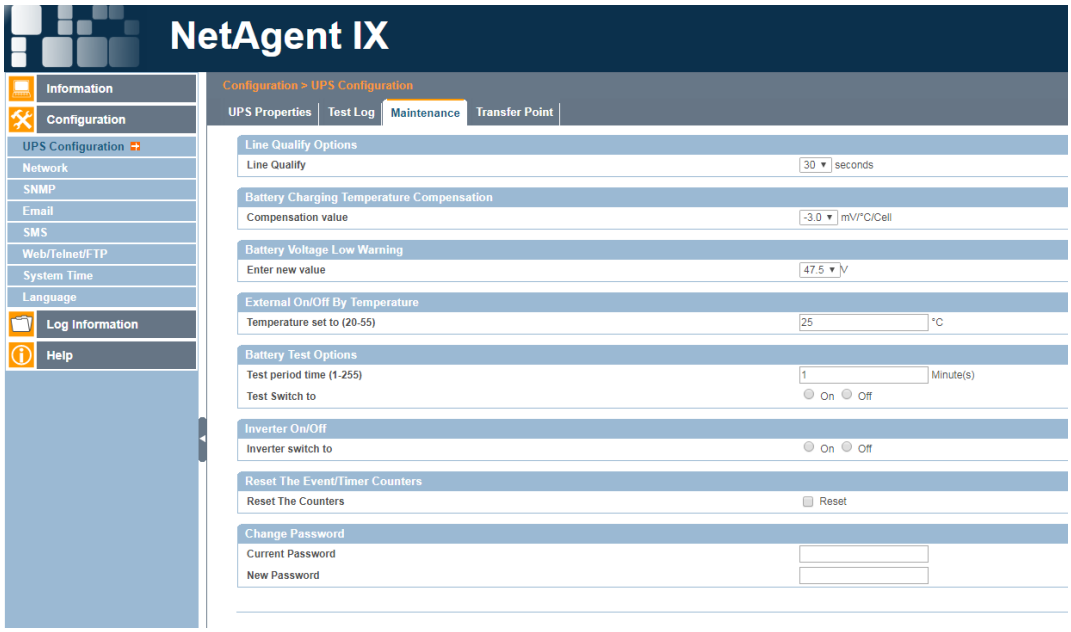


Figure 6-59: Maintenance Form

2.3.6.15 Automatic Voltage Regulation (AVR) Transfer Point Configuration

AVR is an automatic autotransformer function that steps up (Boost mode operation) UPS output VAC when the VAC input is low and steps down (Buck mode operation) UPS output VAC when the VAC input is high. During AVR, the MP2000E front panel PTS output is constantly energized so that VAC output comes from the UPS rather

than bypassing VAC power through the power transfer switch (PTS). Figures 6-60 and 6-61 show the AVR Off Settings and AVR On Settings screens.

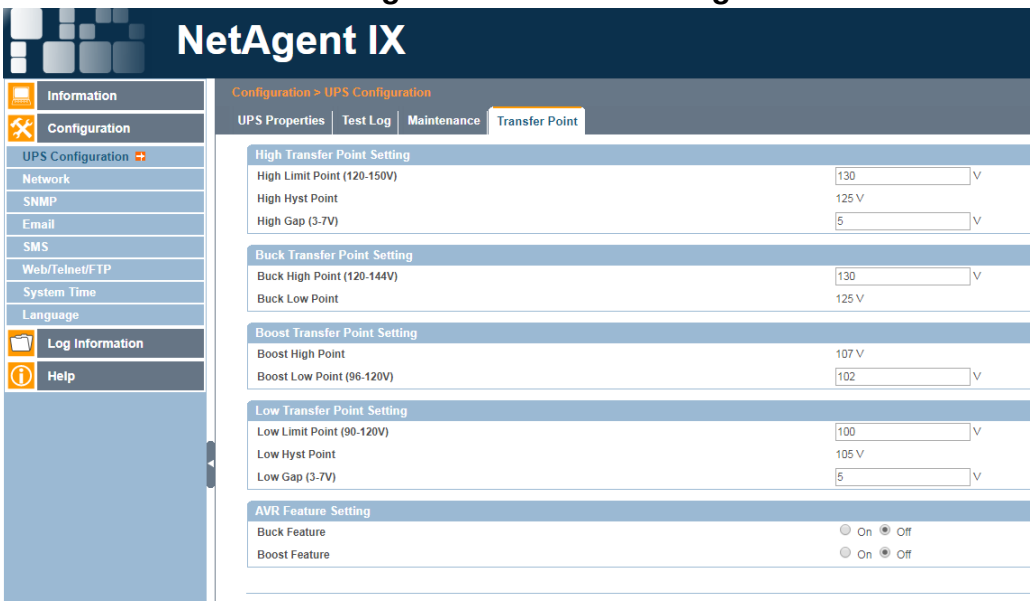


Figure 6-60: AVR Off Settings Form

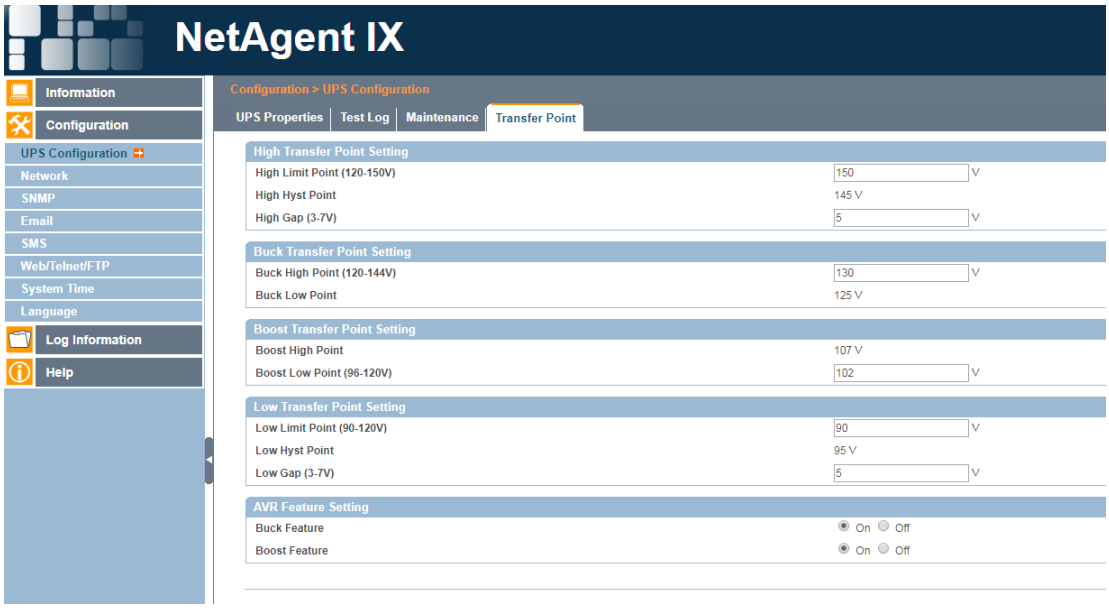


Figure 6-61: AVR On Settings Form

Figure 6-62 describes the fields in the forms.

FIELD	DETAILS
High Voltage Transfer Point Setting	This is the VAC input voltage level at which the UPS switches from On Line to On Battery.
High Limit Point	VAC voltage setting at which the UPS switches from On Line to On Battery.
High Hyst Point	High Hysteresis Point — This is the VAC voltage level down to which the VAC input must lower (after being above High Limit Point) before qualifying for On Line operation.

High Gap	**This is a hysteresis of the High Limit Point and the High Hyst Point.**
Buck Transfer Point Setting	**With AVR Off these settings have no effect.**
Buck High Point	**VAC voltage setting at which the UPS switches from On Line to Buck mode operation (step down voltage).**
Buck Low Point	**This is the VAC voltage level down to which the VAC input must lower (after being above Buck High Point) before qualifying for On Line operation.**
Boost Transfer Point Setting	**With AVR Off these settings have no effect.**
Boost High Point	**VAC voltage setting at which the MP2000E switches from On Line to Boost mode operation (step up voltage).**
Boost Low Point	**This is the VAC voltage level down to which the VAC input must raise (after being below Boost Low Point) before qualifying for On Line operation.**
Low Voltage Transfer Point Setting	**This is the VAC input voltage level at which the MP2000E switches from On Line to On Battery.**
Low Limit Point	**VAC voltage setting at which the MP2000E switches from On Line to On Battery.**
Low Hyst Point	**Low Hysteresis Point – This is the VAC voltage level up to which the VAC input must rise (after being below Low Limit Point) before qualifying for On Line operation.**
Low Gap	**This is a hysteresis of the Low Limit Point and the Low Hyst Point.**
AVR Feature Setting	**Turn On or Off boost and / or buck operation.**

Figure 6-62: AVR Transfer Point Form Fields

2.6.3.16 Network

In the Network tab under the larger Configuration tab is where you can edit and configure:

- **IPv4**
- **IPv6**
- **Ethernet**
- **Dynamic DNS**
- **PPPoE**

Fields associated with each of these settings are described in Figure 6-63.

FIELD	DETAILS
IPV4 Method	To have a Dynamic Host Configuration Protocol (DHCP) server assign the IP address: • Click the drop down button next to "Obtain an IP address" • Select "using DHCP • Reboot the HTML Ethernet card to get the DHCP IP address assignment • Use the Netility to find the card by its MAC address Doing so will populate the following fields: • IP Address • Subnet Mask • Default Gateway
Manual Method	Click this drop-down button to set a fixed IP address. Then, enter values into the following fields: • IP Address • Subnet Mask • Default Gateway
MAC Address	The Media Access Control (MAC) address is the unique number on each HTML Ethernet card. The numbering is hexadecimal.
DNS Server 1 IP DNS Server 2 IP	Enter the IP address(es) of up to three Domain Name Servers

Figure 6-63: System Network Screen Fields

Figure 6-64 shows the System Network Screen.

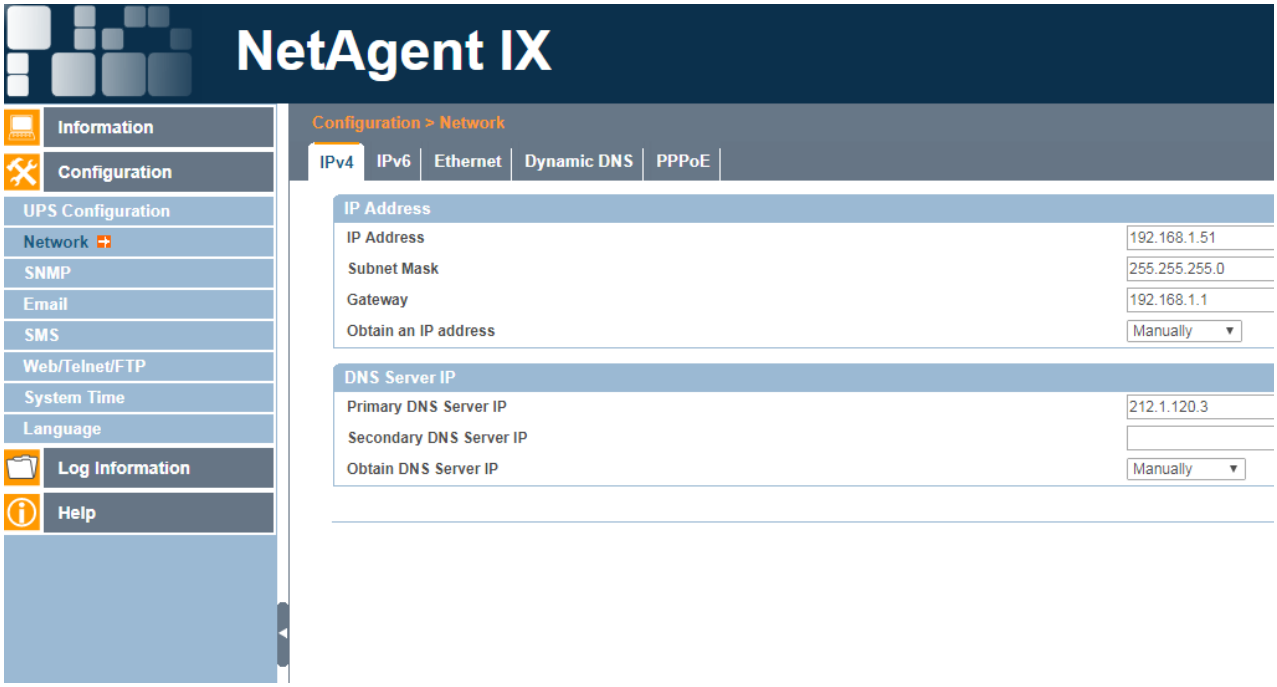


Figure 6-64: Network Screen

2.3.6.17 SNMP Configuration

Contact Myers for the MP2000E MIB.

2.3.6.18 Email Configuration

In the Email tab under the larger Configuration tab is where the user can set up the ability to send Email notifications.

FIELD	DETAILS
SMTP Server	Enter the IP address of the Simple Mail Transfer Protocol (SMTP) network e-mail server
SMTP Port	Enter the TCP port number used for the SMTP. This is typically port 25.
Authorized	Select enable if the recipient e-mail account requires a user name and password. Select disable otherwise (The typical setting is disable).
From	Enter an e-mail address to which an e-mail reply will be sent.
User Name Password	Enter a user name and password if Authorized enable has been selected.

Figure 6-65: Email Screen Fields

Figure 6-66 shows the E-mail Setting Screen.

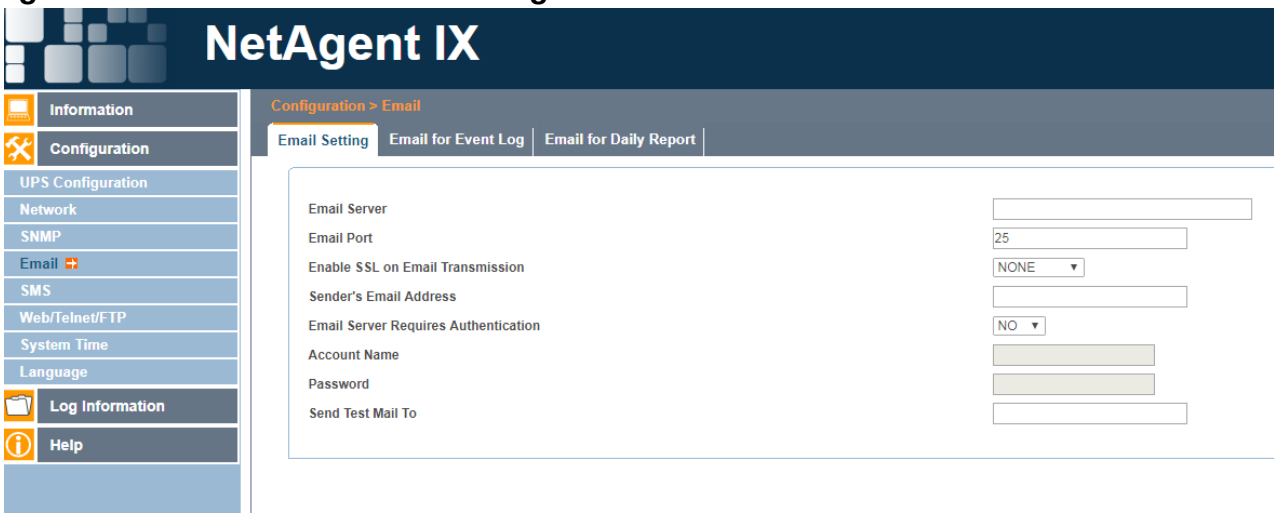


Figure 6-66: Email Settings Screen

After entering data, click the "Apply" button to save the information. Once the information has been saved, click the "Test" button to send a test e-mail to the e-mail address in the From field.

To receive Emails on events click the upper tab labeled "Email for Event Log". Change "Send Email When Event Occurs" to "YES", then add the recipients Email to the list. To select which events the recipient will be Emailed about, click "Select" button next to their Email and a pop up box will appear with a list to select from (Figure 6-67). Once done click "Apply" in the pop up window then again on the main Email for Event Log page.

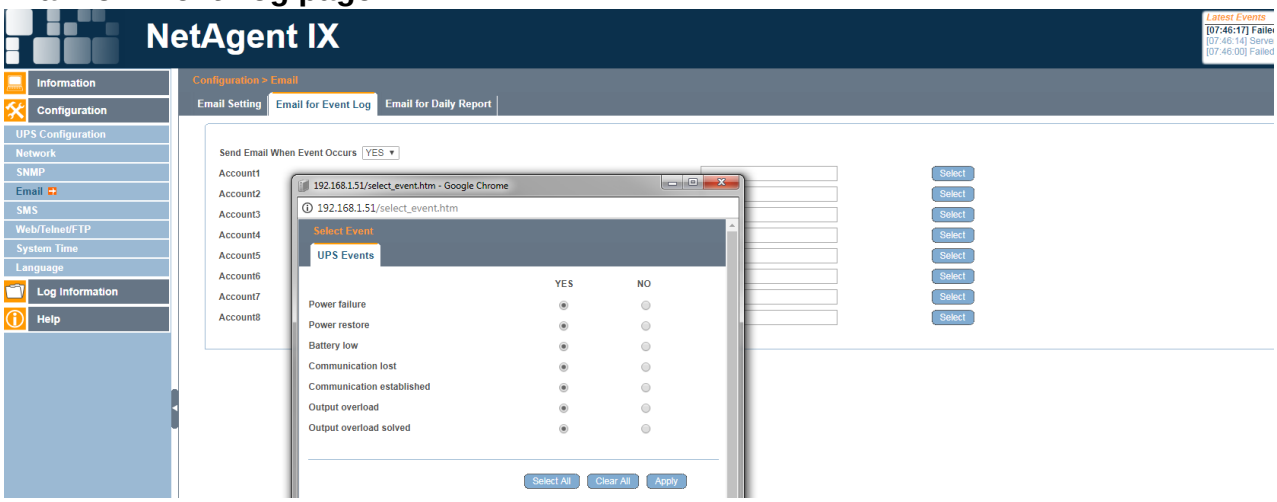


Figure 6-67: Email for Event Log Screen

To enable daily reports, click the last upper tab in the Email section labeled "Email for Daily Report". Change the setting for "Send Email for Daily Report" to "YES", then add the recipients Email address to the list and select "Apply" to save.

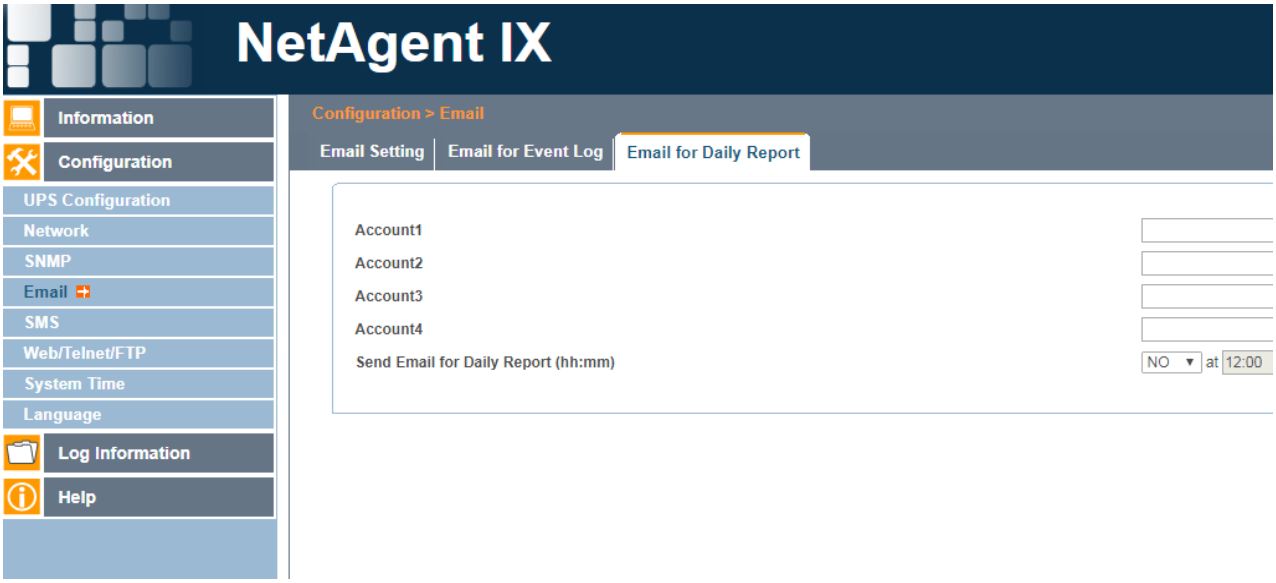


Figure 6-68: Email for Daily Report Screen

2.3.6.19 SMS Configuration

Under SMS tab the user can set up mobile alerts by filling their information for SMS Server, SMS Port, Account Name, and Password.

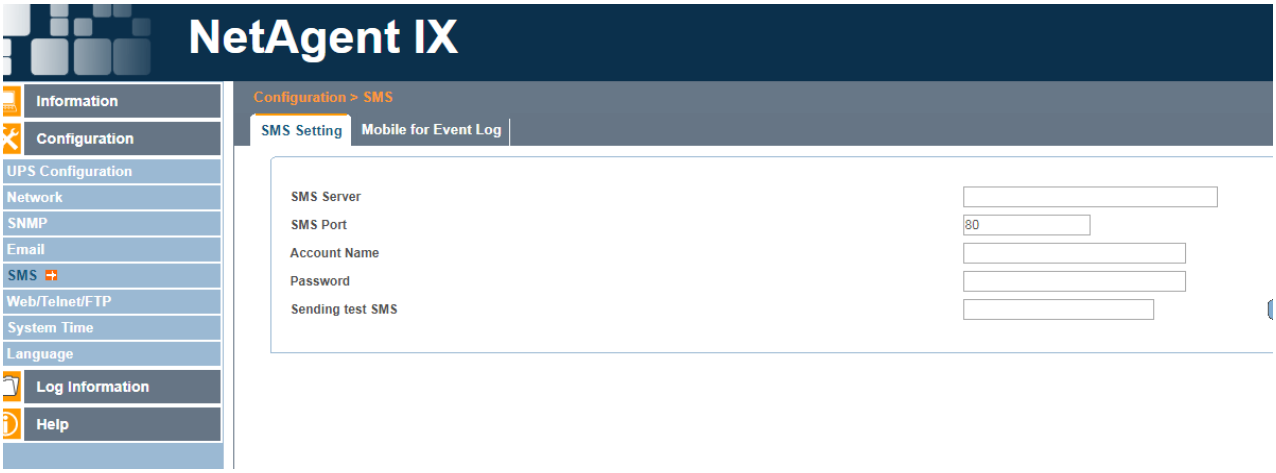


Figure 6-69: SMS Settings Screen

After entering data, click the "Apply" button to save the information.
To receive SMS on events click the upper tab labeled "Mobile for Event Log". Change "Send SMS When Event Occurs" to "YES", then add the recipients cellular phone number to the list. To select which events the recipient will be SMS about, click "Select" button next to their Email and a pop up box will appear with a list to select from (Figure 6-70). Once done click "Apply" in the pop up window then again on the main Mobile for Event Log page.

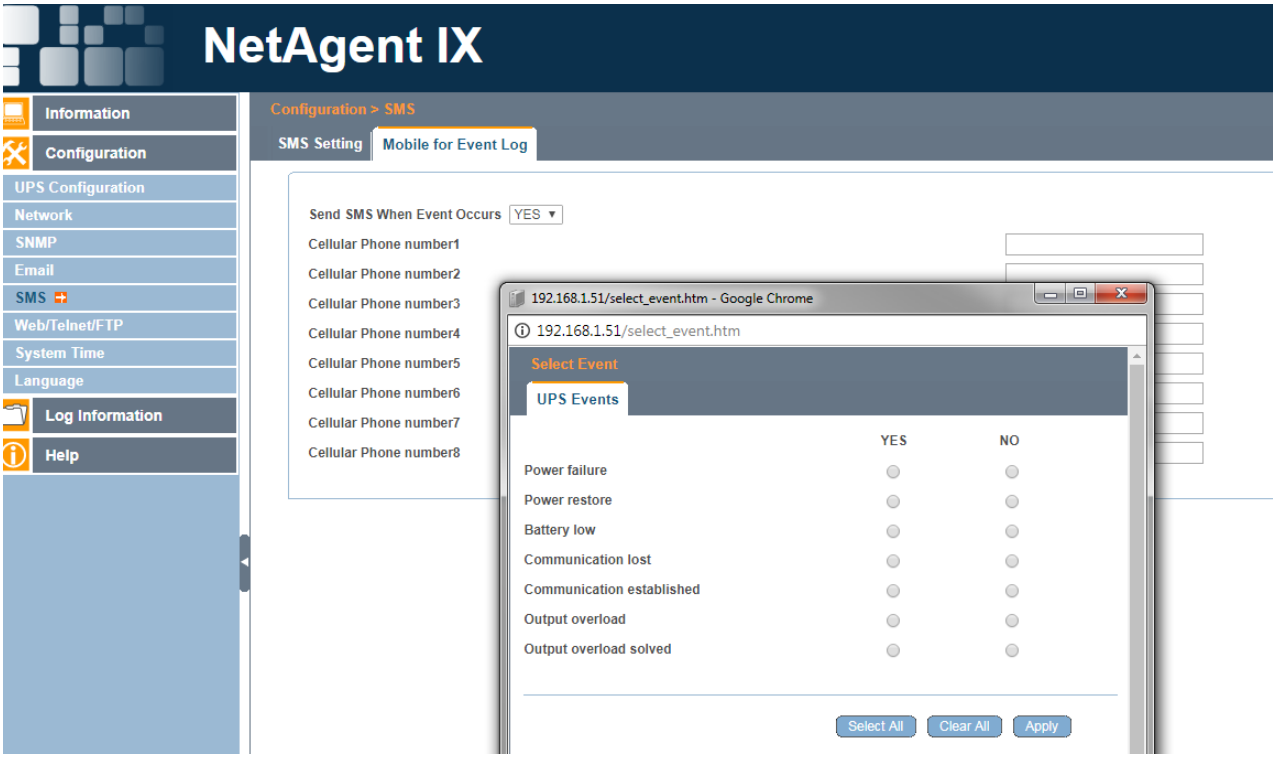


Figure 6-70: SMS for Event Log Screen

2.3.6.20 Web/Telnet/FTP Configuration

Under this tab the user can edit login information, User permissions, as well as enabling auto Log Off.

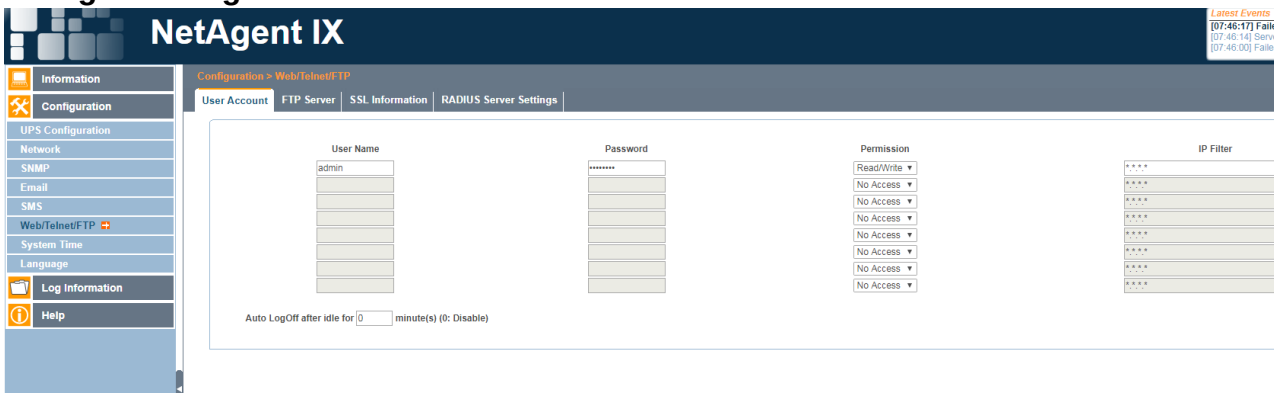


Figure 6-71: User Account Screen

2.3.6.21 System Time

The System Time screen allows users to adjust the system date, time, and time zone settings. The date and time settings in this screen set the date and time on the HTML Ethernet card, which provides the date and time stamp in the following Event Actions messages:

- **Log Tab Event Log screen**
- **Log Tab Data Log screen**
- **Information Tab Summary screen**

Details on the fields in this screen are presented in Figure 6-72.

FIELD	DETAILS
Date	Use the pull down menus to select the correct date.
Time	The MP2000E uses a 24-hour (military) time system. Use the pull down menus to select the correct time.
Time Zone	The time zone is set through a drop down menu. Time zone 0 is Greenwich Mean Time. U.S. time zones are as follows: • -5 is Eastern Standard Time • -6 is Central Standard Time • -7 is Mountain Time • -8 is Pacific Standard Time

Figure 6-72: Date and Time Screen Fields (continued)

The date and time stamps controlled by the settings in this Date and Time screen do not control the date/time stamps in the UPS Event Log. These are controlled by the clock on the MP2000E LCD display PCB.

Figure 6-73 shows the Date and Time screen.

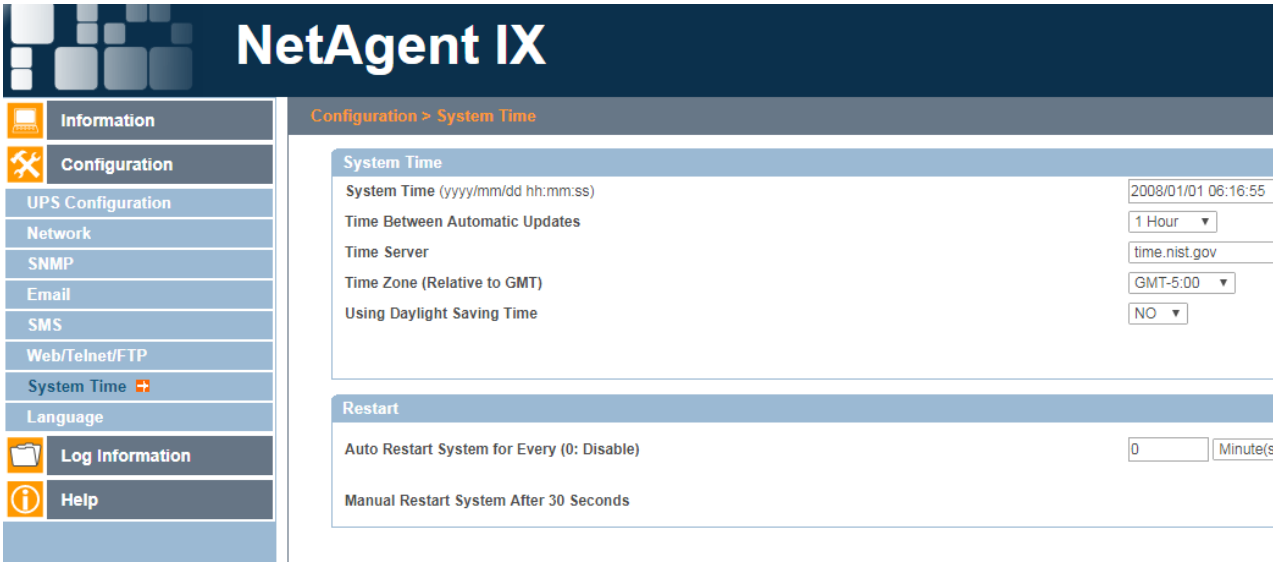


Figure 6-73: Date and Time Screen

2.3.6.22 Language

NetAgent IX Language can be set under this tab, as well as the language in which you would like to receive Emails and SMS.

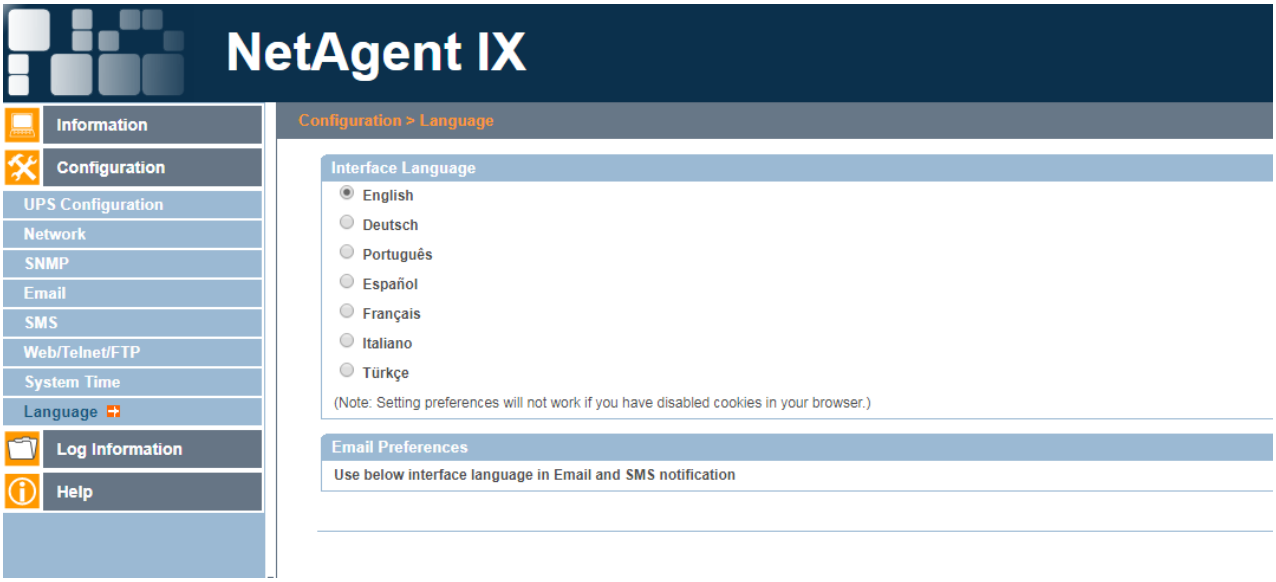


Figure 6-74: Date and Time Screen

2.3.6.23 Making Changes to the Log Information Tab

Click on the Log tab to open it and access its settings. The Log tab allows users to change the following sets of information:

- **Event Log**
- **Data Log**
- **UPS Event Log**

To navigate between items, use the tabs on the left.

2.3.6.24 Event Log Screen

The Event Log in NetAgent IX is the utility that records from the HTML Ethernet card itself and is different from the UPS event log. The Date and Time are the settings of the HTML Ethernet card clock rather than the MP2000E clock. The HTML Ethernet card clock is set in the Configuration – System Time screen. Clicking the "Save" button downloads a text file version of the event log.

Figure 6-75 shows the Event Log screen.

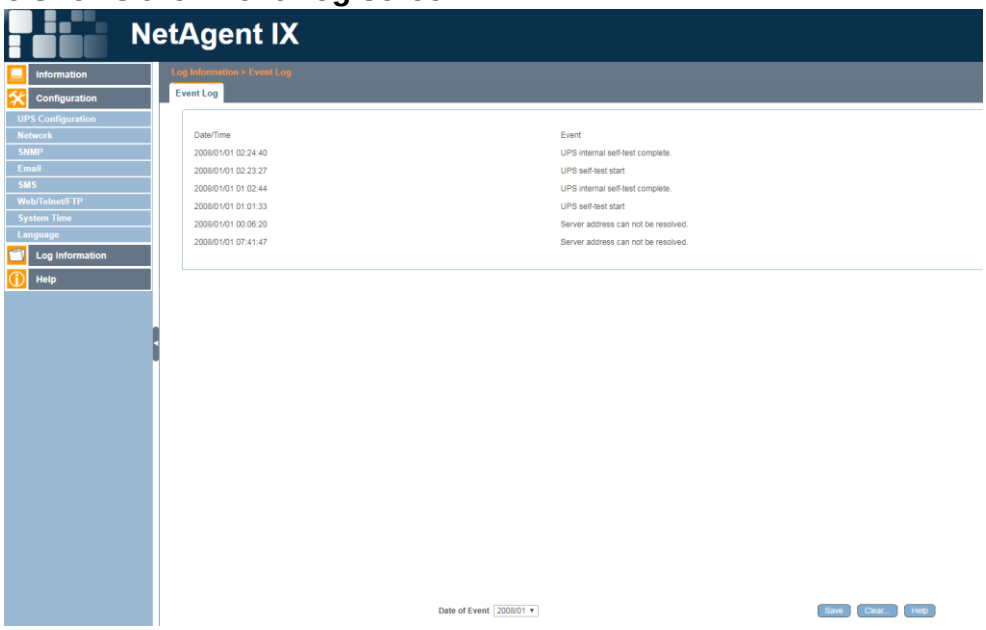


Figure 6-75: Event Log Screen.

2.3.6.25 Data Log Screen

The Data Log Screen displays the continuous log of readings. To adjust logging intervals, use the Configuration – UPS Configuration - Test Log screen, which is described in Section 6.c.6.4.1.2. Detail regarding the fields on this screen is presented in Figure 6-76.

FIELD	DETAILS
Date and Time	Date and Time are the settings of the HTML Ethernet card clock rather than the MP2000E clock. The HTML Ethernet card clock is set in the System – Date and Time screen.

Figure 6-76: Data Log Screen Fields

FIELD	DETAILS
Temp	The battery temperature probe reading, in degrees Celsius.
Download	This button downloads a text version of the data log.

Figure 6-76: Data Log Screen Fields (continued)

Figure 6-77 shows the Data Log screen.

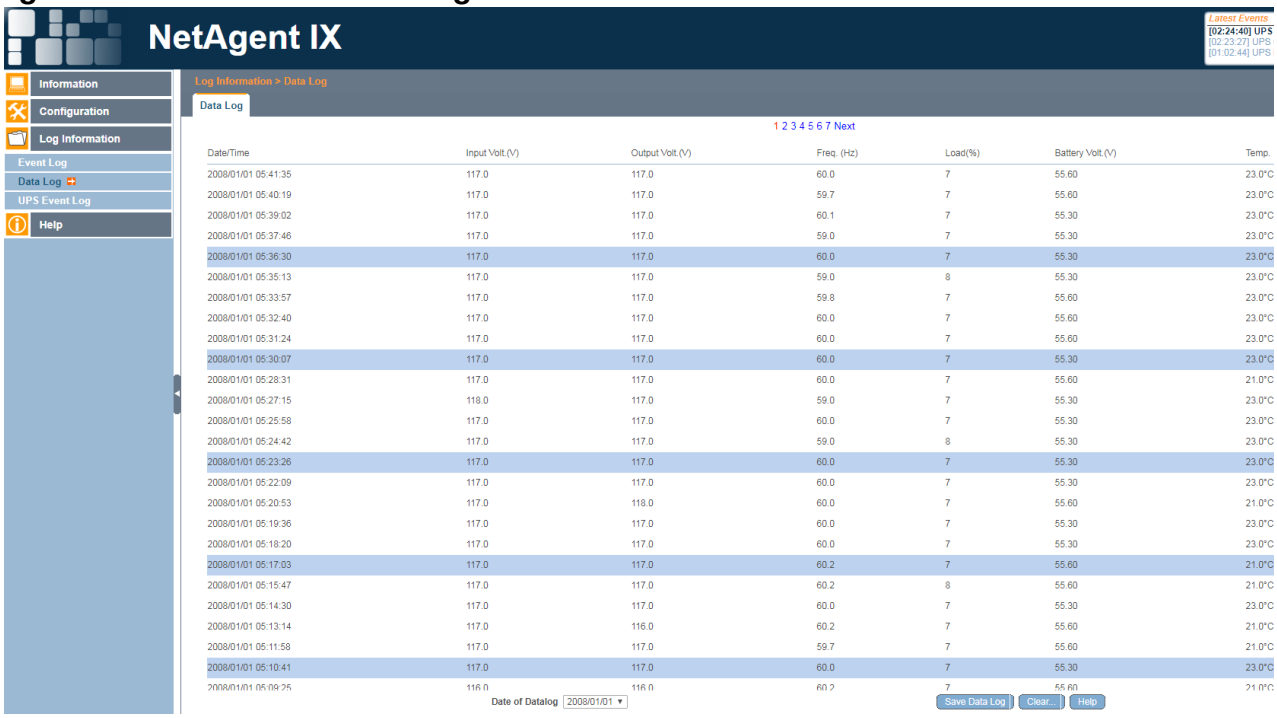


Figure 6-77: Data Log Screen

2.3.6.26 UPS Event Log

The UPS Event Log screen records various readings and statuses related to the state of the UPS. Figure 6-78 provides a description of each field in the log.

FIELD	DETAILS
Date and Time	The settings of the MP2000E clock rather than the HTML Ethernet card clock.
Vin	MP2000E VAC input.
Vout	MP2000E VAC output
Fin	MP2000E VAC line frequency input, in hertz
Pout	MP2000E power output, in watts
Vbat	Battery voltage / (fluctuating) battery charge voltage
Tbat	Battery temperature probe measurement, in degrees Celsius
Ths, Vds1, Vds2	Values used by engineering for detailed theory of operation analysis
AVR Status	Automatic Voltage Regulation status; indicates MP2000E operating status (e.g. On-Line Boost, On-Line Buck, On-Line Normal, On-Batt, etc.) See the Section 6.c.6.4.1.4 for details on AVR.

Figure 6-78: UPS Event Log Screen Fields

To access log data, click the update buttons next to the event numbers you wish to view. Doing so will cause them to be displayed in the UPS Event Log box in the upper half of the screen. This view is shown in Figure 6-79.

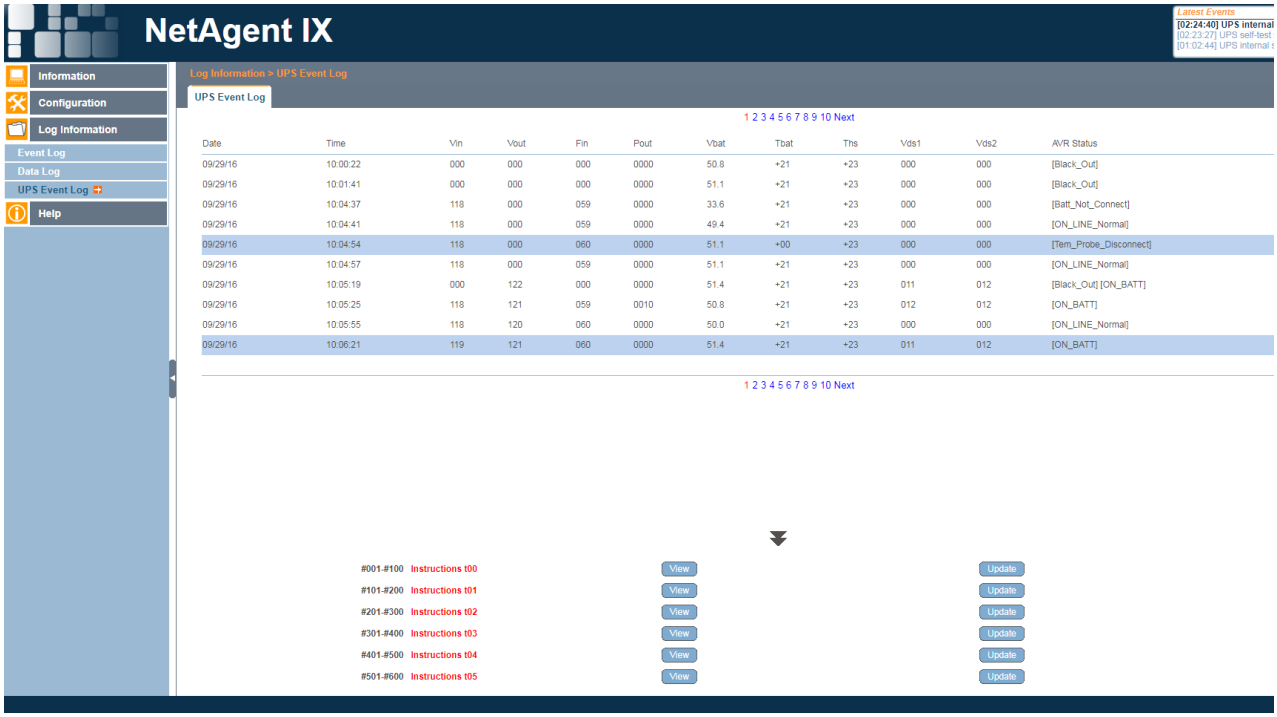


Figure 6-79: UPS Event Log Screen With Detail

2.3.6.27 NetAgent Help

NetAgent search screen is similar to Netility search…finds NetAgent cards on the network by their MAC address.

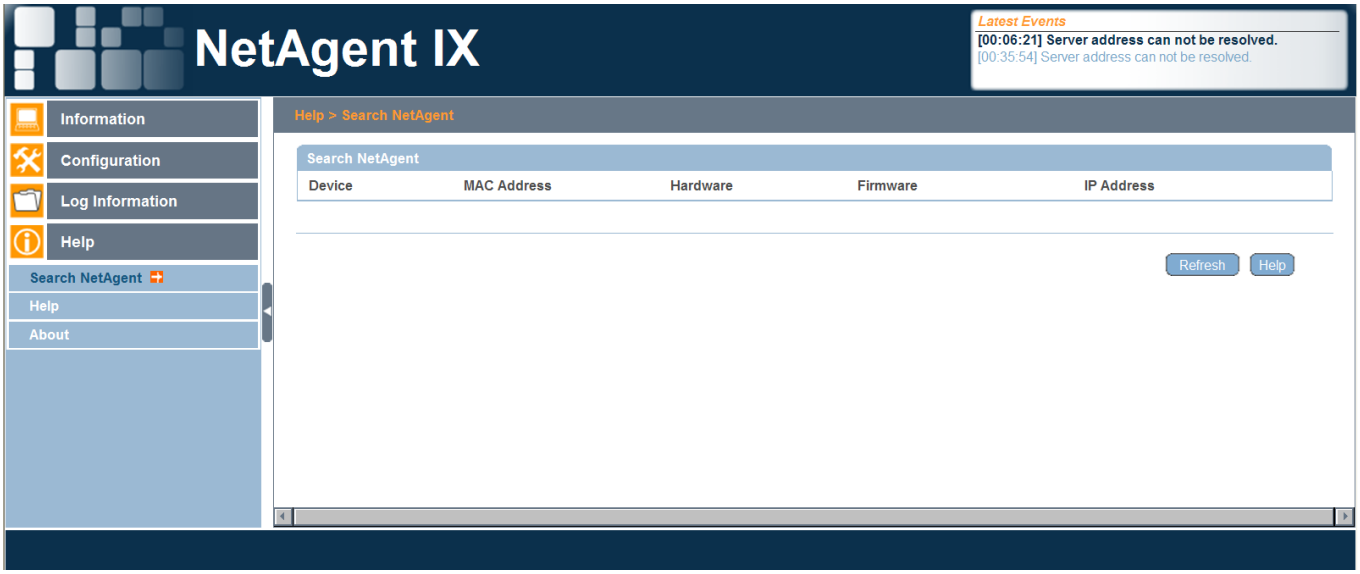
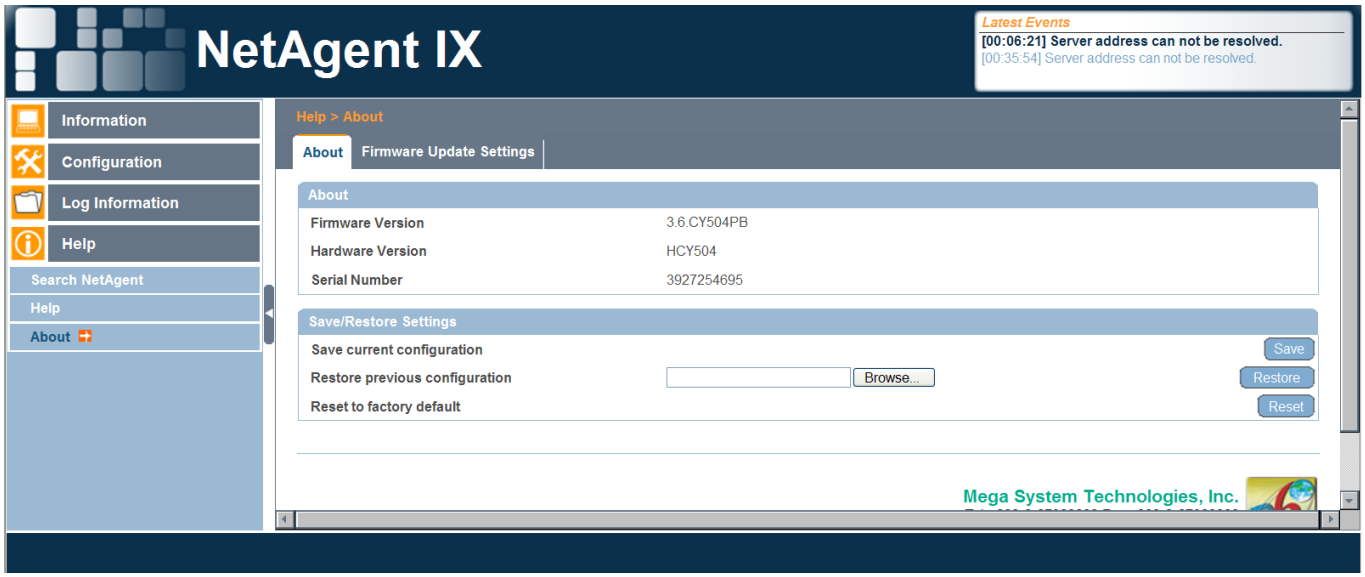


Figure 6-80: NetAgent Search Screen

The Help link brings up the NetAgent OEM help website.

The NetAgent About screen allows for saving and restoring current configurations



as well as resetting to factory defaults.

Figure 6-81: NetAgent About OEM Firmware Screen with Settings Save / Restore / Reset to Default

Figure 6-82 shows the NetAgent OEM firmware update screen…
for the CY504-01g-PB-LF card installed in Myers MP2000E
use the Netility.exe firmware update provision (Netility is on the accompanying DVD)

A firmware .bin file associated with the Myers MP2000E power supply comes from Myers.

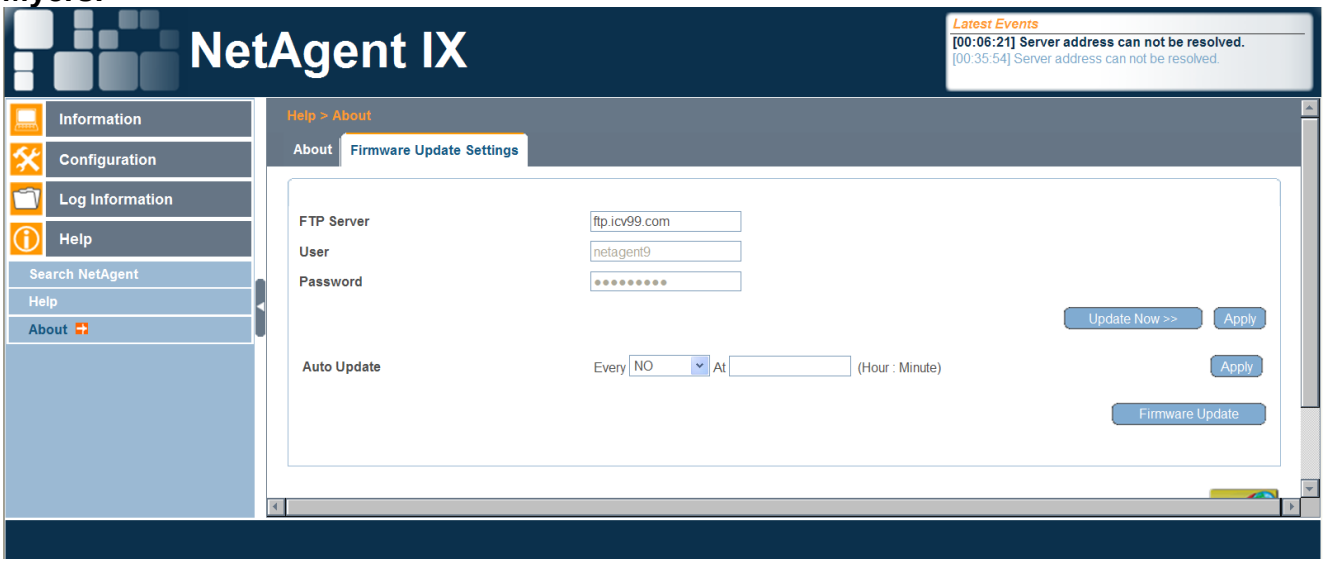


Figure 6-82: NetAgent OEM Firmware Screen

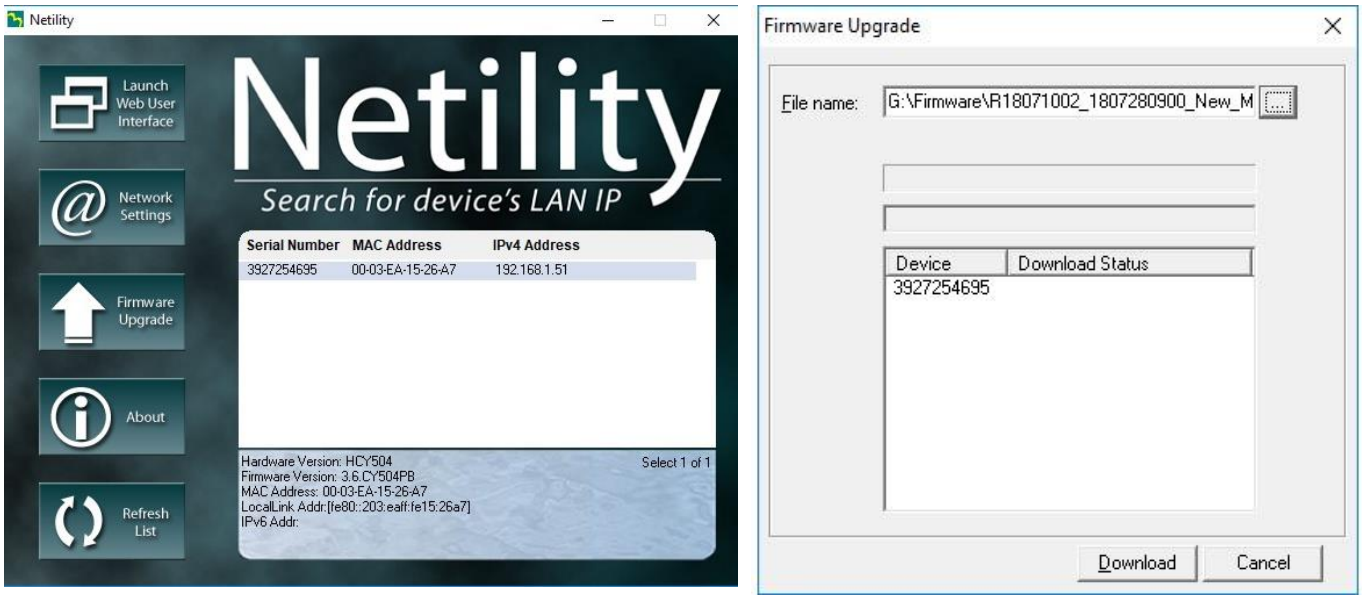


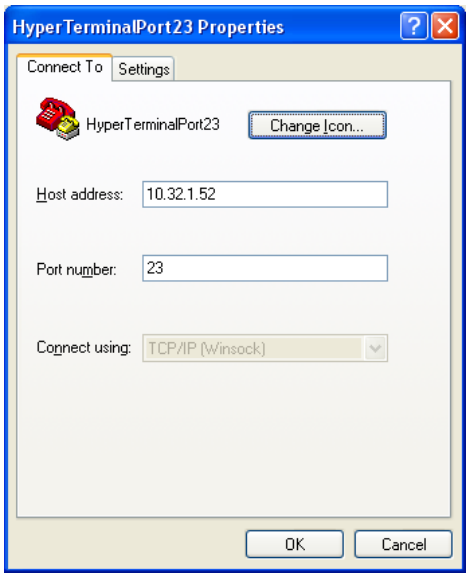
Figure 6-83: Netility Firmware Update Screens

2.3.6.28 NetAgent Telnet Screens

From the command line prompt e.g. C:>telnet [NetAgent card IP address]
Alternatively use a terminal emulator such as Hyperterminal

<<<<< Main Menu >>>>>
<<<<<----------->>>>>
1. Set IP Address.
2. Set SNMP MIB System.
3. Set SNMP Access Control.
4. Set SNMP Trap Notification.
5. Set UPS Properties.
6. Set UPS Devices Connected.
7. Set System Time & Time Server.
8. Set Web and Telnet User Account.
9. Set E-mail.
a. Reset Configuration to Default & Reboot
c. Save & Reboot.
0. Exit Without Saving.

Select =>



HyperTerminal Settings Example

<<<<< Set IP Address >>>>>
<<<<<----------->>>>>
1. IP Address. (192.168.1.51)
2. Gateway Address. (192.168.1.1)
3. Subnet Mask. (255.255.255.0)
4. Obtain an IP address automatically. (By manual)
5. IPv6 Address. (::)
6. Obtain an IPv6 address method. (Automatic)
7. Router Discovery Autoresend. (YES)
8. Obtain an DNS Server IP address method. (By manual)
9. Primary DNS Server IP. (212.1.120.3)
a. Secondary DNS Server IP. (nameserver)
b. Third DNS Server IP. ()
c. Fourth DNS Server IP. ()
0. Return to Main Menu.

Select =>
<<<<< Set SNMP MIB System >>>>>
<<<<<----------->>>>>
1. System Contact. (Administrator)
2. System Name. (UPS Agent)
3. System Location. (My Office)
0. Return to Main Menu.

Obtain the MP2000E MIB from Myers

SNMP Access Control Settings:

	Manager IP	Community	Permission
1)		public	Read/Write *.*.*.*
2)		public	No Access *.*.*.*
3)		public	No Access *.*.*.*
4)		public	No Access *.*.*.*
5)		public	No Access *.*.*.*
6)		public	No Access *.*.*.*
7)		public	No Access *.*.*.*
8)		public	No Access *.*.*.*

<<<<< SNMP Access Control >>>>>

<<<<<----------->>>>>

1. Add.
2. Delete.
0. Return to Main Menu.

Select =>

SNMP Trap Notification Settings:

	Receiver IP	Community	Trap Type	Severity	Accept
1)		public	PPC	INFORMATIONAL	NO
2)		public	PPC	INFORMATIONAL	NO
3)		public	PPC	INFORMATIONAL	NO
4)		public	PPC	INFORMATIONAL	NO
5)		public	PPC	INFORMATIONAL	NO
6)		public	PPC	INFORMATIONAL	NO
7)		public	PPC	INFORMATIONAL	NO
8)		public	PPC	INFORMATIONAL	NO

<<<<< SNMP Access Control >>>>>
<<<<<----------->>>>>
1. Add.
2. Delete.
0. Return to Main Menu.

Select =>

<<<<< Set UPS Properties >>>>>
<<<<<----------->>>>>
1. UPS Communication Type. (Not Defined)
2. UPS Device Name. ()
3. Last Battery Replacement Date.(mm/dd/yyyy) ()
4. UPS Model. ()
5. UPS Voltage Rating. (1100)
0. Return to Main Menu.

Select =>

Devices Connected Settings:

	System Name	Rating	Connected
1		0 (%)	NO
2		0 (%)	NO
3		0 (%)	NO
4		0 (%)	NO

<<<<< Set Devices Connected >>>>>
<<<<<---------->>>>>

1. Add.
2. Delete.
0. Return to Main Menu.

Select =>

<<<<< Set System Time & Time Server >>>>>
<<<<<---------->>>>>

1. Set Date(yyyy/mm/dd HH:MM:SS). (2008/01/01 01:34:19)
2. Automatically Check Every (60) Minutes
3. Set Time Server. (time.nist.gov)
4. Set Time Zone. (-800)
5. Using Daylight Saving Time.(YES)
0. Return to Main Menu.

Select =>
Web and Telnet User Account:

User Name	Password	Access Rights	IP Address
1) admin	****	Read/Write	*.*.*.*
2)		No Access	*.*.*.*
3)		No Access	*.*.*.*
4)		No Access	*.*.*.*
5)		No Access	*.*.*.*
6)		No Access	*.*.*.*
7)		No Access	*.*.*.*
8)		No Access	*.*.*.*

<<<<< User Account >>>>>
<<<<<----------->>>>>
1. Add.
2. Delete.
0. Return to Main Menu.

Select =>

<<<<< Set E-mail >>>>>
<<<<<----------->>>>>
1. Email Server Name or IP. ()
2. Email Server Port. (25)
3. Email Server Requires Authentication. (NO)
4. Email Account Name. ()
5. Email Password. ()
6. Sender Account. ()
7. Event Email Recipient. ()
8. Send Email When Trap Occurs. (NO)
9. Send Email for Daily Report. (NO)
a. Daily Report Email Recipient.() at (12:00:00)
0. Return to Main Menu.

Select =>

2.3.6.29 Ethernet-to-Serial Adapter Card IPV4

The Ethernet-to-serial card inserts into the MP2000E UPS front panel. Figure 6-84 shows the front panel with annotations.

Figure 6-84: MP2000E UPS Front Panel

Default IP: 192.168.0.10
SubNet Mask: 255.255.255.0

Default Password: 1111

NOTE THESE SETTINGS ARE FOR THE ETHERNET-TO-SERIAL ADAPTER CARD. FOR THE NETAGENT HTML CARD SEE THAT SECTION ELSEWHERE IN THIS MANUAL

The Ethernet-to-serial adapter interfaces with a terminal emulator (such as Hyperterminal) and with Myers MEMS software.
There are two versions of the Ethernet-to-serial adapter card, one of which is longer than the other. The MP2000E models with serial numbers that begin "MC" use the longer version of the card and those with serial numbers that begin with "MD" use the shorter version of the card. Both versions are shown in Figure 6-85…functionally they're identical.

Figure 6-85: Ethernet to Serial Adapter Cards

2.3.6.30 Making the IPV4 Ethernet-to-Serial Connection

Use either the Etm.exe utility or make a RJ45 cross-over cable direct connection between
a PC and the MP2000E Ethernet-to-serial adapter.
An RJ45 cross-over cable direct connection requires administrator's access to the PC.

2.3.6.31 Using a Direct PC to Ethernet Card Connection

Interconnect the MP2000E Ethernet card and PC with an RJ45 cross-over cable.
Go to the PC's Networks Settings and select
" Internet Protocol (TCP/IP)" then "Properties."

With the Ethernet-to-serial adapter card set to default IP 192.168.0.10
set the PC to a fixed IP address of 192.168.0.xxx, where xxx is any number zero to 255 except 10.
Leave the subnet mask at 255.255.255.0. These steps are illustrated in Figure 6-86.

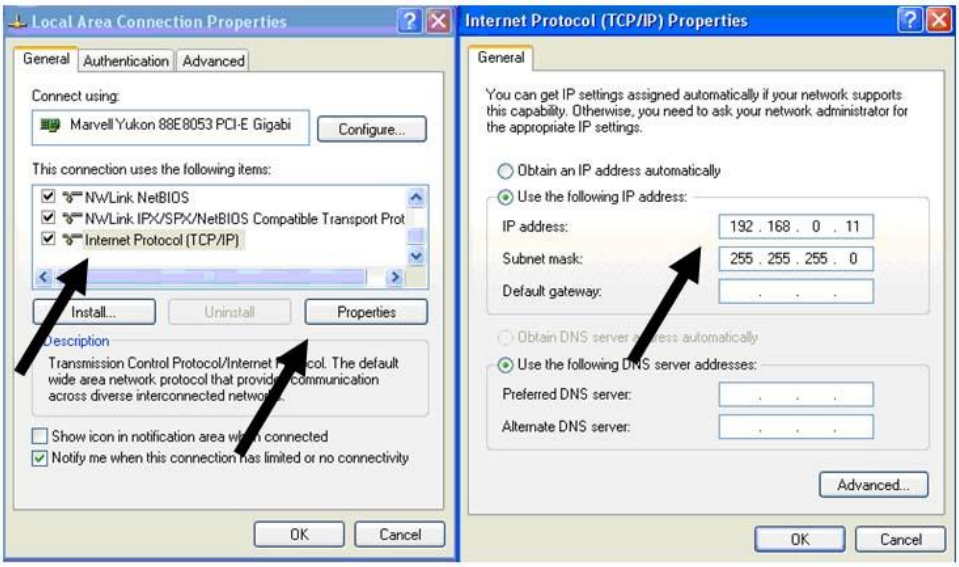


Figure 6-86: Using a Direct PC to Ethernet Card Connection

Performing these tasks requires Administrator's access to the PC.

2.3.6.32 Using the ETM.exe Utility

Use the ETM.exe utility to find the Ethernet to serial adapter card on the network by its MAC address. The default IP address is 192.168.0.10 with subnet 255.255.255.0, as shown in Figure 6-87.

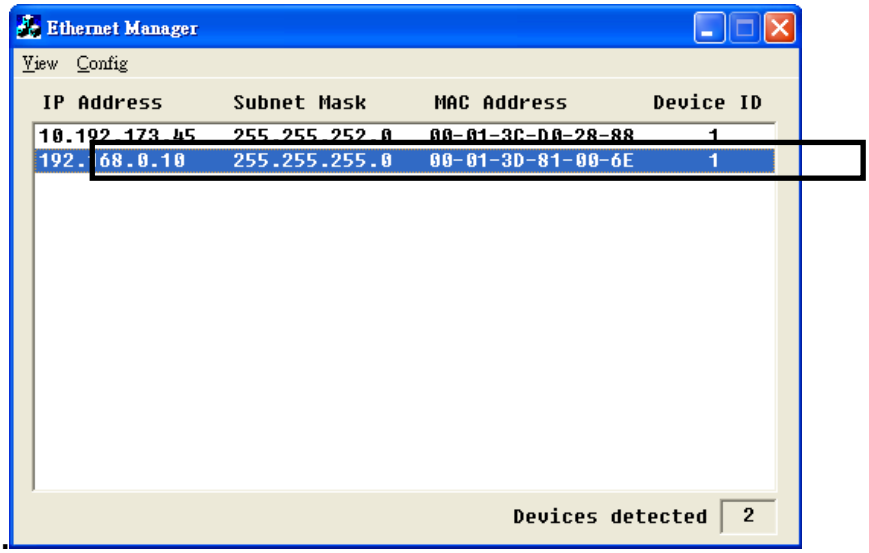


Figure 6-87: Ethernet Manager Dialog Box

Click on "Config" to change the IP address, as shown in Figure 6-88. The card can be set for DHCP later in the web browser controller setup screen.

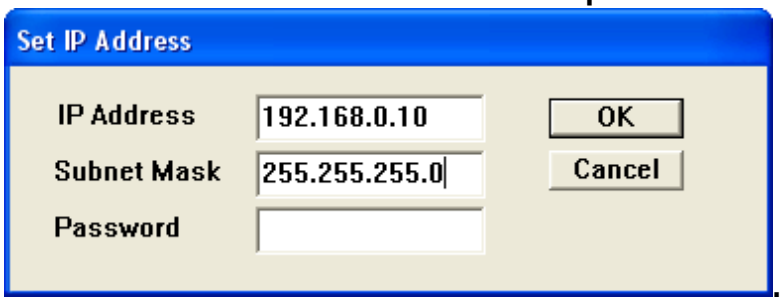


Figure 6-88: Set IP Address Dialog Box

The default password is 1111.

2.3.6.33 Controller Setup Web Browser Screen

Open a web browser and enter the Ethernet card's IP address in the URL field. This will access to Controller Status screen, which is shown in Figure 6-89.

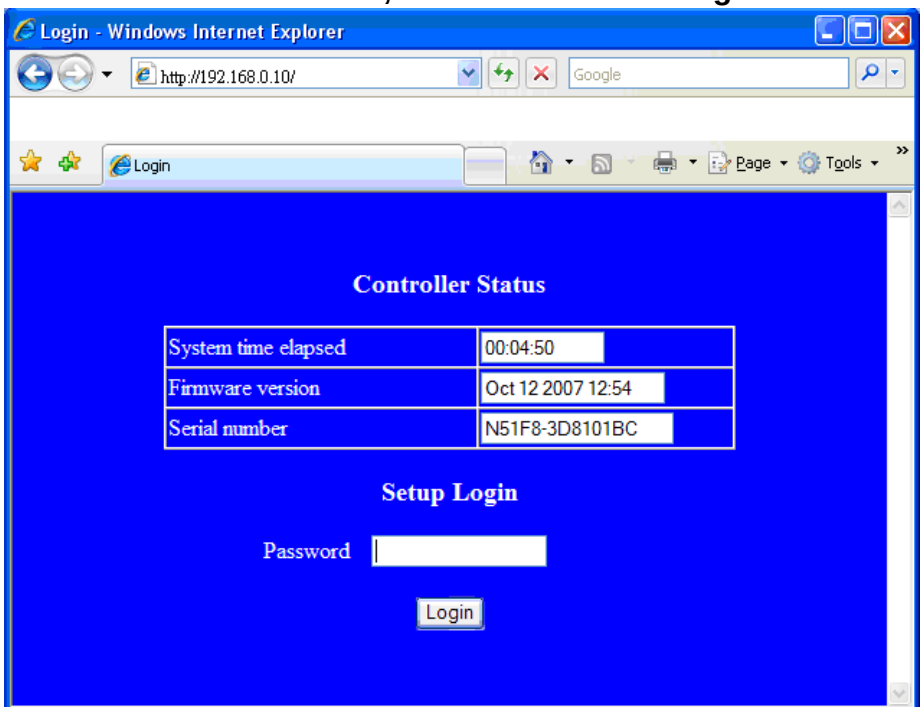


Figure 6-89: Controller Status Screen

The default password is 1111.

The Controller Setup screen appears after the login. The fields in this screen are detailed in Figure 6-90. See Figure 6-92 controller setup screen shot.

FIELD	DETAILS
IP Address Subnet Mask Default Gateway	If not using DHCP, enter data into these fields
Network Link Speed	The Network link speed is set through a pull-down menu. It is typically set to "auto" although other available values are: • 10 full-duplex • 100 full-duplex • 10 half-duplex • 100 half-duplex
DHCP Client	If you have manually entered IP address data, choose "disable" from the pulldown menu in this field.
Socket Port of HTTP Setup	This is the IP socket port number. Port 80 is the standard (TCP) socket port number for hyper text transfer protocol (HTTP). Other values are "81" and "disabled."
Socket Port of Serial I / O	The Default is 100 — make the number correspond to the terminal emulator (HyperTerminal) serial I / O setting or Myers MEMS serial I / O setting. Configure the card for TCP server.
Destination IP Address / Socket Port (TCP Client and UDP) Connection	These settings correspond to the "TCP Client" and "UDP" selection in "Socket port of serial I/O." Refer to the Hyperterminal Example in Figure 6-113.
TCP Socket Inactive Timeout (in minutes)	The default is 10 minutes.
Serial I / O Settings Interface of Serial I / O Packet Mode of Serial Input	With the Ethernet-to-serial adapter card installed in the MP2000E, leave these settings unchanged. These are the RS232 Communication settings between the Ethernet card and the MP2000E. Serial I/O settings (baud rate, parity, data bits, stop bits): 2400 N 8 1 Interface of serial I/O: RS 232 Packet mode of serial input: Disable
Setup Password	This allows the Controller Setup access password to be changed. The default is 1111.

Figure 6-90: Controller Setup Screen Fields

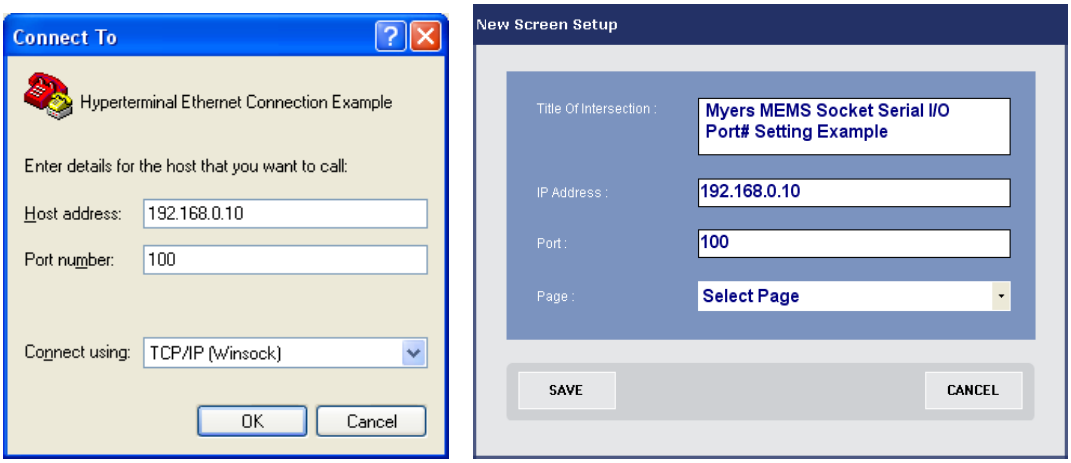


Figure 6-91: HyperTerminal Example

The Ethernet to serial adapter card defaults to port 100.

Figure 6-92 shows the Controller Set Up Screen.

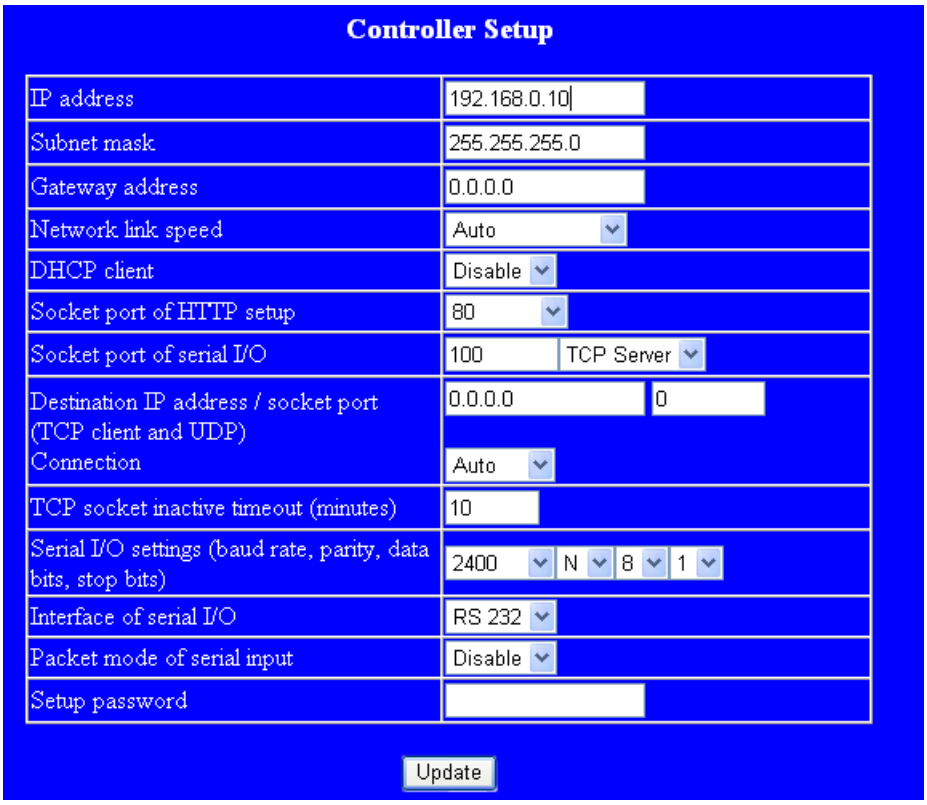


Figure 6-92: Controller Set Up Screen

2.3.6.34 Terminal Emulator Setup Example

To follow is an example of HyperTerminal setup.

1. **Start the HyperTerminal program and assign it a name, as shown in Figure 6-93.**

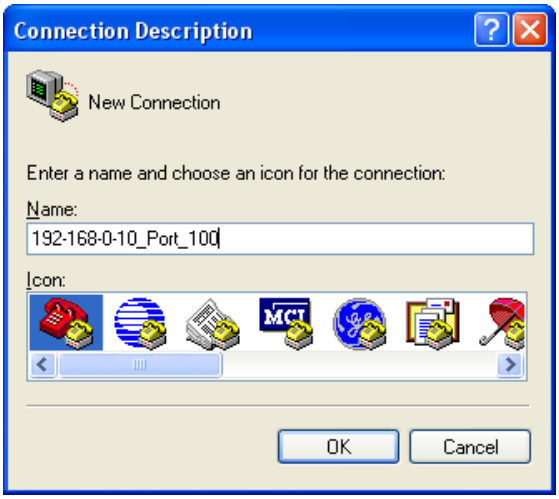


Figure 6-93: Start HyperTerminal Program

Press OK. This will bring up the Connect To screen. Select the TCP / IP (Winsock) from the drop down menu as shown in Figure 6-94.

Figure 6-94: Connect To Screen

Enter the IP address and port number of the Ethernet–to–serial adapter card, then press OK. This is shown in Figure 6-95.

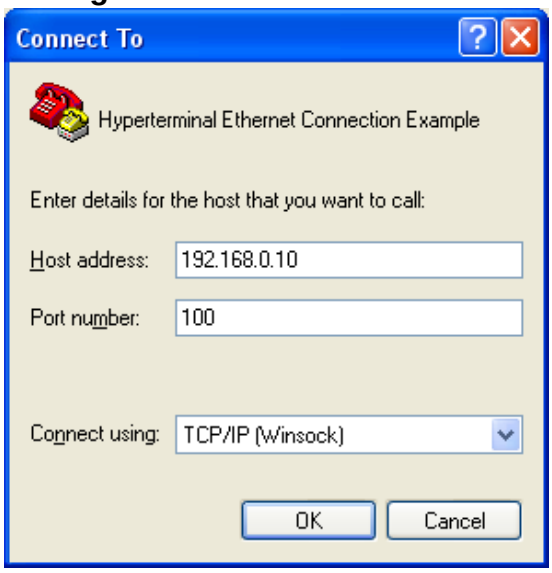


Figure 6-95: Enter IP Address

3. **The terminal emulator screen interface will appear while HyperTerminal connects to the card. This is shown in Figure 6-96.**

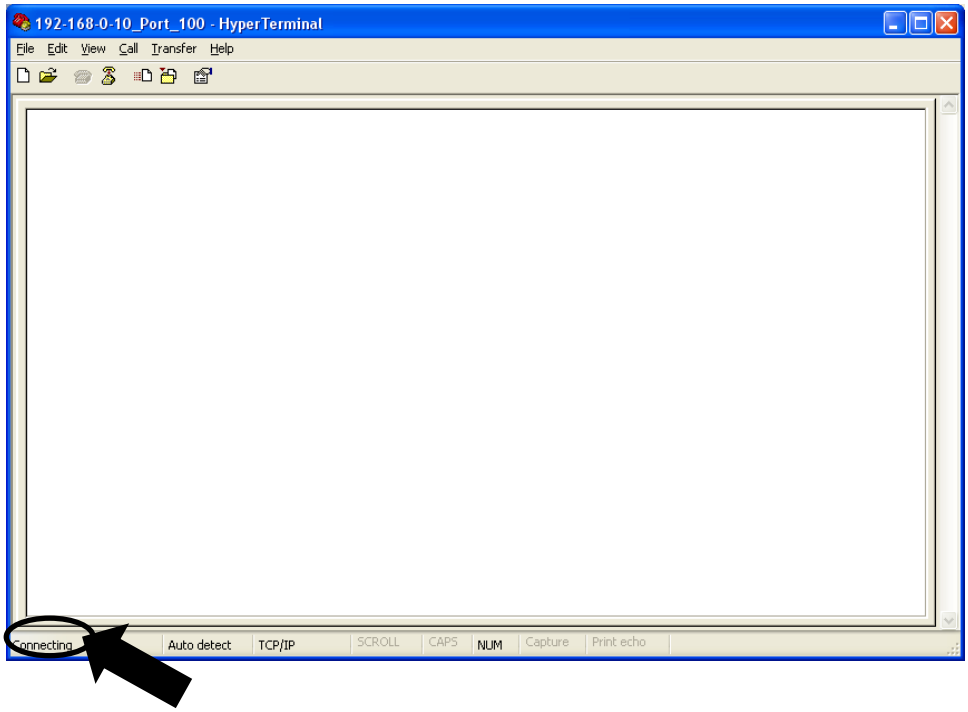


Figure 6-96: Terminal Emulator Screen Interface

4. **Next, set up the ACSII text formatting by going to File>Properties>Settings>ASCII Set. Make the selections shown in Figure 6-97.**

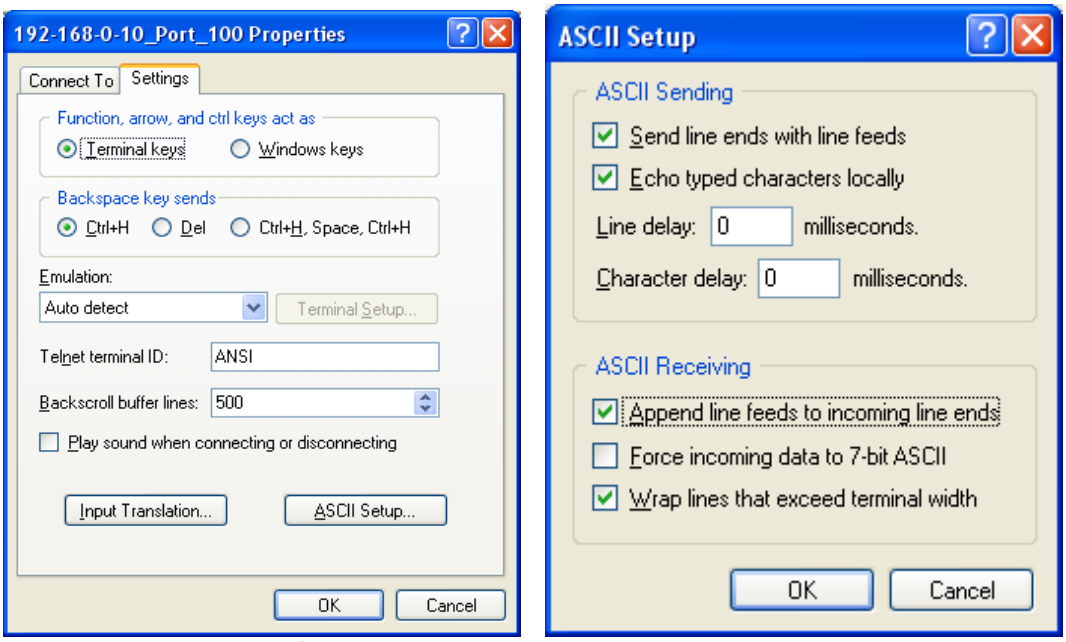


Figure 6-97: ASCII Text Formatting Set Up

5. **Go to the HyperTerminal Interface Screen and press "Enter" on the PC keyboard, as shown in Figure 6-98.**

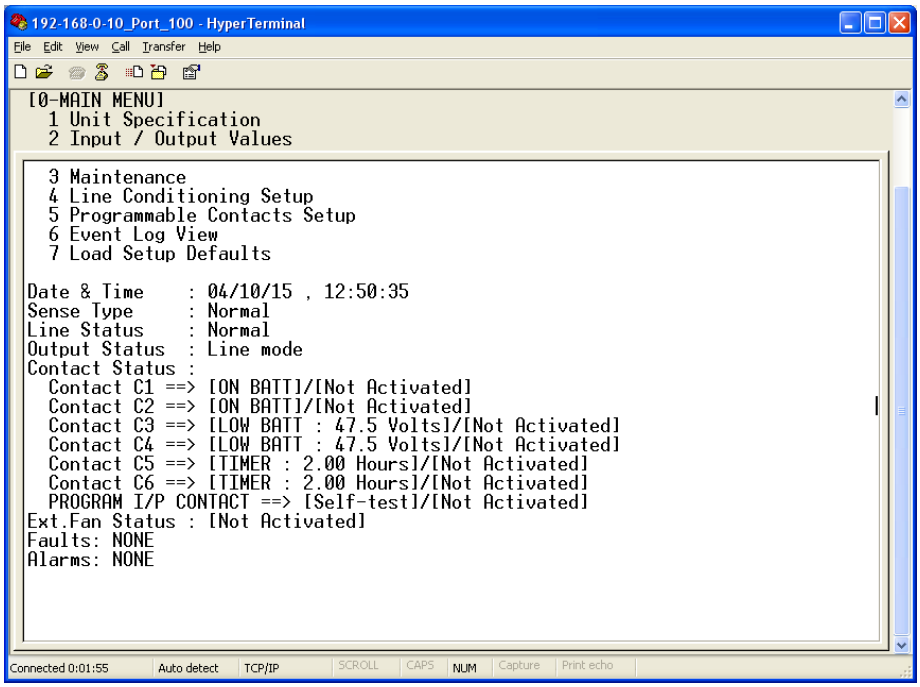
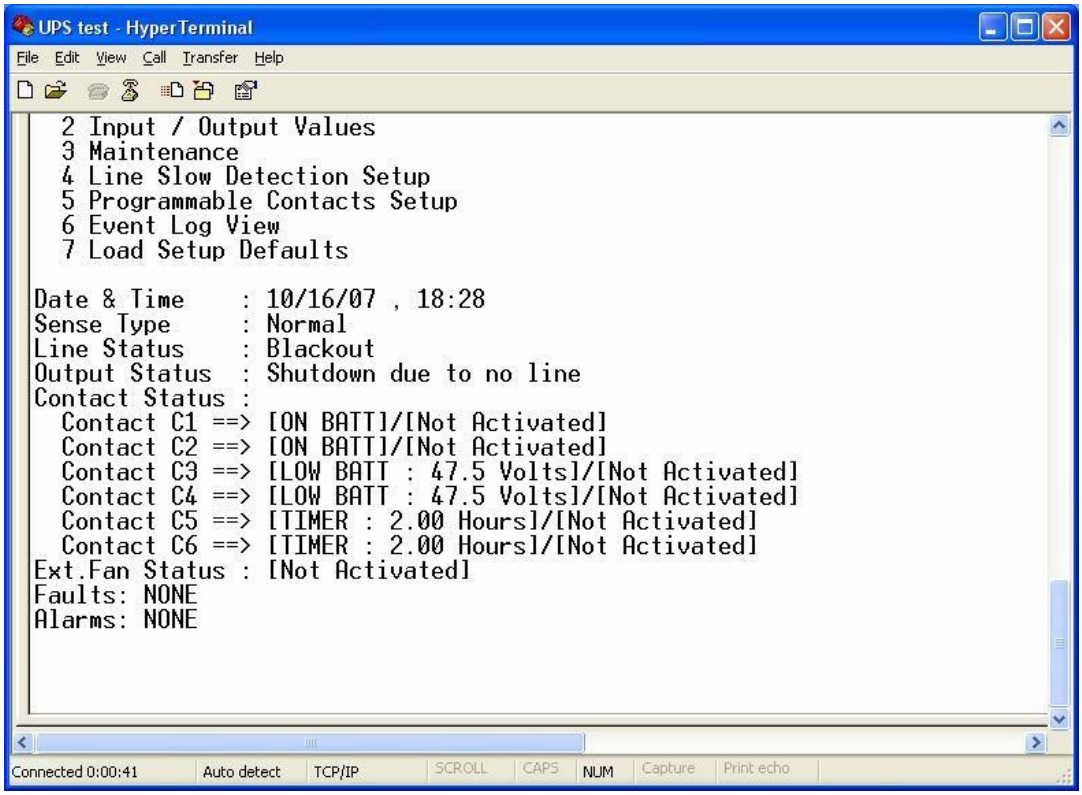


Figure 6-98: HyperTerminal Main Menu Screen

See the HyperTerminal menu information elsewhere in this manual.

Ethernet card hard reset for regaining the Ethernet card default settings.

5. Press enter then get into next screen.


UPS test - HyperTerminal
File Edit View Call Transfer Help
2 Input / Output Values
3 Maintenance
4 Line Slow Detection Setup
5 Programmable Contacts Setup
6 Event Log View
7 Load Setup Defaults
Date & Time : 10/16/07 , 18:28
Sense Type : Normal
Line Status : Blackout
Output Status : Shutdown due to no line
Contact Status :
Contact C1 ==> [ON BATT]/[Not Activated]
Contact C2 ==> [ON BATT]/[Not Activated]
Contact C3 ==> [LOW BATT : 47.5 Volts]/[Not Activated]
Contact C4 ==> [LOW BATT : 47.5 Volts]/[Not Activated]
Contact C5 ==> [TIMER : 2.00 Hours]/[Not Activated]
Contact C6 ==> [TIMER : 2.00 Hours]/[Not Activated]
Ext.Fan Status : [Not Activated]
Faults: NONE
Alarms: NONE
Connected 0:00:41
Auto detect
TCP/IP
SCROLL
CAPS
NUM
Capture
Print echo

Section 2.4
Maintenance

This section describes how to maintain the MP2000E:

2.4.1 Battery Back-Up Time Test

Purpose: Describes how to measure the back up capacity of batteries.

This test provides the measurement of back-up time during power outage by actually discharging the batteries. The back-up time is load as well as battery dependent, thus more back-up time is available with a lower load (in Amps or Watts) and less time with more load.

Tip: It is recommended to perform this test every 6 months.

Tip: Make sure the batteries are fully charged before starting this test.

PROCEDURE

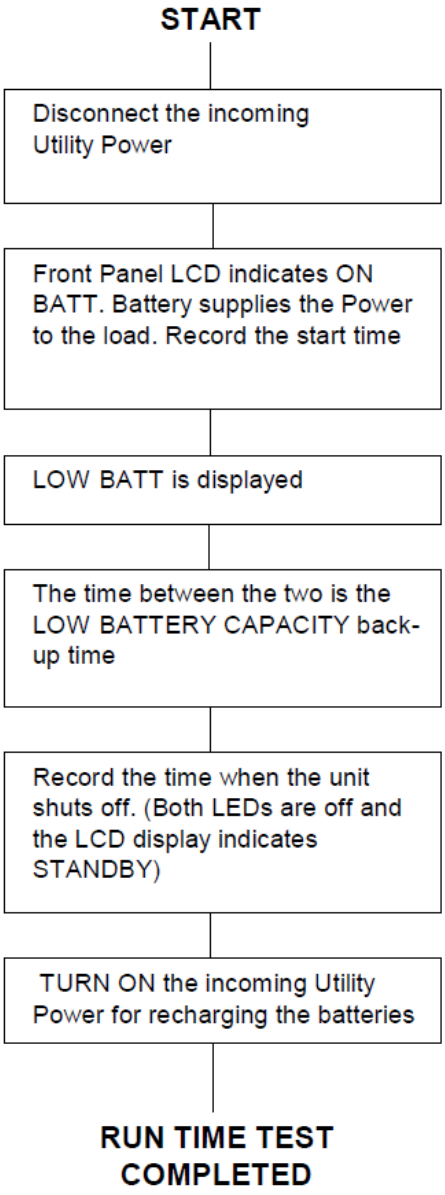
EXAMPLE:
Start time is 1PM.
ON BAT contact if selected, is activated.

Low Battery Alarm LED appears at 4PM. LOW BAT contact at selected value will be activated.

Low Battery capacity battery back-up time will be the time difference between 4PM and 1PM or 3 hours.

Shutdown time is 5PM.
Battery reserve time will be the time difference between 4PM and 5PM or 1 hour.

The Total Battery Back-up time is the sum of Low Battery capacity back-up time and Battery Reserve time or the time difference between 5PM and 1PM or 4 hours.



2.4.2 MP2000E Return Instructions

Purpose: Describes how to return the MP2000E to Myers Emergency Power Systems.

Note: Myers Emergency Power Systems. does not assume responsibility for damage caused by improper packaging of returned units.

Before returning an MP2000E for repair, obtain a Return Material Authorization (RMA) number from Myers Emergency Power Systems, customer service representative (CSR) at following Telephone / Address. Clearly write the RMA number on the shipping container. If you do not have the original container, pack the replacement carton with at least three inches of shock absorbing material, but do *not* use popcorn type material. Returns should be prepaid and insured (COD and freight collect cannot be accepted).

Contact Myers Emergency Power Systems to order parts or service.

Myers Emergency Power Systems.
44 S. COMMERCE WAY
BETHLEHM, PA 18017, USA

TEL: (610) 868-3500
FAX: (610) 868-8686

WEB: https://www.myerseps.com

2.4.3 Troubleshooting

The normal operation of the MP2000E is to allow a qualified utility line to pass through the BBS system to the output load. If the line drops out of tolerance then the MP2000E will assume the load until the utility line is re-qualified or the batteries are depleted. Oscilloscope traces are included at the end of this section illustrating what typical in tolerance waveforms should look like. Following are some general troubleshooting guideline to isolate a problem within the BBS system.

1. MBPS (Manual Bypass Switch)

The Manual ByPass Switch is used when the MP2000E requires servicing. During normal operation the MBPS is set to UPS mode. This will allow the utility input line to pass through the MBPS to the PTS input as well as allowing the PTS output to pass through to the load.

a) To check the MBPS when it is set to UPS mode:

- **Verify that the position of the MBPS is in UPS mode (See Figure 9).**
- **Measure the voltage on position 2 of the MBPS with respect to neutral. Note: All neutral wires in the system are common, so the neutral wire can be found on the input terminal block of the PTS, on the input block in the cabinet, or on the MP2000E input terminal block.**
- **If the utility voltage is not present then check the wiring from the utility entrance to the MBPS.**
- **If the utility voltage is present measure the voltage on position 1B of the MBPS with respect to neutral. If the voltage is not present then the MBPS switch is defective.**
- **If the utility voltage is present measure the voltage from the line out terminal block on the PTS. If the voltage is not present there is a problem with the PTS or MP2000E. See troubleshooting the PTS or MP2000E.**
- **If the utility voltage is present measure the voltage on terminal 1 of the MBPS with respect to neutral. If the utility voltage is not present the MBPS switch is defective.**
- **If the utility voltage is present on terminal 1 with respect to neutral but not present at the load then check the wiring between the MBPS and the load.**

b) To check the MBPS when it is set to Bypass mode:

- **Ensure the MBPS in UPS mode first by following steps above.**
- **Verify that the position of the MBPS is in UPS mode.**
- **Measure the voltage on position 2B of the MBPS with respect to neutral. Note: All neutral wires in the system are common, so the neutral wire can be found on the input terminal block of the PTS, on the input block in the cabinet, or on the MP2000E input terminal block.**
- **If the utility voltage is present measure the voltage on position 2A of the MBPS with respect to neutral. If the voltage is not present then replace the jumper wire between position 2B and position 2A.**
- **If the utility voltage is present measure the voltage on position 1 of the MBPS with respect to neutral. If the utility voltage is not present the MBPS switch is defective.**

2. PTS (Power Transfer Switch)

The Power Transfer Switch is used to control the flow of power between the utility line, the MP2000E, and the output load. During normal operation, the utility line is fed into the PTS and the PTS distributes the utility line to the load as well as the BBS to allow battery charging to occur. If the utility line fails, buck mode or boost mode operation is enabled the PTS will only supply the utility line to the MP2000E and direct the output of the MP2000E to support the load.

a. **Verify the utility line is reaching the PTS by measuring the voltage on the L IN terminal with respect to ground. If voltage is not present see step 1 – MBPS.**
b. **Verify buck and boost operation is disabled and the MP2000E is operating in line mode. If any of these conditions exist see troubleshooting MP2000E.**
c. **Measure the voltage at the AC input to the MP2000E with respect to neutral. If voltage is not present check the BBS input AC breaker on the PTS. If it is reset then the PTS is defective. If the breaker cannot be reset, open the AC input breaker on the MP2000E and try to reset the breaker. If it still cannot be reset then the PTS is defective. If the breaker can be reset the see troubleshooting MP2000E.**
d. **Unplug all devices from the 5-15R duplex outlet. Measure the voltage at the 515R duplex outlet. If voltage is not present ensure the circuit breaker labeled outlet receptacle is reset. If the circuit breaker cannot be reset or the circuit breaker is reset but there still is no voltage at outlet, the PTS is defective.**
e. **Measure the voltage at the L OUT terminals of the PTS with respect to neutral. If no voltage is present ensure step b has been verified, check the wiring from the PTS to ensure it is connected to the PTS terminal location on the MP2000E, and then measure the DC voltage on the MP2000E Terminal Block pin 22 (positive) with respect to pin 21 (negative) to ensure the voltage is zero. If the voltage is not zero then the MP2000E is defective. If the voltage is zero then the PTS is defective.**
f. **Measure the line voltage on the AC output terminal block of the MP2000E with respect to neutral. If the voltage is zero see troubleshooting MP2000E.**
g. **If the voltage is present enable the MP2000E in buck mode or boost mode. You should immediately hear the contactor in the PTS engage.**
h. **If you do not hear the contactor engage, measure the DC voltage on the MP2000E Terminal Block pin 22 (positive) with respect to pin 21 (negative) to ensure the voltage is between 40-60VDC. If the voltage is not then the MP2000E is defective. If the voltage is between 40-60VDC and the contactor has not picked up then the PTS is defective.**
i. **Measure the voltage at the L OUT terminal block with respect to neutral. If the voltage is not present the PTS is defective.**

3. MP2000E (Battery Back-up System)

The MP2000E is a Battery Backup System that under normal operation passes the AC input to the AC output. If the utility line falls out of tolerance the unit will disconnect from the AC utility source and invert the batteries DC voltage to an AC voltage to support the load.

a. **Line Mode Operation**
    - **Ensure the status of the MP2000E is in line mode and no faults are present.**

If alarm or fault is present see 2.2.12 for alarms or 2.2.13 for faults. If a fault persists when power is cycled by turning the AC breaker is off and back on then the MP2000E is defective. Once the MP2000E is cycled off and then back on allow 1 minute for the qualification process before checking if the unit is on line.

- **If the unit is in line mode and not faults are present check that the line voltage is supplied to the output by measuring the output line terminal with respect to neutral. If voltage is not present then the MP2000E is defective.**

b. Battery Charging Check

- **If the MP2000E is in line mode with no faults present the batteries should be getting charged. In order to measure the charging current ensure the load is powered by the utility line so there is no load current going through the MP2000E. To check the charger operation measure the AC input current into the MP2000E. If the battery voltage at the battery test point is less than 48VDC then the charger should be in full operation. This should be seen by an AC line current of approximately 4 amps. If a battery voltage is greater than 48VDC then the charger may be in float voltage operation. During float voltage operation a fluctuating current will be seen in the AC line that will be a low as zero and as high as 4 amps.**
- **If the AC line current is less than 1 amp then the battery is not charging. This can be caused by a faulty sensor. Shut the MP2000E off and remove the battery temperature sensor. Check the probe tip to ensure it is not crushed, inspect the wire for damage, and inspect the connector for corrosion. The resistance of the probe should be approximately 10,000 ohms at 25˚C, 20,000 at 10°C, and 5000 at 40°C.**
- **If the sensor is OK check the temperature of the battery in the meter menu. If the temperature of the battery is above 50˚C then the unit will not charge.**

c. Battery Backup Check – Battery backup is tested by actuating a self test by shorting the front panel control contacts 19 and 20 labeled self test, through the keypad self test (see 2.2.9), or the RS232 menu under maintenance mode battery test (see 2.3.4.4). Once the MP2000E is placed in self test the MP2000E should transfer to battery backup mode.

- **If the MP2000E exhibits a short circuit fault when transferring to battery backup mode check the wiring to the load and ensure that the load is not too large for the unit. Remove the load and retry the test if a short circuit appears with no load connected then the MP2000E is defective.**
- **If the MP2000E exhibits a Battery low voltage fault check the battery health and the wiring connection from the MP2000E to the battery.**

For additional troubleshooting information please see sections 1.6, 2.2.3, 2.2.4, and 2.4.3 of the manual.

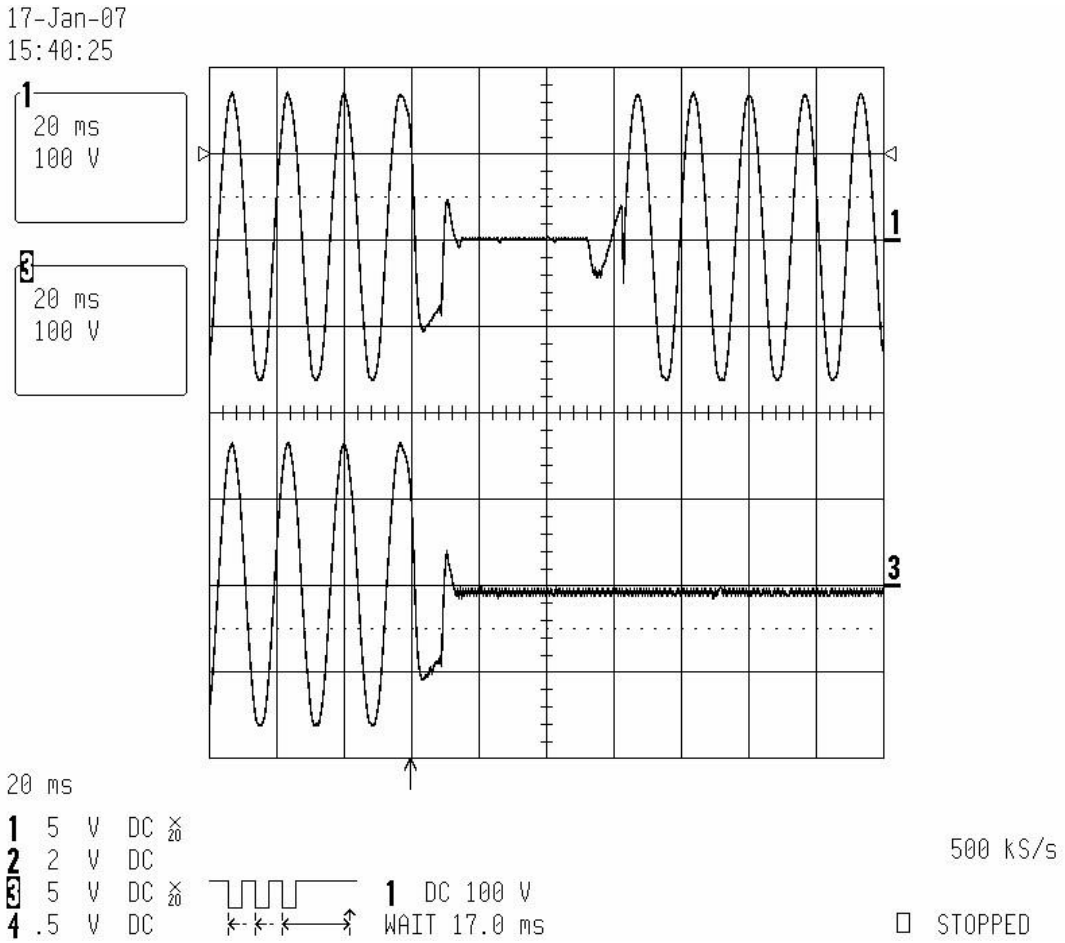


Figure 51

Waveform

Figure 51 is a waveform illustrating the transfer from line mode to battery backup mode. The top trace is the line output of the PTS with respect to neutral and the lower trace is the line input of the utility with respect to the neutral. When the utility line drops to zero, there is a transfer time of 50ms before the inverter supports the load.

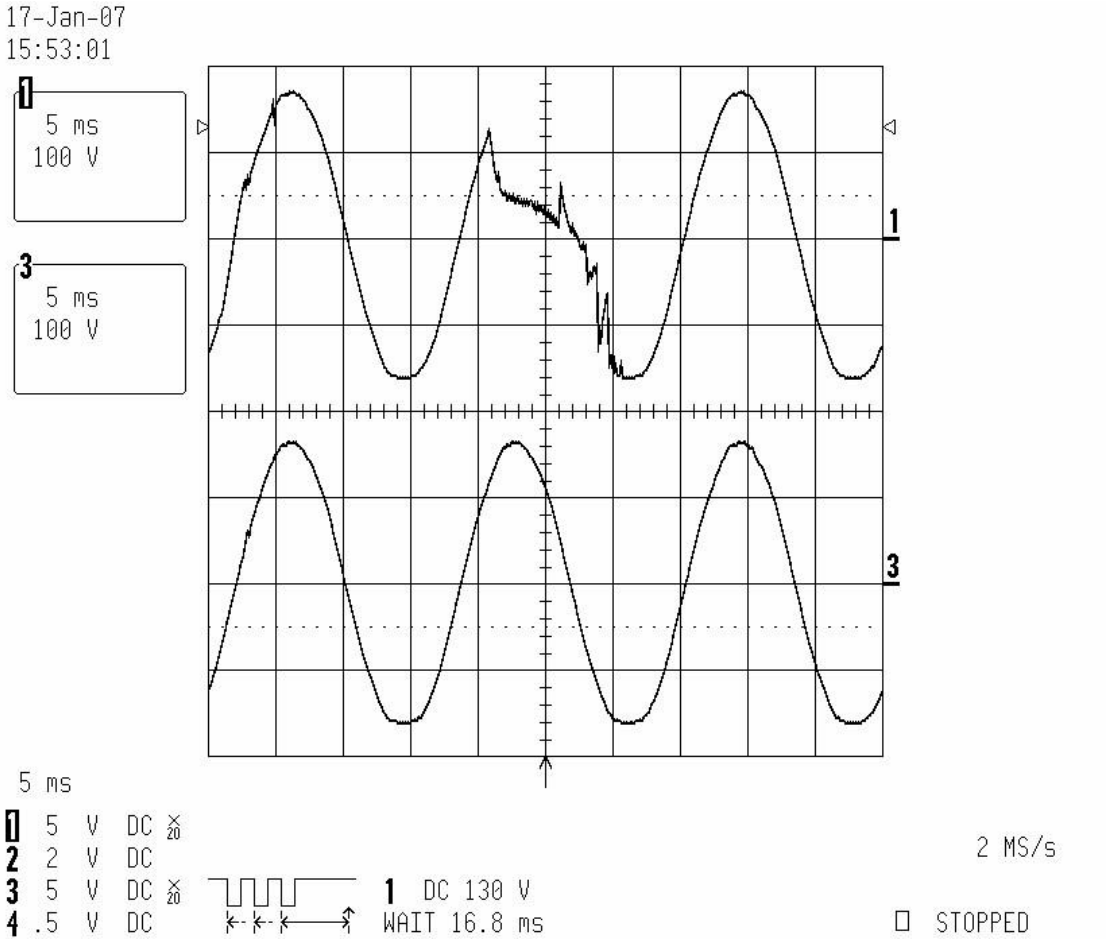


Figure 52

Waveform

Figure 52 is a waveform illustrating the transfer from battery backup mode back to line mode. The top trace is the line output of the PTS with respect to neutral and the lower trace is the line input of the utility with respect to the neutral. When the utility line is qualified, there is a short transfer time of 10ms before the utility supports the load.

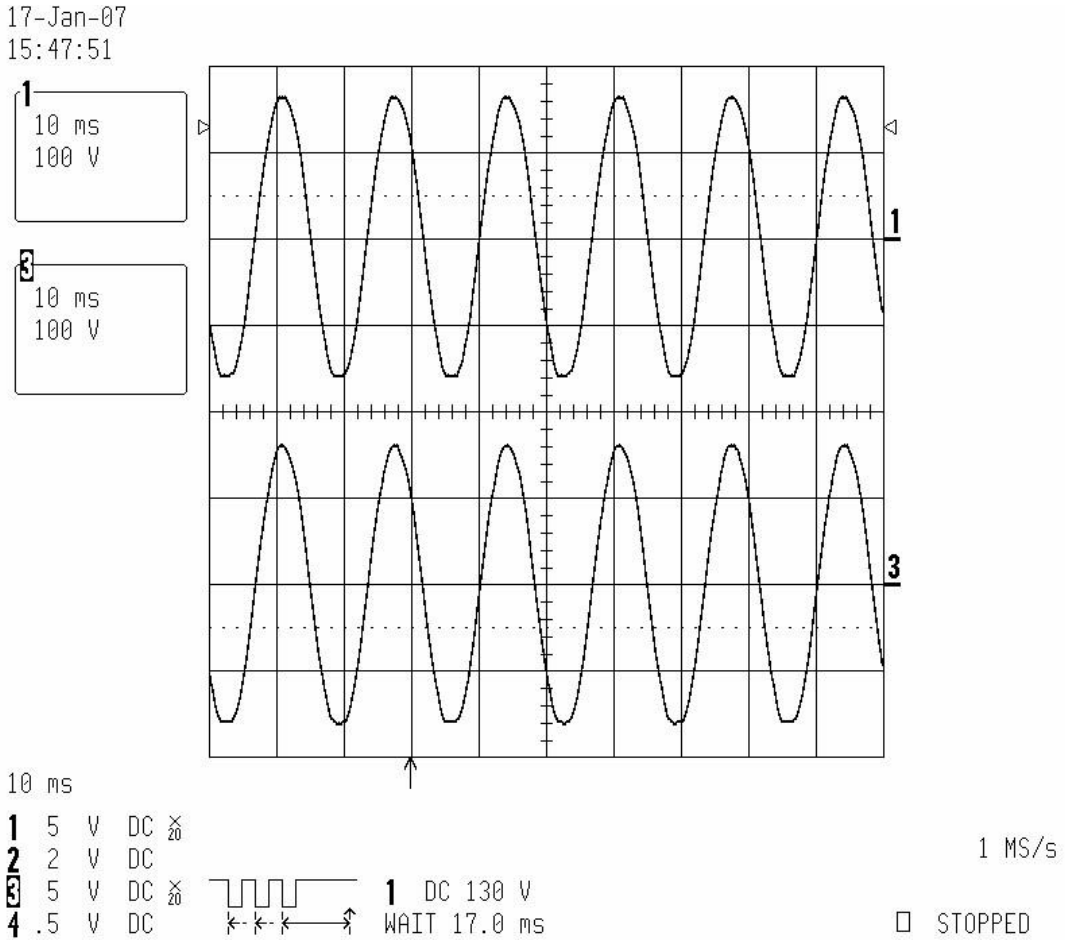


Figure 53

Line Mode Waveform

Figure 53 is a waveform illustrating normal waveforms during line mode. The top trace is the line output of the PTS with respect to neutral and the lower trace is the line input of the utility with respect to the neutral. The utility line is 118VAC, 60Hz which is within the normal specification for the MP2000E. The exact transfer set points are adjustable by the parameters in the line detection area of the menu. For further details, refer to the Adjustments section of the manual, under Line Detection Adjustments.

2.4.3.1 Troubleshooting Table

Purpose: Describes the most common problems with the MP2000E.

There are NO Maintenance items inside the MP2000E and it should be opened or serviced only by factory authorized service personnel, failure to do so will void the WARRANTY. If it fails to perform a specific function, Figure 54 below lists typical symptoms, causes and solutions. If you cannot resolve a problem, contact Myers Emergency Power Systems. customer service department (see 2.4.2 above).

SYMPTOM	CAUSE	REMEDY
No Output	AC input & output circuit breaker is OFF	Turn input & output circuit breaker on
	No incoming utility line power	Apply incoming utility power by closing upstream breaker
	Red LED is lit solid on front indicating FAULT	Read the FAULT under Status Menu of LCD display. See 2.2.13. Clear the fault. Shut off both the breakers on the front panel. Restart. Contact the factory, if fault persists
Output LED OFF	Incoming utility power or battery power not available	Apply qualified input power and verify battery breaker is closed
	Faulty Unit	Contact factory
Unit does not transfer to Battery mode during a power failure **OR** **Backup time is less than rated**	Battery Not connected	Connect batteries (48VDC nominal)
	Battery circuit breaker OFF	Close battery breaker
	Battery is not fully charged	Fully recharge the battery then test backup time (see 2.4.1)
	Dead battery	Replace with a good battery
	Battery failure	Clean and tighten battery connections Check batteries and replace if needed
	Faulty Unit	Contact vendor
Alarm LED is lit	Red LED steady ON indicates FAULT	Correct the Fault (see 2.2.13)
	Red LED flashing indicates ALARM	Correct the Alarm (see 2.2.12). Contact the factory if Alarm persists

Figure 54
Troubleshooting Table

SYMPTOM	CAUSE	REMEDY
Batteries will NOT Charge	Battery Circuit OPEN	Check that battery connections have proper torque. Check 46 to 56VDC present at the battery connector to MP2000E. Check battery cable harness for connection error, loose/open connections. Check if Battery Breaker is closed. Replace the bad battery, if any.
	Wrong or bad temperature probe connected at front panel	Use Factory supplied Temperature Probe reading approximately 12,000 OHMS @ 25°C (77°F)
LCD screen NOT readable	Adjust the contrast for LCD screen	Press and hold the ESC buttom. Press ENTER Button. Adjust the contrst using UP or DOWN arrow buttons. Press ENTER when completed
	Faulty Unit	Contact factory
Password access NOT available	Entered Password is LOST or forgotten	Call factory for resetting of the new password

Figure 54
Troubleshooting Table

CONTRAST ADJUSTMENT FOR LCD DISPLAY

1. **While pushing the ESC button on the front panel**
2. **Press the ENTER button and adjust the contrast up or down**
3. **Press Enter when adjustment is complete**

2.4.4 Battery Maintenance

The batteries are maintenance-free. Battery life can be affected by many factors such as: operating temperature, number of discharges during the battery's life, and periodic Preventative Maintenance (see 2.4.1). This system complies with the battery manufacturer's specifications for optimum performance and the longest possible battery life.

2.4.5 Glossary

Absorbed Glass Mat (AGM):
A fiberglass mat material used in a lead acid battery to hold the electrolyte. A technology for making a battery non spills.

Ambient Temperature:
The temperature of the surrounding environment such as the cabinet or room temperature.

Alternating Current:
An electrical current that pulsates the direction of flow of electrons. The flow changes from positive to negative. Abbreviated as AC

Amp Meter:
Instrument that measures electrical current in a line.

Ampere Hour (Ah):
Term used to convey the capacity of a battery. Ampere hours is the length of time a battery can deliver a rate of discharge under specific conditions.

ASCII:
American Standard Code for Information Exchange

Battery:
A device that produces electricity; may have several primary or secondary cells arranged in parallel or series.

BBS:
Battery Back-Up System

Capacity:
The quantity of electricity a battery can deliver at a given rate over a specific period of time.

Charging:
The process a battery is subjected to replenish it to its fully charged state. The process is accomplished by passing an electrical current through the battery plates and electrolyte to restore the chemicals to their original state.

Continuity:
The condition of a circuit when it makes a connection between two points.

CPU:
Central processing unit.

Current:
The rate flowing electrons over a period of time. This is usually expressed in amperes

Cycling:
Repeatedly turning something on and off, such as cycling a battery.

Deep Discharge:
To use up 80% or more of a batteries capacity.

Direct Current:
electrons flowing in a single direction. Abbreviated as DC.

Electricity:
the flow of electrons through a circuit or device.

Fuse:
Device placed in a circuit designed to open or break the connection at a specific level of current. A device placed in a circuit to protect it from dead shorts and spikes in current.

Gel Cell:
A form of electrolyte used in lead acid batteries. A gel cell battery is non-spill able design.

Generator:
A device that converts mechanical energy to electrical energy, generally using electromagnetic induction. The source of the mechanical energy may be a reciprocating or turbine engine or internal combustion engine.

Hz:
Hertz

Incandescent Light:
The incandescent light bulb or incandescent lamp is a source of artificial light that works by incandescence. An electrical current passes through a thin filament, heating it and causing it to become excited, releasing thermally equilibrated photons in the process. The enclosing glass bulb prevents the oxygen in air from reaching the hot filament, which otherwise would be destroyed rapidly by oxidation.

LED:
A light-emitting diode (LED) is a semiconductor device that emits incoherent narrow-spectrum light when electrically biased in the forward direction. This effect is a form of electroluminescence. LED lights are used in traffic signals to replace incandecent lights.

79 Load:
The resistance in a circuit. In a typical traffic intersection the load is the signal heads and the electrical equipment housed in the signal cabinet.

Maintenance Free Battery:
A sealed battery that requires no service. The battery is sealed so it requires no water to be added.

MPP:
Myers Emergency Power Systems

OHM:
Unit of electrical resistance named after George Ohm. An ohm is a resistance that produces a potential difference of one volt when a current of one ampere is flowing through it.

Ohmmeter:
A device or instrument for measuring resistance in an electrical circuit.

Polarity:
All of the electrical equipment in a system has been designed with proper A/C polarity in mind. A specific leg of the A/C line has been dedicated as the positive (sometimes referred to as hot) conductor and the other leg as the negative (sometimes cold) or neutral.

Resistance:
The opposition of a circuit or conductor to allow the passage of electrical current.

RFI:
Radio Frequency Interference

Sine Wave:
A waveform is a representation of how alternating current (AC) varies with time. The most familiar AC waveform is the sine wave, which derives its name from the fact that the current or voltage varies with the sine of the elapsed time.

Volt:
The volt (symbol: V) is the SI derived unit of electric potential difference or electromotive force. It is named in honor of Alessandro Volta.

Watt:
Unit of measurement for electrical power. It is named in honor of James Watt

2.4.6 Specifications

Functions	
Brownout Protection	This unit boosts the output voltage (or transfers to battery) during brownout or low input line conditions and returns to On Line when input power stabilizes and returns to normal. The values for Transfer / Retransfer, To / From Battery/ Boost mode are user programmable.
Generator Compatibility	Generator mode allows for more variations in input voltage and frequency for use with an AC generator
Battery Charger 10A	PFC switch-mode charger is temperature compensated (-3 to -5 mV/C/Cell) with automatic shut off above 50 C.
Inverter Mode	Capable of running continuously in inverter mode.
Inverter Mode Current Limit	Continuous electronic current limit is provided.
Measurements available for remote monitoring	Input and output voltages Input line frequency Battery voltage and current Battery and heat sink temp.

Mechanical Specifications	
Dimensions (H x W x D), inch (mm)	5.25" x 17" x 10.5", 3U size (133 mm x 432 mm x 267 mm)
Weight, lb (kg)	46.2 (21)
Input Connection	Quick Connect Connector or terminal block
Output Connection	Quick Connect Connector or terminal block
Mounting	19" (483 mm) or 23" (584 mm) rack or shelf mount
Cooling	Microprocessor controlled, 12VDC, 3.62" (92 mm) fan
Audible Noise Level, dBA	<40
Operating Temperature oC	-37 to +74°C (See Notes 1 and 2)
Storage Temperature oC	-50° to +75°C
Humidity	Less than or equal to 95%, Non-Condensing
Altitude, ft (m)	10, 000 (3048) (See Note 2)

Electrical Specifications	
Output Apparent Power, VA	2000 (Inverter Mode) 2000 (Line Mode)
Output Active Power, W	1500 (Inverter Mode) 1500(Line Mode)
Power Factor	0.75
Input Frequency, Hz +/ 3HZ	60
Input Voltage Range, VAC	90 to 150 VAC User programmable. Defaults set @ 100 ~ 130 VAC +/ 2 VAC.
Output Voltage	120 Nom (Tolerances are user programmable)
Inverter Mode	120 VAC+/-5%
Maximum Input Current, A	30
Transformer	Linear (Non-Isolated)
Transfer Time, msec	<65 msec. Buck & Boost enabled <10 msec.
Inrush Current	Load dependant
Output Waveform THD, %	<3 (Resistive Load)
Load Crest Ratio	3:1
Efficiency, Line Mode	> 95% (Resistive Load)
Efficiency, Inverter Mode	> 80% (Resistive Load)
Nominal Battery String	48VDC Voltage, VDC
Step Load Response (50%)	1Cycle full recovery
Over Current Protection	Double Pole Single Throw Circuit Breaker Rated at 30 Amp for input and output DC Bus: 60 Amp circuit breaker
Transient Suppression	MOV transient suppression elements (>150V)
DC Power	Drawn from batteries

Notes:

Notes:
1. Between 55° and 74°C, the unit is de-rated to a maximum load of 1600VA/1200W.
2. De-rate operating temperature above 4900 FT (1500m) by 5° C per each additional 1000 ft (3000m).

Note: Specifications subject to change without notice.

22 Position Terminal Block	
Functions	A. Provides 6 sets of programmable contacts on pin 1 thru pin 18 for intersection flash control, remote alarms, pagers or per user's discretion. 1. Low Batt: the batteries reach approx 40% 2. On Batt: the unit is in inverter mode. 3. Timer: the unit has been in inverter mode 4. Alarm: the "Alarm" contact energizes a. Line Freq error b. Low O/P watt c. No Temp d. Overload f. High Temp e. No battery connect g. Low Temp 5. Fault: the "Fault" contact energizes when the following condition appear. a. Short circuit b. Batt low voltage c. Batt high voltage d. High temperature e. Overload B. Provides 48VDC signal to the PTS on pins 21 & 22 C. Triggers the self-test by momentarily shorting
Contact Type	Form C dry contacts rated to 1 Amp at 120V
Wiring	Uses 14-26 AWG

Communication Specifications	
RS232 / USB Interface	Monitors, controls and calibrates with terminal emulation software for service personnel to obtain unit diagnostics
RS232	DB-9, Female, Opto-Isolated
Ethernet	Embedded HTML

Note: Specifications subject to change without notice

PART NUMBER LISTING

G30219CA	MP2000E w/ Quick Connect VAC I/O	1.0 EA
G30219TB	MP2000E W/ SET-SCREW TB VAC I/O	1.0 EA
722541	KIT, PTS/MBPS, MANUAL, INSTRUCTIONS	1.0 EA
722506	EIA, MTG BRKTS, KIT MP2000E	1.0 EA
722507	INSTALLATION KIT, UPS WIRE/TERM/DIAG CADOT	1.0 EA
722535	PTS/MBPS ASSY, EIA MOUNT BLK, #10 WIRE	1.0 EA
722535CT	PTS/MBPS w/ Quick Connect VAC I/O	1.0 EA
739575M	BATTERY CABLE, MP2000E, 5/16, QUICK BC SERIES 10 FT	1.0 EA

722506	EIA MKG BRKTS, KIT	1.0 EA
80456	UPS MP2000E EIA MOUNTING BRACKETS	2.0 EA
722528	SCREW KIT, EIA BRACKET FOR MP2000E BBS	1.0 EA

722507	INSTALLATION KIT, UPS	1.0 EA
519	WIRE 10AWG WHT 105/30 600V 105C UL1015	7.0 FT
526	WIRE 10AWG RED 105/30 600V 105C UL1015	7.0 FT
527	WIRE 10AWG BLK 105/30 600V 105C UL1015	7.0 FT
582	WIRE 10AWG GRN 105/30 600V 105C UL1015	7.0 FT
28026101-209	CABLE 18AWG 1 PR TWISTED BLK/WHT 600V 105C PVC NY	20.0 FT

722535	PTS/MBPS ASSEMBLY, EIA MOUNT	1.0 EA
71243	TERMINAL BLOCK 04P 65A 600V 14-6AWG BLACK .571 CTC	1.0 EA
71250	PTS ASSEMBLY	1.0 EA
722027	FRONT PANEL, PTS/MBPS, PAINTED AND SILK SCREENED	1.0 EA
G30030	SWITCH, TRANSFER 40A 2P 600V, ENT#VY40/S/122/ST	1.0 EA

71250	PTS ASSEMBLY	1.0 EA
71241	RECEPTACLE 15A 125V DUPLEX BLACK	1.0 EA
71242	CONTACTOR DL 4K-T ENTRELEC	1.0 EA
71243	TERMINAL BLOCK 04P65A 600V 14-6AWG BLACK .571 CTC	1.0 EA
71249	CIRCUIT BREAKER, 15A PUSH RESET, FUSE HOLDER, TYPE W28	2.0 EA

739579M	BATTERY CABLE, MP2000E, ¼"	1.0 EA
739558	ASSEMBLY, BATTERY CABLE, (4), MP2000E QUICK BC-UPS	1.0 EA
739577	BATTERY TERMINAL ADAPTER, ¼" RING MP2000E QUICK (MOLEX)	4.0 EA

2.4.8 WARRANTY

MYERS
EMERGENCY POWER SYSTEMS

LIMITED 24-MONTH WARRANTY

Myers Emergency Power Systems. warrants its equipment to be free of manufacturing defects in material and Workmanship to the original purchaser for a period of 24 months from the date of manufacture. The liability of Myers Emergency Power Systems. under this warranty is solely limited to repairing, replacing, or issuing credit for such equipment (at the discretion of Myers Emergency Power Systems.), provided that:

Myers Emergency Power Systems Customer Service Department is promptly notified, by facsimile or telephone, that a failure or defect has occurred within the warranty period.

Myers Emergency Power Systems. Customer Service Department issues a Return Materials Authorization (RMA) number, and designates the service location. The RMA must be clearly marked on the outside of the shipping container.

Purchaser is responsible for all in-bound shipping and handing charges (COD and freight collect will not be accepted without prior approval from Myers Emergency Power Systems.); Myers Emergency Power Systems. will pay out-bound surface shipping charges for return of repaired equipment that is under warranty.

A satisfactory examination of the returned unit by Myers Emergency Power Systems. Service personnel shall disclose that defects have not been caused by misuse, neglect, improper installation, repair, alteration, or accident, or failure to follow instructions furnished by Myers Emergency Power Systems. If Myers Emergency Power Systems. Service personnel determine that the unit has been damaged due to one of these causes, or if the unit is free of defects, a handing or repair fee may be assessed prior to returning the unit.

BATTERIES, PERIPHERAL DEVICES, ATTACHMENTS OR APPARATUS NOT MANUFACTURED BY MYERS EMERGENCY POWER SYSTEMS.; MYERS EMERGENCY POWER SYSTEMS. WILL ASSIGN TO THE PURCHASER, IT'S RIGHTS UNDER THE ORIGINAL MANUFACTURER'S WARRRANTY OF SUCH BATTERIES, PERIPHERAL DEVICES, ATTTACHMENTS OR APPARATUS, BUT OFFERS NO ADDITIONAL WARRANTIES IN CONNECTION THEREWITH.

THIS LIMITED 24-MONTH WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANT ABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

IN NO CASE SHALL MYERS EMERGENCY POWER SYSTEMS. BE LIABLE FOR ANY INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES WHAT SO EVER, INCLUDING WITHOUT LIMITATION ANY CLAIM FOR LOST PROFITS, REVENUES ,OR OTHER LIABILITIES, EVEN IF MYERS EMERGENCY POWER SYSTEMS. HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH, FOR BREACH OR THIS OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED.

Any action for breach of this limited 24-month warranty must be brought within a period of 24 months from date of manufacture.

This limited 24-month warranty does not extend to any unit that has been repaired or altered by any party other than Myers Emergency Power Systems. or its Authorized Service Center

Myers Emergency Power Systems. reserves the right to discontinue particular models and to make modifications in design and/or function at any time, without notice and without incurring obligations to modify previously purchased units.

2.4.9 EMERGENCY SHUTDOWN PROCEDURE

TURN-OFF BOTH THE AC & BATTERY BREAKER IN AN EMERGENCY. The MP2000E BBS contains more than one live circuit. In an emergency, AC line power may be disconnected at the system's input, but output AC power may still be present from batteries.

START

Turn OFF the battery circuit breaker

Turn *OFF* the AC input & output circuit breaker

Unplug the Line Cord or turn off the incoming utility input breaker located upstream, supplying power

EMERGENCY SHUTDOWN FINISHED

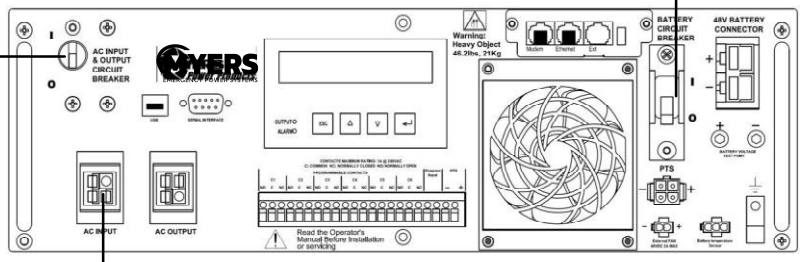
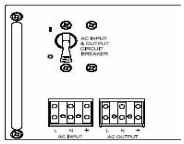


Figure 65

MP2000E BBS Front Panel



Alternate Connection

For parts or technical information contact:

Myers Emergency Power Systems

TEL: (610) 868-3500

FAX: (610) 868-8686

WEB: www.myerseps.com

Myers Emergency Power Systems LLC
44 S. Commerce Way
Bethlehem, PA 18017 USA
TEL: (610) 868-3500
FAX: (610) 868-8686
WEB: www.myerseps.com