

Smart choice for power

xantrex



Owner's Manual

**Trace Unrestricted Run-time -
Uninterruptible Power System**

Trace 512 UR-UPS

Trace 524 UR-UPS

Trace 1012 UR-UPS

Trace 1024 UR-UPS

www.xantrex.com

About Xantrex

Xantrex Technology Inc., is a world-leading supplier of advanced power electronics and controls with products from 50 watt mobile units to 1 MW utility-scale systems for wind, solar, batteries, fuel cells, microturbines, and backup power applications in both grid-connected and stand-alone systems. Xantrex products include inverters, battery chargers, programmable power supplies, and variable speed drives that convert, supply, control, clean, and distribute electrical power.

Trademarks

Trace is a registered trademark of Xantrex Technology Inc. Xantrex is a registered trademark of Xantrex International.

Notice of Copyright

Trace Unrestricted Run-Time Uninterruptible Power System (UR-UPS) Owner's Manual © October 2002 Xantrex Technology Inc. All rights reserved.

Disclaimer

Since the use of this guide and the conditions or methods of installation, operation, use, and maintenance of the unit are beyond the control of Xantrex Technology Inc., the company does not assume responsibility and expressly disclaims liability for loss, damage, or expense arising out of or any way connected with such installation, operation, use, or maintenance.



See Appendix C - Product Information and Warranty for specific warranty coverage.

Date and Revision

October 2002, Revision A

Document Number

975-0049-01-01

Contact Information

Web: www.xantrex.com

Email: CustomerService@xantrex.com

Phone: 1.888.670.0707 (Toll Free)
1.604.422.2777 (Direct)

Fax: 1.604.420.2145

Table of Contents

1.0 Introduction	1
Basic Features and Functions	1
Unpacking and Inspection	2
Model Identification and Numbering Conventions	2
2.0 Installation	5
Materials Required	5
Tools Required	5
Mounting	6
To Mount the Trace UR-UPS to the Wall	6
Configuration Options	8
To Remove the Top Cover	8
Replacing the Top Cover	8
To Configure the Trace UR-UPS	9
Setting AC Transfer Sensitivity (JP1 - BROWNOUT)	11
To Select UPS MODE (Default) (105 - 130 Vac)	11
To Select GEN MODE (90 - 140 Vac)	11
Setting Battery Type (JP2 - Gel/Liquid)	12
To Select GEL Battery Charging (Default)	12
To Select LIQUID Battery Charging	12
Setting Depth-of-Discharge (JP3 - LVD)	13
To Select Deep Depth-of-Discharge (Default)	13
To Select Shallow Depth-of-Discharge	13
Setting Option B (JP4 - OPTION B) (Not used)	14
DC Grounding	15
DC Wiring	15
DC Disconnect and Over-current Protection	16
Connection to the Battery	17
AC Grounding	19
AC Wiring	19
Prewired AC Input and Output	19
Hardwiring the AC Input and Output (if required)	20
Knockout Preparation	20
Input Wiring	21
Output Wiring	22

Table of Contents (continued)

3.0 Operation	23
Basic Control Panel Features	23
Modes of Operation	24
INVERT Mode	24
CHG Mode	24
SEARCH Mode	24
Battery Voltage Meter	25
LED Indicators	25
Battery Charger Operation	26
BULK	26
ABSORPTION	26
FLOAT	26
Inverter to Charger Transition	27
4.0 Troubleshooting	29
Basic Troubleshooting	29
Potential Brownout Conditions	30
Potential Problem Loads for UPS Applications	30
General Issues	30
Heavy Loads	30
Cell Phones	31
Consumer Electronics	31
Waveform Issues	31
Ceiling Fans	31
Clocks	31
Dimmer Switches	31
Microwave Ovens	32
Printers	32
Rechargeable Devices	32
Potential Problem Loads related to Search Sense Mode	32
Confirming Search Mode Operation	32
Computers and Sensitive Electronics	33
Incandescent Lights	33
Fluorescent Bulbs	33
Fluorescent Lights	33
Decreasing Loads	33
Undersized Loads	33
Other loads	34

Table of Contents (continued)

Appendix A - Specifications	A-1
Appendix B - Battery Information	B-1
Selection of a Battery Type	B-1
Flooded Lead Acid (FLA)	B-1
RV and Marine	B-1
Golf Cart	B-2
Industrial (electric forklift)	B-2
Sealed Batteries (GEL and AGM)	B-2
Gel Cell	B-2
Absorbed Glass Mat	B-2
Battery-Bank Sizing	B-3
Estimating Battery Requirements	B-4
Typical Appliance Wattages	B-9
Battery Configurations	B-10
Series	B-10
Parallel	B-11
Series-Parallel	B-11
Battery Care and Maintenance	B-12
Replenish Water Levels	B-12
Clean Battery Cables and Posts	B-12
Check Battery's State-of-Charge	B-13
Appendix C - Product Warranty and Service Information	C-1
Limited Warranty	C-1
What does this warranty cover and how long does it last?	C-1
What will Xantrex do?	C-1
How do you get service?	C-2
What does this warranty not cover?	C-3
DISCLAIMER	C-4
Product	C-4
Exclusions	C-5
Information	C-5
WARNING: LIMITATIONS ON USE	C-6
Return Material Authorization Policy	C-6
Shipping Instructions	C-7
If you are returning a product from outside of the USA or Canada	C-7
If you are returning a product to a Xantrex Authorized Service Center (ASC)	C-7
Service Information	C-8
Appendix D - Index	D-1

List of Figures

Figure 1-1	Trace UR-UPS (Unrestricted Runtime - Uninterruptible Power System) ...	1
Figure 1-2	Product Identification	3
Figure 1-3	Model/Serial Number Sticker	3
Figure 2-1	Wall-mounting the Trace UR-UPS	7
Figure 2-2	Removing and Replacing the Top Cover	8
Figure 2-3	Jumper Enlargement	9
Figure 2-4	Jumper Placement	9
Figure 2-5	Jumper Location	10
Figure 2-6	Setting AC Transfer Sensitivity (JP1)	11
Figure 2-7	Battery Type Selection (JP2)	12
Figure 2-8	Setting Depth of Discharge (JP3)	13
Figure 2-9	Setting Option B (JP4) (Not Applicable at this time)	14
Figure 2-10	DC Connections	15
Figure 2-11	Battery Cable Connections	18
Figure 2-12	Battery Cable Caps	18
Figure 2-13	AC Input Plug and Output Receptacles	19
Figure 2-14	Knockout locations for AC IN and AC OUT Wiring	20
Figure 2-15	Wiring AC Input to Terminal Block	21
Figure 2-16	Wiring AC Output to Terminal Block	22
Figure 3-1	Trace UR-UPS Control Panel	23
Figure 3-2	3-Stage Battery Charger Graph	27
Figure B-1	Series Configuration for Battery Connections	B-10
Figure B-2	Parallel Configuration for Battery Connections	B-11
Figure B-3	Series-parallel Configuration for Battery Connections	B-11

List of Tables

Table 2-1	Jumper Settings	10
Table 2-2	Recommended Battery Cable Sizes	15
Table 3-1	Status Indicator LEDs	25
Table B-1	Sample - Estimating Battery Requirements	B-6
Table B-2	Estimating Battery Requirements - Worksheet	B-8
Table B-3	Typical Appliance Wattage	B-9
Table B-4	Battery State-of-Charge	B-14

Important Safety Instructions

NOTE: This statement is important. Follow instructions closely.

NOTE: Cette déclaration est importante. Suivre les instructions de près.



CAUTION: This procedure is critical to the safe installation or operation of the unit. Follow these instructions closely.

ATTENTION: Cette procédure est essentielle à l'installation ou l'utilisation de l'unité en toute sécurité. Suivre ces instructions de près.



WARNING: A DANGEROUS VOLTAGE OR CONDITION EXISTS IN THIS AREA. USE EXTREME CAUTION WHEN PERFORMING THESE TASKS.

AVERTISSEMENT: UNE TENSION OU CONDITION DANGEREUSE EXISTE DANS CETTE ZONE. FAIRE PREUVE D'EXTRÊME PRUDENCE LORS DE LA RÉALISATION DE CES TÂCHES.

This manual contains important safety instructions that should be followed during the installation and maintenance of this product.

To reduce the risk of electrical shock, and to ensure the safe installation and operation of this product, these safety symbols have been placed throughout this manual to indicate dangerous conditions and important safety instructions.

- All electrical work must be done in accordance with local, national, and/or international electrical codes.
- Before installing or using this device, read all instructions and cautionary markings located in this manual, on the unit itself, and/or on the generator.
- Do not expose this unit to rain, snow, or liquids of any type. This product is designed only for indoor usage.
- To reduce the chance of short circuits, always use insulated tools when installing or working with electrical appliances of any kind.
- Remove *all* jewelry while installing this system. This will greatly reduce the chance of accidental exposure to live circuits.
- The unit contains more than one live circuit (e.g., grid and/or generator, or batteries). Power may be present at more than one source.
- This product contains no user-serviceable parts. Do not attempt to repair this unit.
- To reduce risk of electric shock, disconnect all wiring before attempting any maintenance or cleaning. *Turning off the device may not reduce this risk.* As long as AC input power is present, AC power may pass through the unit regardless of the ON/OFF switch position.

Battery Safety Information

- Always wear eye protection, such as safety glasses, when working with batteries.
- Remove all loose jewelry before working with batteries.
- Never work alone. Have someone assist you with the installation or be close enough to come to your aid when working with batteries.
- Always use proper lifting techniques when handling batteries.
- Always use identical types of batteries.
- Never install old or untested batteries. Check each battery's date code or label to ensure age and type.
- Batteries are temperature sensitive. For optimum performance, they should be installed in a stable temperature environment.
- Batteries should be installed in a well vented area to prevent the possible buildup of explosive gasses. If the batteries are installed inside an enclosure, vent its highest point to the outdoors.
- When installing batteries, allow at least 1 inch of air space between batteries to promote cooling and ventilation.
- NEVER smoke in the vicinity of a battery or generator.
- Use insulated tools when working with batteries.
- When connecting batteries, always verify proper voltage and polarity.
- Do not short-circuit battery cables. Fire or explosion can occur.
- In the event of exposure to battery electrolyte, wash the area with soap and water. If acid enters the eyes, flood them with running cold water for at least 15 minutes and get immediate medical attention.
- Always recycle old batteries. Contact your local recycling center for proper disposal information.

1.0 Introduction

Thank you for purchasing the Trace Unrestricted Run-Time - Uninterruptible Power System (UR-UPS) from Xantrex Technology Inc. The Trace UR-UPS takes DC energy stored in a battery, or battery-bank, and converts it to usable AC power to provide backup support in the event of a power failure. When AC power is restored, the UR-UPS recharges the batteries and keeps them ready for future use.

Internal circuitry protects the batteries from over-discharge by shutting down the inverter when a user-defined, low-battery condition occurs. The control panel features LEDs for reading system status.

The Trace UR-UPS is microprocessor-controlled and produces a modified sine wave for use with a variety of electrical appliances, including computers.

Basic Features and Functions

Basic features and functions include the following.

- 500 or 1000 watts output (depending on model) for entry-level, backup power applications
- Models for 12-volt or 24-volt DC input
- Automatic transfer to inverter mode when the AC supply is interrupted, with selectable transfer sensitivity
- Duplex, 15-amp, grounded AC outlets (120 Vac/60 Hz models only)
- 15 amp, AC pass-through circuit, with selectable threshold for AC input
- Configurable battery type selection for liquid or gel type batteries
- Three-stage battery charger
- Control-panel LEDs for status and error indication
- Battery voltage indicator
- Selectable low-battery cut-out to protect the batteries from over-discharge
- Automatic cooling fan



Figure 1-1
TRACE UR-UPS (Unrestricted Run-time - Uninterruptible Power System)

1.0 Introduction

Unpacking and Inspection

- Carefully unpack the unit from its shipping carton.
- Verify all of the items listed below are present.
 - One (1) Trace Unrestricted Run-Time Uninterruptible Power System (UR-UPS)
 - Two (2) Battery Cable Caps (one black and one red)
 - One (1) Owner's Manual

Please call Xantrex Customer Service at 1-800-670-0707 (toll free) or 1-604-422-2777 (direct) if any items are missing.

- Save your proof-of-purchase. This is required if the unit should require warranty service.
- Save the original shipping carton and packing materials! If the unit ever needs to be returned for service, it should be shipped in the original carton. This is also a good way to protect the unit if it ever needs to be moved.
- Record the unit's model, serial number and date of purchase in the appropriate fields in section *Appendix B - Product Information and Warranty*.

Model Identification and Numbering Conventions

The Trace UR-UPS is identified by the model number label located below the voltage meter on the control panel. All the necessary information is provided on the label such as AC output voltage, power, and frequency.



See Figure 1-3, *Model Number Sticker*, on page 3.

The model number describes the type of technology, the output specifications, the required battery voltage, the output voltage, and frequency.

“DR” indicates the type of inverter/charger technology - DR Series

“UR” Unrestricted Run-time

“UPS” Uninterruptable Power System

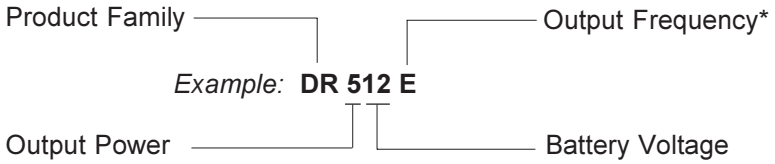
“5” the first one (or two) digits of the numerical designator indicate the unit's output power - e.g., 500 Watts

“12” the last two digits indicate the required nominal battery bank voltage - e.g., 12 Vdc

“E” designates output frequency. No letter indicates 60 hertz models.

1.0 Introduction

Model Identification and Numbering Conventions (continued)



Letter Suffix	Output Voltage	Output Frequency
(no letter)	120 VAC	60 Hz
E*	230 VAC	50 Hz

*Not Available at this time

Figure 1-2
Product Identification

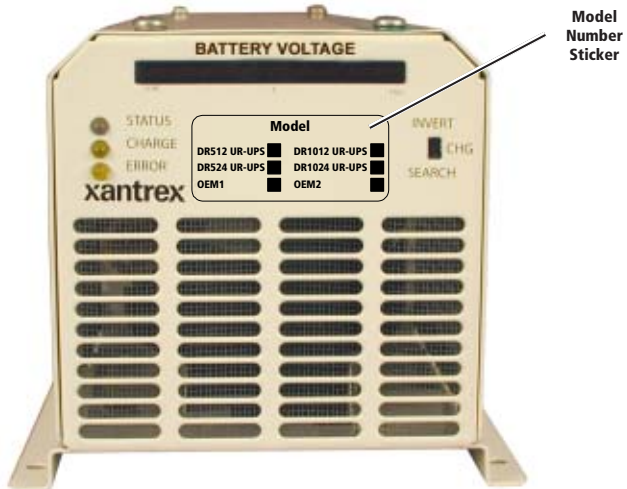


Figure 1-3
Model Number Sticker

1.0 Introduction

Notes:

2.0 Installation

Materials Required

The following items are required for this installation.

- One (1) Trace Unrestricted Run-Time - Uninterruptible Power System (UR-UPS)
- Two (2) Battery Cable Caps (one black and one red) (provided) (optional to use)
- One (1) Owner's Manual
- Two (2) pre-cut 2x4s for mounting the unit on the wall (optional)
- Four (4) #10 wood screws of sufficient length to penetrate the 2x4s and 1½" into the wall studs (optional)
- For units requiring hardwiring of the AC input and output, adequate wire of appropriate size and length to comply with local electrical standards and regulations.
- Appropriately sized battery, or battery-bank, to support the desired loads.



See Appendix B for information on batteries and battery-banks.

- Appropriately sized battery cables.



See Table 2-2 for the recommended sizes for battery cables based on the distance from the Trace UR-UPS.

- DC fuse or disconnect device.



See page 16 for additional information on DC fuses and DC disconnect devices.

Tools Required

The following tools may be needed to complete this installation.

- Wire strippers
- Phillips screw driver
- Drill
- Slotted screw driver ¼" (6 mm) blade
- Torque wrench
- Needle-nose pliers
- Measuring tape or yard stick

2.0 Installation

Mounting

NOTE: Do not locate the unit in the same enclosure with liquid batteries. These batteries can produce explosive gases and must be well ventilated.

It is recommended to use a battery enclosure that is vented to the outdoors for these types of batteries.

The Trace UR-UPS is designed for indoor use only. It can be mounted on a shelf or a table next to the batteries or mounted to a wall. Make sure the location has very good ventilation.

If wall mounting is used, extra support must be provided as wallboard is not strong enough to support the weight of the unit (approximately 30 lbs). The easiest method for securing the unit to an existing wall is to place two 2x4s horizontally on the wall (spanning at least three (3) studs) and securing the unit to the 2x4s.

To Mount the Trace UR-UPS to the Wall

NOTE: Before mounting the Trace UR-UPS to a wall, be sure to configure the internal jumpers according to your specific installation requirements.



See pages 9 through 14 for specific instructions on changing jumper settings.

1. Locate the studs and mark their location on the wall.
2. Measure the desired height from the floor for the unit to be mounted.
3. Place a pre-cut 2x4 on the marked location and drill pilot holes through the 2x4s and studs.
4. Secure the 2x4 with #10 wood screws of sufficient length to penetrate 1½ inches into the studs.
5. Repeat steps 3 and 4 above for the second 2x4.
6. Secure the Trace UR-UPS to the 2x4s using the four (4) keyhole slots and six (6) mounting holes as shown in Figure 2-1.

2.0 Installation

Mounting (continued)

To Mount the Trace UR-UPS to the Wall (continued)

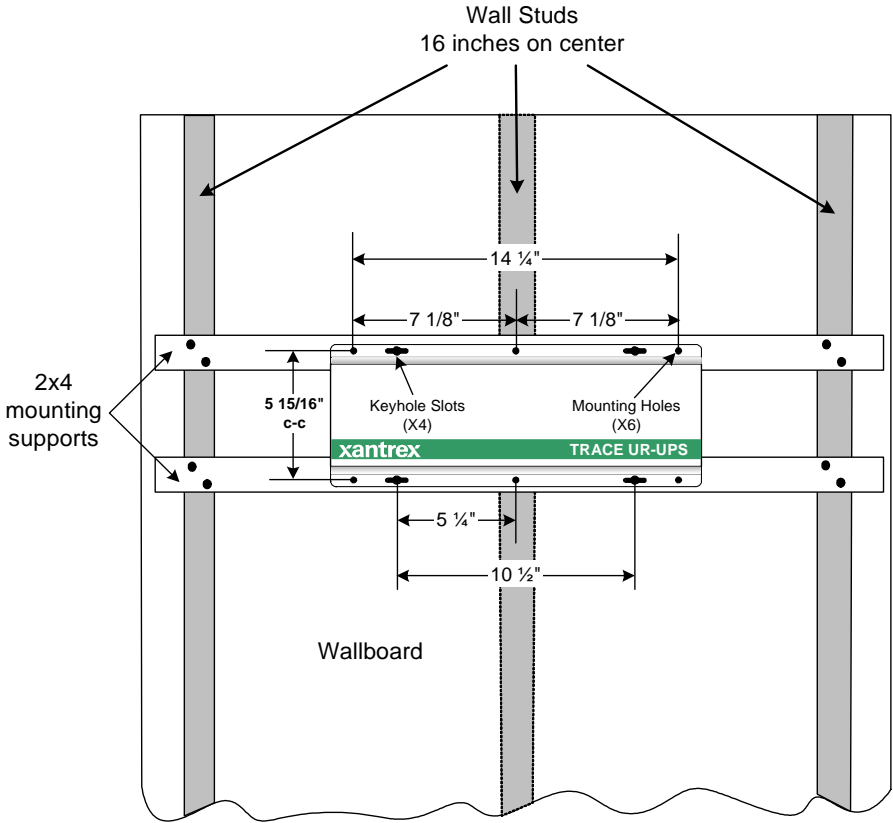


Figure 2-1
Wall-mounting the Trace UR-UPS

2.0 Installation

Configuration Options



WARNING:
CHANGING
CONFIGURATION
SETTINGS
REQUIRES ALL
SOURCES OF
POWER (AC AND
DC) BE
DISCONNECTED
FROM THE TRACE
UR-UPS.

Before connecting the Trace UR-UPS to the AC or DC power source, configure the unit for the following:

- AC Transfer Voltage Sensitivity (JP1)
- Battery Type (JP2)
- Battery Depth-of-Discharge Voltage (JP3)
- Option B (JP4) - Not used at this time.



See pages 9-14 for instructions on setting specific configuration selections.

To Remove the Top Cover

1. Removing the four Phillips screws from the top of the unit.
2. Lift the cover off the unit.

Replacing the Top Cover

1. Set the cover back on the unit ensuring the guide feet insert properly into the base and the ventilation holes are on the top. The four rows of ventilation slots must be on the right hand side.
2. Replace the four Phillips screws from the front of the unit.

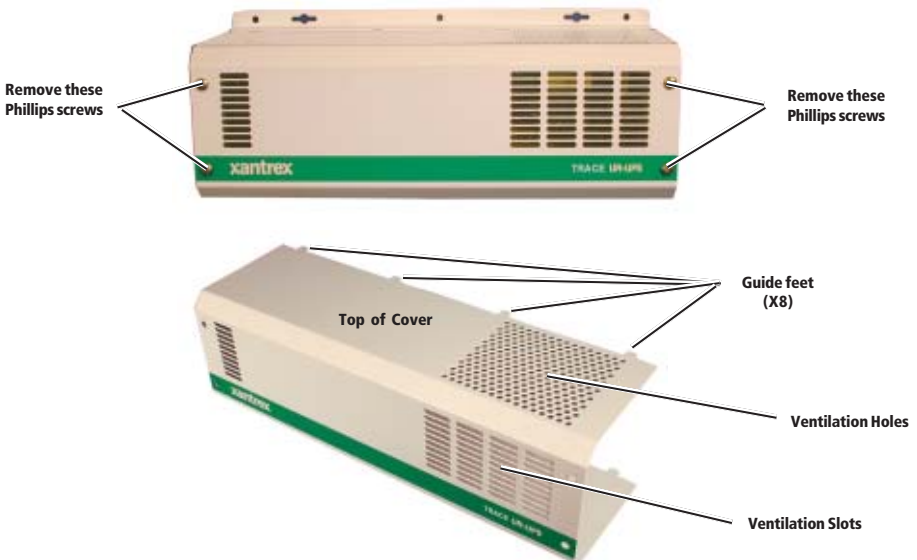


Figure 2-2
Removing and Replacing the Top Cover

2.0 Installation

To Configure the Trace UR-UPS



WARNING:
CHANGING
CONFIGURATION
SETTINGS
REQUIRES ALL
SOURCES OF
POWER (AC AND
DC) BE
DISCONNECTED
FROM THE TRACE
UR-UPS.

The Trace UR-UPS has four jumpers to control its operation. A jumper is a small, rectangular piece of plastic with two square holes in it that fit over two pins. A jumper contains an internal conductor that joins the two pins completing a circuit. When the jumper is removed, the circuit is interrupted.

When a jumper is not connecting the two pins, it can be stored by slipping it over just one of the pins instead of both. This will have no effect upon the configuration but will keep the jumper available for future use.



Figure 2-3
Jumper Enlargement

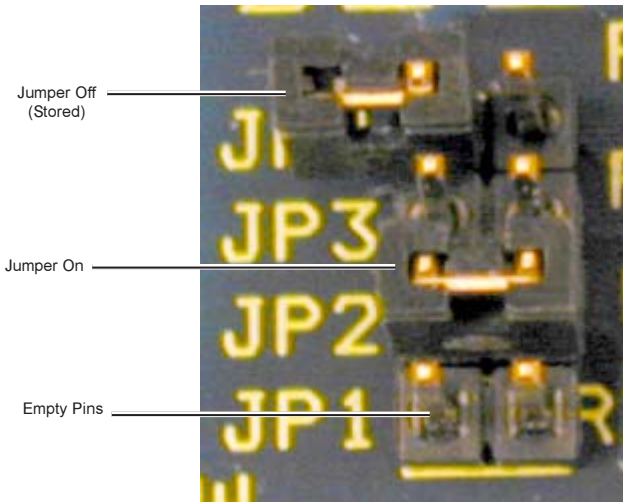


Figure 2-4
Jumper Placement

2.0 Installation

To Configure the Trace UR-UPS (continued)



CAUTION: Be extremely careful when removing and/or installing the jumpers. Do NOT bend the pins as permanent damage to the circuit board can occur.

The jumpers in the Trace UR-UPS are located on the main circuit board and are labeled JP1 for AC transfer sensitivity, JP2 for battery type selection, JP3 for depth-of-discharge, and JP4 for Option B (which is not used at this time).

1. To access the jumpers, remove the top cover from the unit following the instructions on page 8.
2. Locate the configuration jumpers on the main printed circuit board.
3. Either install or remove (store) the jumpers depending upon the desired configuration. Use needle-nose pliers to *carefully* remove the jumpers.

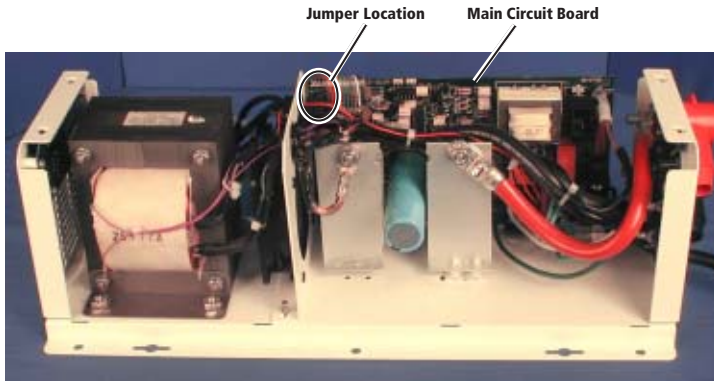


Figure 2-5
Jumper Location

Jumper ID	Function	Jumper ON (Default)	Jumper OFF
JP1	AC Transfer Sensitivity (Brownout)	UPS Mode 105-130 Vac _{rms}	GEN Mode 90 - 140 Vac _{rms}
JP2	Battery Type Selection	Sealed (Gel)/(AGM) Bulk = 14.3 Vdc Absorption Time = 60 minutes Float Volts = 13.4 Vdc	Liquid (Flooded Lead Acid) Bulk = 14.7 Vdc Absorption Time = 60 minutes Float Volts = 13.2 Vdc
JP3	Depth of Discharge (Low Voltage Discharge (LVD))	Deep Discharge ≥ 10.6 Vdc	Shallow Discharge ≤ 11.7 Vdc
JP4	Option B	NOT USED	NOT USED

Table 2-1
Jumper Settings

2.0 Installation

To Configure the Trace UR-UPS (continued)

Setting AC Transfer Sensitivity (JP1 - BROWNOUT)



WARNING:
CHANGING
CONFIGURATION
SETTINGS
REQUIRES ALL
SOURCES OF
POWER (AC AND
DC) BE
DISCONNECTED
FROM THE TRACE
UR-UPS.

NOTE: Transfer time from utility to inverter is approximately 8-10 milliseconds with the loss of grid power.

NOTE: This unit requires a well-regulated generator for optimal performance.

The Transfer Sensitivity jumper sets the voltage limits which the AC input voltage can fall or rise to before the unit switches to the battery (or batteries) to power the load.



Refer to Table 2-1, on page 10, for the AC transfer voltage ranges of the Trace UR-UPS.

Two settings are available: GEN for generator supplied power, and UPS (default) for utility supplied power. Since some generators may have wide fluctuations in the output voltage, selecting GEN MODE allows the range of acceptable voltage to be from 90–140 Vac before the unit switches to batteries. In the UPS MODE, the tolerance for utility supplied power is from 105–130 Vac.

To Select UPS MODE (Default) (105 - 130 Vac)

- JUMPER ON: Place the jumper on both contact pins.

To Select GEN MODE (90 - 140 Vac)

- JUMPER OFF: Remove the jumper from the contact pins and place it over only one of the pins. This will keep the jumper available for future use.



To select UPS MODE,
leave the jumper ON
(This is the default configuration.)



To select GEN Mode,
take the jumper OFF and place
it over only one pin.

Figure 2-6
Setting AC Transfer Sensitivity (JP1)

2.0 Installation

To Configure the Trace UR-UPS (continued)

Setting Battery Type (JP2 - Gel/Liquid)



WARNING:
CHANGING CONFIGURATION SETTINGS REQUIRES ALL SOURCES OF POWER (AC AND DC) BE DISCONNECTED FROM THE TRACE UR-UPS.

NOTE: Using batteries that require different voltage levels that those indicated in Table 2-1 can result in shortened battery life or even damage the batteries and can adversely affect performance by the Trace UR-UPS.

The Trace UR-UPS can charge GEL or LIQUID batteries. The different types of batteries require specific charging voltages.



Refer to Table 2-1, on page 10, for the bulk, absorption, and float mode charging values of the Trace UR-UPS.

Determine what type of battery will be used before changing the battery-type jumper. The default setting is for Gel batteries.

If your battery chemistry is something other than Gel or Liquid, contact your battery manufacturer for information on the best voltage level to use for charging. If they do not support the voltage levels indicated on Table 2-1 on page 9, use different batteries.

To Select GEL Battery Charging (Default)

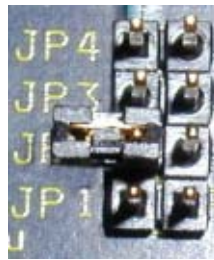
- JUMPER ON: Place the jumper on both contact pins.

To Select LIQUID Battery Charging

- JUMPER OFF: Remove the jumper from both contact pins and place it over only one of the pins. This will keep the jumper available for future use.



To select Gel Batteries, place the jumper ON the two pins. (This is the default configuration.)



To select Liquid Batteries, leave the jumper OFF and placed over only one pin.

Figure 2-7
Battery Type Selection (JP2)

2.0 Installation

To Configure the Trace UR-UPS (continued)

Setting Depth-of-Discharge (JP3 - LVD)



WARNING:
CHANGING
CONFIGURATION
SETTINGS
REQUIRES ALL
SOURCES OF
POWER (AC AND
DC) BE
DISCONNECTED
FROM THE TRACE
UR-UPS.

NOTE: DEEP discharge
will increase run
time but may
decrease battery
life.

The DEPTH-OF-DISCHARGE jumper sets the battery voltage for DEEP or SHALLOW discharge.

In DEEP discharge mode, the unit continues to supply AC output power to the load until the batteries have discharged to 10.6 Vdc for one minute. This allows the batteries to discharge almost completely. The unit's run-time will be longer in this mode and there will be fewer charge/discharge cycles. DEEP discharge is the default factory setting (jumper on).

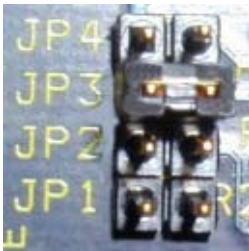
In shallow discharge mode, the unit continues to supply AC output power to the loads until the batteries have discharged to 11.7 Vdc for a period of five minutes. This causes less stress on the batteries resulting in longer battery life. The unit's run-time will be shorter in this mode and the batteries will receive more charge/discharge cycles.

To Select DEEP Depth-of-Discharge (Default)

- JUMPER ON: Leave the jumper on both contact pins.

To Select SHALLOW Depth-of-Discharge

- JUMPER OFF: Remove the jumper from both contact pins and place it over only one of the pins. This will keep the jumper available for future use.



To select DEEP Depth-of-Discharge, place the jumper ON the two pins. (This is the default configuration.)



To select SHALLOW Depth-of-Discharge, leave the jumper OFF and placed over only one pin.

Figure 2-8
Setting Depth-of-Discharge (JP3)

2.0 Installation

To Configure the Trace UR-UPS (continued)

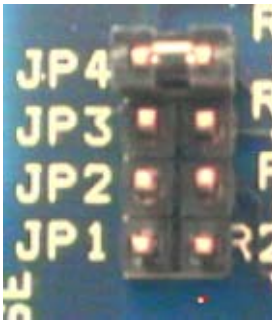
Setting Option B (JP4 - OPTION B) (Not used)



WARNING:
CHANGING
CONFIGURATION
SETTINGS
REQUIRES ALL
SOURCES OF
POWER (AC AND
DC) BE
DISCONNECTED
FROM THE TRACE
UR-UPS.

This jumper assignment is currently not used. Disregard this jumper setting until further notice or unless told to remove it by an authorized Xantrex Customer Service Representative.

- JUMPER ON: Default position (N/A)
- JUMPER OFF: N/A



Jumper ON: This is the default configuration.



Jumper OFF: Do not remove the jumper unless instructed to do so by an authorized Xantrex Customer Service Representative.

Figure 2-9
Setting Option B (JP4) (Not Used at this time)

2.0 Installation

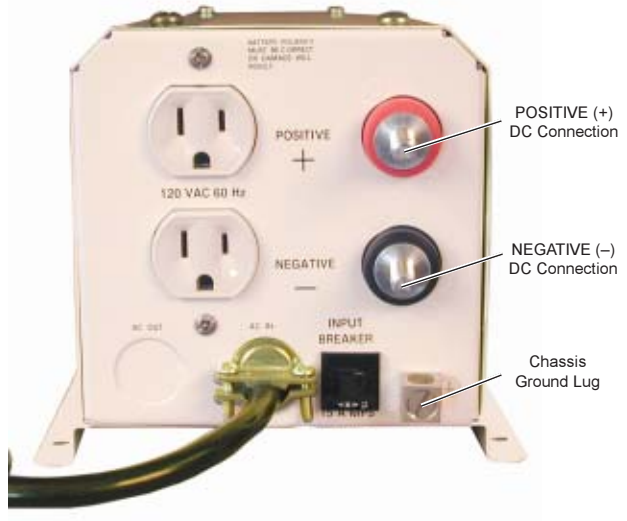
DC Wiring



WARNING: READ THE IMPORTANT SAFETY INSTRUCTIONS IN THIS MANUAL AND THE BATTERY SUPPLIER'S PRECAUTIONS BEFORE INSTALLING THE TRACE UR-UPS AND BATTERIES.



WARNING: BE VERY CAREFUL WHEN WORKING WITH BATTERIES. BATTERIES CAN PRODUCE EXTREMELY HIGH CURRENTS IF SHORT-CIRCUITED.



**Figure 2-10
DC Connections**

DC Grounding

NOTE: Cable sizes listed in Table 2-2 are recommendations only. Consult your local electrical codes to ensure compliance.

1. Connect one end of a (green) #8 AWG ground wire to the Chassis Ground Lug.
2. Connect the other end of the ground wire to the negative (-) terminal on the battery.
3. Run another #8 AWG ground wire from the battery's negative (-) terminal to the main utility panel's ground bar or grounding electrode.

Model #	Distance	
	0-5 feet	5-10 feet
DR512 UR-UPS	4 AWG	2 AWG
DR1012 UR-UPS	2 AWG	1 AWG
DR524 UR-UPS	6 AWG	4 AWG
DR1024 UR-UPS	4 AWG	2 AWG

**Table 2-2
Recommended Battery Cable Sizes**

2.0 Installation

DC Wiring (continued)

DC Disconnect and Over-current Protection

NOTE: Consult your local electrical code for exact DC disconnect and over-current protection requirements.

See your local dealer for obtaining the correct hardware for your installation.

For safety and compliance with national electrical codes and regulations, battery over-current protection is required. Fuses and disconnects must be sized to protect the wiring in the system and are required to open before the wire reaches its maximum current carrying capability.

The National Electrical Code (NEC) requires both over-current protection and a disconnect switch for residential and commercial electrical systems.

When sizing the DC disconnect, the expected continuous load on the unit should be used to determine the DC current. Efficiency loss through the unit increase the DC current draw and must be accounted for. Divide the maximum continuous current draw by the unit's efficiency. Add a 25% safety margin to comply with code requirements.

The term "free air" is defined by the NEC as cabling that is not enclosed in a conduit or a raceway. Cables enclosed in conduit or raceways have substantially lower continuous current carrying ability due to heating factors.

Some installations may not require conduit or a disconnect device, although over-current protection is still required.

To protect the battery wiring in the event of a short-circuit, the installation should include a class-T, DC fuse with a disconnect switch in the positive line between the unit and the batteries. Consult your local electrical codes for the appropriate size of this DC disconnect based on the size of the DC cables being used for this installation. DC disconnect and over-current protection (fuse) are not provided with the unit.

2.0 Installation

DC Wiring (continued)

Connection to the Battery



WARNING: DO NOT ALLOW TOOLS TO TOUCH THE CONNECTORS WHEN INSTALLING THE CABLES. ALSO DO NOT ALLOW THE ENDS OF THE CABLES TO TOUCH EACH OTHER AFTER BEING CONNECTED TO THE BATTERY AND BEFORE BEING CONNECTED TO THE UNIT.



CAUTION: Observe battery polarity before connecting the unit's wires to the battery. Failure to do so will damage the Trace UR-UPS. This type of damage is not covered under warranty.

NOTE: Ensure the battery terminals are clean, without any type of coating, prior to connecting the wiring/cables.

NOTE: When connecting the cables to the unit, there may be a brief spark and snapping sound as the unit's capacitors charge. This is normal.



See Figure 2-10 on page 15 for the location of the DC connectors.



See Figure 2-11 on page 18 for proper connection of the battery cable.



See Figure 2-12 on page 18 for a photograph of the battery cable caps.

1. If using copper compression lugs on the battery cables, slide the red cable cap onto a positive (red) battery cable with the cap side closest to the DC connectors on the Trace UR-UPS. Slide the black cable cap onto a negative (-) battery cable with the cap side closest to the DC connectors on the Trace UR-UPS.

If using aluminum mechanical lugs on the battery cables, the cable caps may not fit. If this is the case, do not use the cable caps and proceed with the following steps below.

2. Connect the red, positive (+) battery cable to the positive (+) DC connector on the Trace UR-UPS.
3. Connect this red, positive (+) battery cable to a DC fuse and DC disconnect switch (not supplied).
4. Connect another red, positive (+) battery cable to the other end of the DC fuse and DC disconnect switch.
5. Connect the negative (-) battery cable to the negative (-) DC connection on the Trace UR-UPS.
6. Connect the second, positive (+) battery cable connected to the DC fuse and disconnect directly to the positive (+) battery terminal. Ensure the cable's lug is flush against the battery's terminal.
7. Connect the negative (-) battery cable directly to the negative (-) battery terminal. Ensure the cable's lug is flush against the battery's terminal.
8. Torque these connections according to the battery manufacturer's specifications.
9. After all the connections are made, coat the terminals with an approved anti-corrosive compound available at a battery or automotive supplier. Only coat the terminals *AFTER* the connections are made and torqued.
10. If using the cable caps, slide the red and black cable caps over the red (+) and black (-) connectors (respectively) on the Trace UR-UPS.

2.0 Installation

DC Wiring (continued)

Connection to the Battery (continued)

Do not place anything between battery cable lug and the battery terminal surface.
Assemble exactly as shown.

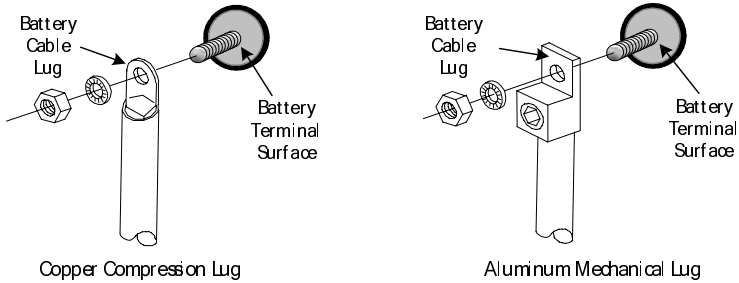


Figure 2-11
Battery Cable Connections



Battery Cable Caps



Figure 2-12
Battery Cable Caps

2.0 Installation

AC Wiring

Prewired AC Input and Output



CAUTION: Do not connect the AC input plug into the unit's output receptacles.

Insert the AC input plug into a properly grounded, 120 Vac outlet receptacle.

Insert the load's power cord (from an AC appliance) into the unit's output receptacle.



CAUTION: To reduce the risk of fire, use only AC input circuits protected by a 20 ampere branch circuit breaker.

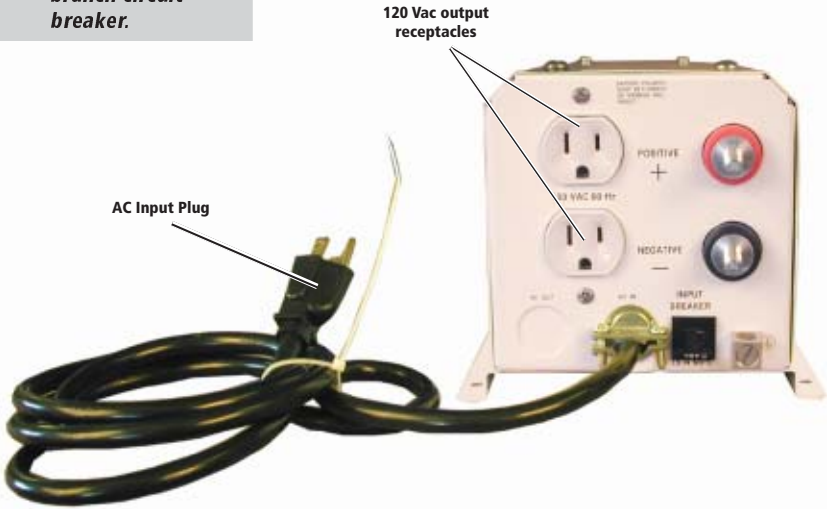


Figure 2-13
AC Input Plug and Output Receptacles

AC Grounding



WARNING: FAILURE TO USE A PROPERLY GROUNDED WALL OUTLET MAY CREATE A POTENTIAL SHOCK HAZARD.

AC input plug must be connected to a properly grounded wall outlet.

Models with the prewired AC input cord and outlets have the AC ground connected to the chassis.

The bonding of the AC ground wire to neutral must be provided by the AC charging source used by the unit for recharging the batteries.

2.0 Installation

AC Wiring (continued)

Hardwiring the AC Input and Output (if required)

Some models may require you to hardwire the AC input and output. If your unit requires hardwiring the AC input and output, follow the directions on pages 21 through 22. Use a minimum 14 AWG, solid wire for all input and output wiring. Check with your local electrical codes for absolute compliance on this wire size.

Knockout Preparation

Remove the knockouts from the end panel as shown below for AC IN and AC out wiring.

Output receptacles may or may not be present on these models.

Two (2) Knockouts for ½" conduit or strain relief

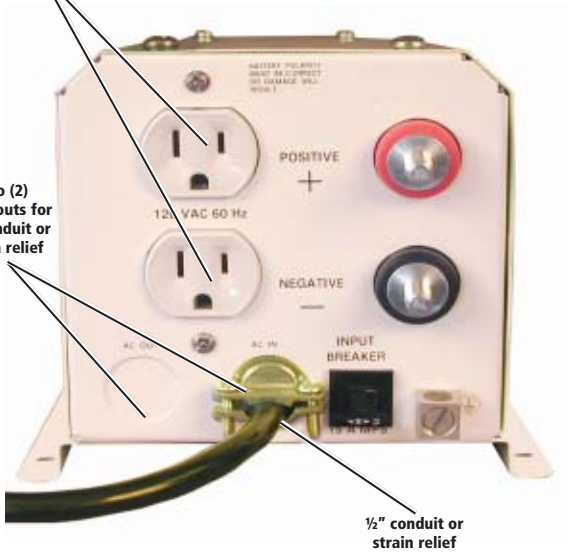


Figure 2-14
Knockout locations for AC IN and AC OUT Wiring

2.0 Installation

AC Wiring (continued)

Hardwiring the AC Input and Output (if required)

Input Wiring



CAUTION: TO REDUCE THE RISK OF FIRE, USE ONLY AC INPUT CIRCUITS PROTECTED BY AN APPROPRIATELY SIZED DC BRANCH CIRCUIT BREAKER.

1. Install a conduit or strain relief in the rear panel AC IN knockout hole.
2. Feed the AC input cord (from the generator or main utility panel) through the strain relief.
3. Strip all wires back approximately 3/8 inch (10 mm).
4. Connect the green/yellow (ground) wire to the lower terminal on the main PC board.
5. Connect the blue or white (neutral) wire to the center terminal on the main PC board.
6. Connect the brown or black (hot) wire to the upper terminal on the main PC board.
7. Torque all screws to 16 inch-lb (1.8 Nm).
8. Tighten the screws on the strain relief (leave some slack in the wire before tightening).
9. Proceed to output wiring.

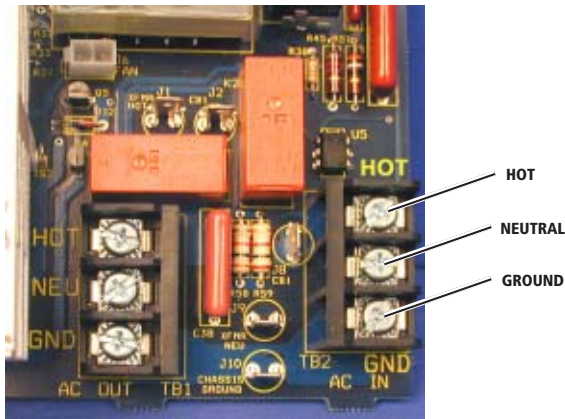


Figure 2-15
Wiring AC Input to Terminal Block

2.0 Installation

AC Wiring (continued)

Hardwiring the AC Input and Output (if required)

Output Wiring

1. Install a conduit or strain relief in the rear panel AC OUT knockout hole.
2. Feed the AC output cord through the strain relief to the subpanel designated for the desired loads for the Trace UR-UPS (not the main electrical utility box).
3. Strip all wires back approximately 3/8 inch (10 mm).
4. Connect the green/yellow (ground) wire to the lower terminal on the main PC board.
5. Connect the blue or white (neutral) wire to the center terminal on the main PC board.
6. Connect the brown or black (hot) wire to the upper terminal on the main PC board.
7. Torque all screws to 16 inch-lb (1.8 Nm).
8. Tighten the screws on the strain relief (leave some slack in the wire before tightening).
9. Reinstall the cover following the instructions on page 8.

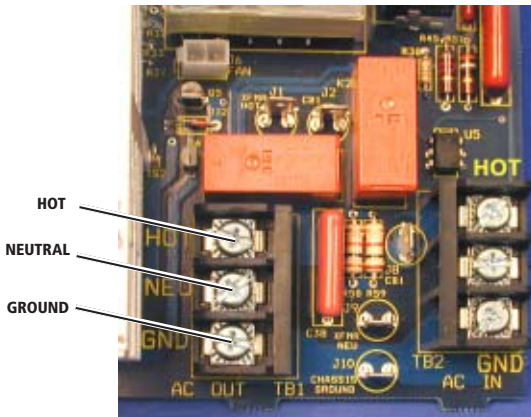


Figure 2-16
Wiring AC Output to Terminal Block

3.0 Operation

Basic Control Panel Features

The Trace UR-UPS control panel includes the following items.

- A slide switch for setting its mode of operation: INVERT, CHG, or SEARCH
- Green STATUS LED - indicates whether or not the unit is active
- Yellow CHARGER status LED - indicates that the unit is in charger mode
- Red/Yellow ERROR status LED - indicates an error condition



See Table 3-1 for a description of the various meanings of the LED indicators.

- Battery Voltage Meter - indicates the voltage level of the batteries

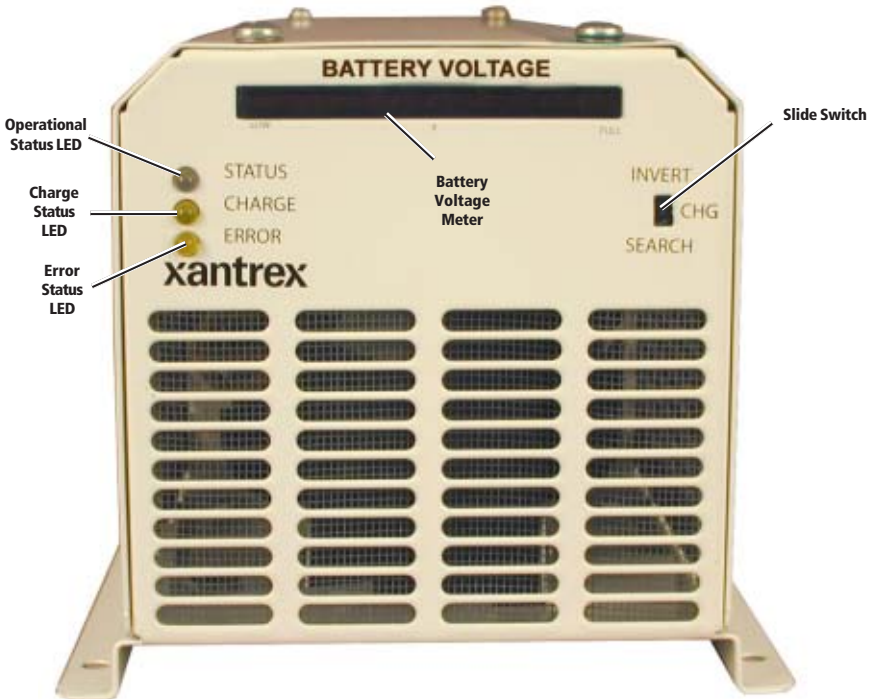


Figure 3-1
Trace UR-UPS Control Panel

3.0 Operation

Modes of Operation

Once the batteries have been connected, the unit becomes operational and performs a quick self-test. When AC power is present at the inputs, the unit performs as a charger regardless of the position of the slide switch on the control panel.

When no AC input power is present, the slide switch provides a manual method of selecting operational modes for the unit (e.g., INVERT, CHG, and SEARCH modes).

INVERT Mode

When the unit is in INVERT mode and it detects no AC power available at its input plug, it will take DC power from the battery and inverts it to AC power. That AC power is then routed to the AC output receptacles to power the AC loads connected to it. The duration of time the unit can invert power is directly related to the size of the battery (or battery bank).

To run the unit in “INVERT” mode, move the slide switch to INVERT on the control panel.

CHG Mode

When no AC power is present, this is the OFF position for the unit and will not provide backup power to the connected loads. When the unit is in CHG mode and it detects AC power available at its input plug, it will route power to the battery charger and charge the batteries back up to the specified level.

To run the unit in “CHG” mode, move the slide switch to CHG on the control panel.

SEARCH Mode

NOTE: Selecting search mode may result in a slower transfer for power in the event of a power outage.

To conserve battery power when an input source of AC voltage is not available (as during a grid failure), the *SRCH* mode can be selected. In this mode, the unit checks the AC output circuit to see if a load has been turned ON. If it detects a load, the unit switches to full output power to operate the load. When the load is switched OFF, the unit resumes its sleep mode and continues to monitor the output circuit.

To run the unit in SEARCH Mode, move the slide switch on the control panel to the SEARCH position.

The unit is now set to switch OFF the AC output during a grid failure until the minimum load requirements are met.

3.0 Operation

LED Indicators

The side panel contains LEDs indicating the unit's status. These LEDs flash at predetermined rates to indicate a specific mode of operation or error condition.

LED INDICATORS		
LED	Indication	Description
STATUS (Green)	OFF	The unit is off.
	Flashing	The unit is in SEARCH mode.
	Solid	The unit is in INVERT mode.
CHARGER (Yellow)	Slow Flash (once per second)	Utility AC is present, inverter has not yet transferred to Charge mode. This process usually takes about 20 seconds after utility power is applied to the inverter.
	Fast Flash (ten per second)	The charger is charging the batteries in the bulk/absorption mode.
	Solid Yellow	The charger is charging in the float mode.
Error (Red/Yellow)	Yellow Solid	HIGH-BATTERY CONDITION. The battery voltage exceeds the units limits.
	Yellow Flashing	LOW-BATTERY CONDITION. The battery voltage is below the units limits.
	Slow Flash Red (once per second)	TRANSFORMER OVERTEMP. The temperature of the transformer exceeds safe levels.
	Fast Flash Red (ten per second)	FET OVERTEMP. The temperature of the FETs on the circuit board exceeds safe levels.
	Solid Red	OVERLOAD CONDITION.

Table 3-1
Status Indicator LEDs

Battery Voltage Meter

The Battery Voltage Meter provides a visual indication of the battery voltage level. If the voltage is below 10 Vdc (20 Vdc for 24-volt units), then the left most LED will blink. If the voltage is above 15 Vdc (30 Vdc for 24-volt units), then the right most LED will blink. Between these voltages, the display changes at ½-volt increments (1-volt increments for 24-volt units).

3.0 Operation

Battery Charger Operation

Note: Charging efficiency is directly related to the quality of the input AC waveform.

The Trace UR-UPS is equipped with a three-stage battery charger.

The batteries receive different charge voltages and currents, depending on the charger mode. After a utility grid failure, the charger automatically cycles through the charging modes. When charging is complete, the batteries receive a maintenance charge to keep them in a fully charged, ready state.

BULK

Bulk is the initial stage of charging. In this mode, the charger's maximum constant current is supplied to the batteries. The CHARGE LED flashes once per second to indicate bulk charge mode. Over time, the battery voltage rises until the bulk voltage setting is reached (14.3 Vdc for gel batteries and 14.7 Vdc for liquid batteries). The charger then switches to absorption mode.

During this stage of charging, the automatic cooling fan will be typically running.

ABSORPTION

The charger supplies a constant (bulk) voltage to the batteries as the charge current is slowly reduced. The CHARGE LED flashes rapidly (10/sec) during the absorption stage, lasting approximately 1 hour.

During this stage of charging, the automatic cooling fan will be typically running.

FLOAT

During the final stage of charging, the batteries are held at the float voltage (13.6 Vdc for gel batteries and 13.4 Vdc for liquid batteries). This reduces battery gassing, minimizes watering requirements (for liquid batteries) and ensures complete battery charging.

The CHARGE LED is ON solid while float charging.

3.0 Operation

Battery Charger Operation (continued)

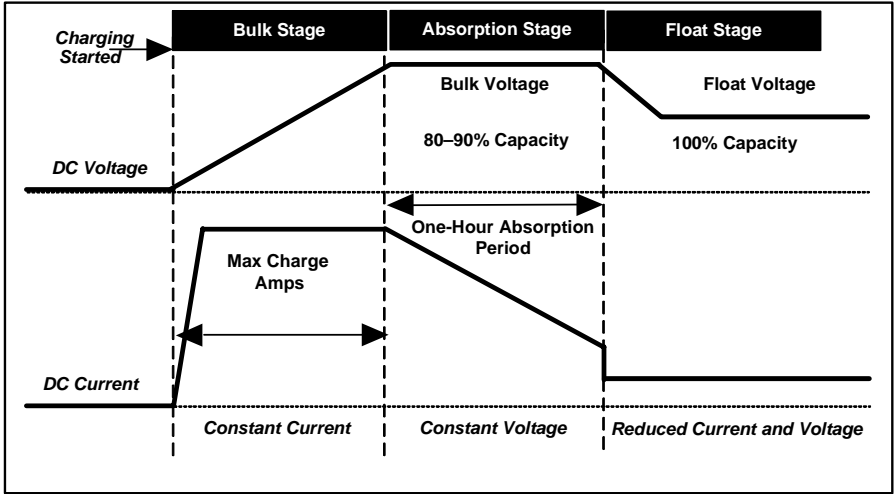


Figure 3-2
3-Stage Battery Charger Graph

Inverter to Charger Transition

The Trace UR-UPS constantly charges the batteries as long as power is being supplied to the unit (from either the utility grid or a generator).

When a utility outage occurs, the unit switches to the batteries to maintain power to the connected load. This is accomplished by an automatic transfer relay, rated at 15 amps and protected by a 15 amp circuit breaker.

When the AC utility (or generator) power returns, there is a built-in 20 second delay before the unit switches from inverter to charger mode. This delay allows the utility power to stabilize after an outage, or for the generator to achieve a stable voltage, thus protecting the connected load.

3.0 Operation

Notes:

4.0 Troubleshooting

Basic Troubleshooting

SYMPTOM	PROBLEM	REMEDY
No AC Output	Unit not plugged in	Check AC power cord.
	Unit slide switch is in CHG position	Switch to INVERT Mode.
	AC circuit breaker tripped	Reset breaker on rear panel.
	Dead batteries, bad cables	Check batteries and cables.
AC output is low	Measuring with wrong type of voltmeter	Voltmeter must be a True RMS reading meter.
	Low batteries	Check and recharge batteries.
	AC input voltage too low	Adjust generator speed or wait for utility to stabilize.
Inverter turns load ON / OFF / ON	Loose or corroded battery connection	Check and clean connections.
	If in SEARCH Mode, the load is not exceeding the search wattage level.	Increase the load or switch to INVERT Mode.
Inverter shuts off after 20 seconds	Inverter's AC power cord plugged into the inverter's output receptacle	Unplug AC line cord.
Batteres will not charge	AC input voltage too high or low	Adjust generator speed or wait for utility to stabilize.
	Internal jumper improperly set	Check jumper setting.
	Loose or corroded battery connection	Check and clean connections.
	Dead batteries, bad cables	Replace batteries. NOTE: The inverter will NOT charge dead batteries.
Yellow ERROR LED (flashing)	Battery voltage is too low	Check and recharge.
Yellow ERROR LED (solid)	Battery voltage is too high	Batteries may be incorrectly connected or external charger may be charging too high.
Red ERROR LED (slow flash)	Transformer Overtemp	Improve ventilation around the unit, or remove or reduce load.
Red ERROR LED (fash flash)	FET Overtemp	Improve ventilation around the unit, or remove or reduce load.
Red ERROR LED (ON solid)	Overload condition	Reduce load.

Potential Brownout Conditions

While operating in INVERT mode, large loads may temporarily overload the unit causing the output voltage to sag or drop out. For example, if a computer is being operated from the unit and someone turns on a TV, the inrush current for the TV may cause a brownout condition on the unit causing the computer to reboot.

To minimize this condition:

1. Keep the DC cables as short as possible.
2. Use the largest battery cable gauge possible.
3. Keep the positive and negative DC cables taped side by side for as long as practical. This helps to reduce the inductance of the cable.

If problems persist, keep in mind that the unit must take in a large amount of DC current in order for it to make a large amount of AC current for the load with a high inrush current demand. A unit that has incorrectly sized DC cables, poor connections, or failing batteries is like a house with a substandard foundation.

Potential Problem Loads for UPS Applications



CAUTION: Some of these problem loads can cause irreparable damage to the load itself. Please contact the manufacturer of the item for more specific information on UPS compatibility before using any of these items with the Trace UR-UPS.

The unit can operate most AC loads. However, there are special conditions that can cause a load to behave differently than expected. The following describes some of the common problems encountered when using devices of this nature.

General Issues

Heavy Loads

If the battery-bank cannot deliver the necessary amperage to operate a heavy load, the unit will shut down. The battery voltage will then slowly rise back above the low-voltage threshold causing the inverter to resume operation. This cycling of the inverter will continue until the heavy load is reduced or an additional source of power is added.

4.0 Troubleshooting

Potential Problem Loads for UPS Applications (continued)

General Issues (continued)

Cell Phones

Some cellular telephones experience interference in the form of a clicking sound.

Consumer Electronics

AM radios, citizen band, amateur radio, and wireless intercom systems tend to pick up inverter noise, especially on the lower half of their band. Inexpensive tape recorders are likely to experience noise as well. Avoid starting large loads when using sensitive electronic devices.

Waveform Issues

Ceiling Fans

Most large-diameter, slow turning fans run correctly, but generate more noise than when connected to utility power. High speed fans tend to operate normally.

Clocks

The unit's crystal controlled oscillator keeps the frequency accurate to within a few seconds a day; however, external loads in the system may alter the unit's output waveform causing clocks to run at different speeds. There may be periods where clocks keep time correctly and then mysteriously do not. This is because most clocks do not draw enough power to trigger the load sensing circuit when in SEARCH mode. In order to operate, especially with no other loads present, the unit's load sensing circuit will have to be defeated (i.e., turn off the SEARCH Mode).

Dimmer Switches

Most dimmer switches lose their ability to dim the lights and operate only in the fully ON or OFF position. Newer dimmer switches controlled by microprocessors tend to work better in these applications.

4.0 Troubleshooting

Potential Problem Loads for UPS Applications (continued)

Waveform Issues (continued)

Microwave Ovens

Microwave ovens are sensitive to peak output voltages. The higher the voltage, the faster they cook. Since the unit's peak output voltage is dependent upon battery voltage and load size, the microwave's cook time may need to be increased.

Printers



CAUTION: Check with your laser printer manufacturer for UPS compatibility before using laser printers with a Trace UR-UPS.

Most inkjet type printers work well in these applications. Most laser printers, however, require a true sinewave output, as opposed to a modified sinewave output. Check with your printer manufacturer for UPS compatibility before using laser printers with this unit.

Rechargeable Devices

When first using a rechargeable device, monitor its temperature for 10 minutes to ensure it does not become abnormally hot. Excessive heat will indicate that it is incompatible with the unit.

Potential Problem Loads related to Search Sense Mode

Some loads can "fool" the Search Sense Mode, causing the unit to cycle on and off, or not to turn on at all.

Confirming Search Mode Operation

A neon-type nightlight can be used as a test indicator to show whether the inverter is searching for loads. Plug the night light into the wall—if the inverter is in search mode the light will blink, showing the search pulses sent out by the inverter. If the inverter is running a load, the light will be on continuously because continuous power is being delivered to a load. A typical incandescent nightlight may also work to show the pulses, but it will use more power.

Potential Problem Loads related to Search Sense Mode (continued)

Computers and Sensitive Electronics

Some computers and sophisticated electronics have power supplies that do not present a load until correct line voltage is available. When this occurs, each unit waits for the other to begin. This can usually be solved by plugging in an additional load (such as a lamp) to bring the unit out of its search mode. Avoid starting large loads when using a computer .

Incandescent Lights

Incandescent lights have a higher starting wattage when the filament is cold than the continuous rating of the bulb. *For example:* if the unit is set to sense a 40-watt load, and a 30-watt bulb is turned on, the unit will initially sense a load because the bulb's cold-starting wattage will exceed the 40-watt threshold . When the bulb warms up, it will draw less than the threshold wattage, the unit will revert to idle mode and the light will go off. When the light cools, its load will again exceed the threshold and the cycle will repeat.

Fluorescent Bulbs

These work the opposite of incandescent light bulbs. If the unit is set to detect a 30-watt load and a 40-watt fluorescent light is switched on, the inverter will not detect it because fluorescent tubes draw less than 30 watts until the gas in the tube ionizes.

Fluorescent Lights

Some devices cannot be detected by the unit's load sensor and will not operate. Small fluorescent lights are the most common example. This can usually be solved by plugging in an additional load.

Decreasing Loads

If the amount of power a load draws decreases after it has been switched on (such as with a small motor) and its current draw becomes less than the load sensing threshold, it will be turned alternately ON and OFF by the unit. This can usually be solved by plugging in an additional load (such as a lamp).

Undersized Loads

If the power consumed by a device is less than the unit's search mode circuitry threshold, it will not run. This can usually be solved by plugging in an additional load such as a 100-watt light bulb.

Potential Problem Loads related to Search Sense Mode (continued)

Other loads

Some appliances draw power even when turned off. Examples of this are television sets equipped with instant-on circuits, microwaves equipped with digital clocks, VCRs, and other clocks. If the search sensitivity threshold is set higher than the combined loads, an auxiliary load must be used to bring the unit out of search mode before the appliances will turn on.

If the sensitivity threshold is set lower than the combination of the loads, the loads will remain on continually, and excess battery drain will occur. Three such 15-watt loads would consume an additional 90 amp hours per 24 hours in a 12 Vdc system. Some alternatives are:

- turn the item off at the wall,
- use an extension cord equipped with an on/off switch,
or
- place an on/off switch at the outlet.

Appendix A - Specifications

	DR512	DR524	DR1012	DR1024
ELECTRICAL SPECIFICATIONS	Modified Sine Wave			
AC Input Voltage	120 Vac	120 Vac	120 Vac	120 Vac
AC Input Voltage Range	90-140 Vac	90-140 Vac	90-140 Vac	90-140 Vac
AC Input Current	15 amps AC maximum - input circuit breaker limited			
Continuous Power (@ 40 °C)	500 VA	500 VA	1000 VA	1000 VA
Efficiency (Peak)	90%	90%	90%	90%
Output Voltage (RMS)	120 Vac	120 Vac	120 Vac	120 Vac
Output Voltage Regulation	2-5%			
Typical	± 2%			
Maximum	± 5%			
Frequency ± 0.04% Crystal Controlled	60 Hz	60 Hz	60 Hz	60 Hz
Continuous Output	4.2 amps AC	4.2 amps AC	8.3 amps AC	8.3 amps AC
Surge Capability -100ms Rating	20 amps	20 amps	25 amps	25 amps
Transfer Time	8-10 ms	8-10 ms	8-10 ms	8-10 ms
Automatic Transfer Relay	15 amps	15 amps	15 amps	15 amps
DC Input Voltage (Rated)	12.6 Vdc	25.2 Vdc	12.6 Vdc	25.2 Vdc
DC Input Voltage Range	10.8 - 15.5 Vdc	21.6 - 31 Vdc	10.8 - 15.5 Vdc	21.6 - 31 Vdc
DC Current Rated Power	44 amps DC	22 amps DC	88 amps DC	44 amps DC
DC Idle Current Consumption (Typical at Full Voltage)	< 0.5 amps	< 0.4 amps	< 0.9 amps	< 0.8 amps
Search Mode Consumption	< 1 watt	< 1 watt	< 1 watt	< 1 watt
Low Battery Protection (Enabled)	11 Vdc	22 Vdc	11 Vdc	22 Vdc
Maximum Charge Rate	20 amps DC	10 amps DC	40 amps DC	20 amps DC

Appendix A - Specifications

	DR512	DR524	DR1012	DR1024
ENVIRONMENTAL SPECIFICATIONS				
Operating Temperatures	32 °F to 122 °F (0 °C to 50 °C) Derate at temperatures above 40°C			
Non-operating/ storage temperatures	-67 °F to 167 °F (-55 °C to 70 °C)			
Operating/Storage Humidity Limits	20% - 95% RH (Non-condensing)			
PHYSICAL SPECIFICATIONS				
Dimensions (H x W x L)	5.5" x 6.5" x 16.250"	5.5" x 6.5" x 16.250"	5.5" x 6.5" x 16.250"	5.5" x 6.5" x 16.250"
Shipping Weight	20-25 lbs	20-25 lbs	30 lbs	30 lbs
Enclosure type	Powder-coated steel			
Mounting	Shelf-mount or Wall-mount indoors only.			

Appendix B - Battery Information

Batteries are available in different sizes, amp-hour ratings, voltage, liquid or gel, vented or non-vented, chemistries, etc. They are also available for starting applications (such as an automobile starting battery) and deep discharge applications. Only the *deep discharge* types are recommended for inverter applications. Choose the batteries best suited for the inverter installation and cost. Use only the same battery type for all batteries in the bank. For best performance, all batteries should be from the same lot and date. This information is usually printed on a label located on the battery.

Selection of a Battery Type

There are two principal types of batteries: starting and deep-cycle (with several different types of chemistries). Batteries can be either sealed or non-sealed (vented).

The battery types recommended for use with this unit are: Flooded Lead Acid (FLA), Sealed Gel Cells (GEL), or Sealed Absorbed Glass Mat (AGM). DO NOT use automotive (starting) batteries—they are designed to provide high starting current for short periods of time.

Flooded Lead Acid (FLA)

This type of battery is designed to be deep cycled before being recharged, making it suitable for inverter applications. Flooded batteries require periodic maintenance consisting mainly of adding distilled water to the cells, checking battery cable connectors for tightness and keeping the terminals clean. Examples of flooded batteries include:

RV and Marine

- Popular in small systems
- Often referred to as “Group 24” or “Group 27” batteries
- Designed for limited cycling
- Do not last as long as the other “true” deep cycle batteries
- Typically rated at 12 volts (80 to 100 amp hours)

Selection of a Battery Type (continued)

Golf Cart

- Popular for smaller off-grid home systems
- Many medium sized inverter systems use “L16” batteries
- Rugged, long lasting
- Typically rated at 6 volts (220 to 350 amp hours)

Industrial (electric forklift)

- Popular in large inverter systems
 - Extremely rugged - lasts up to 10 years or more in an inverter system
 - Typically 2 volt cells (1,000 amp hours or mor
- Estimating Battery Requirements (continued)

Sealed Batteries (GEL and AGM)



CAUTION: If using sealed batteries, ensure the battery charger is set to the appropriate settings or battery damage will result.

Both gel cell and absorbed glass mat (AGM) batteries are virtually maintenance free, making them ideal for inverter applications. Since the batteries are completely sealed, they can be mounted in almost any position. The only disadvantages, compared to flooded batteries, are a higher initial cost and greater susceptibility to damage from changes in temperature during charging.

Gel Cell

- Gelled electrolyte instead of liquid
- Long life (up to 1500 cycles, typical)
- Low self-discharge

Absorbed Glass Mat

- Electrolyte is contained in glass-fiber mats between battery plates
- Similar to gel cells in characteristics
- Good low temperature performance

Battery-Bank Sizing

The battery-bank's size determines the length of time the unit can continue to supply AC output power. The larger the bank, the longer the unit can run. An undersized battery bank results in reduced battery life and shorter unit run times.

In general, the battery-bank should be designed so the batteries do not discharge more than 50% of their capacity on a regular basis. Discharging up to 80% is acceptable on a limited basis, such as a prolonged utility outage. Totally discharging a battery results in permanent damage and reduced battery life.

For off-grid, stand-alone applications, design a battery-bank that can power the loads for 3–5 days without requiring recharging. To duplicate the conditions on sunless days or windless periods, the power supplied from other sources (i.e., solar, wind, hydro, etc.) is not included in this calculation. This is often referred to as the “number of days of autonomy.” If the system is a hybrid, with daily generator run periods, the battery-bank size can be smaller.

Estimating Battery Requirements

To determine the proper battery-bank size, it is necessary to compute the number of amp hours that are required between charging cycles. When the required amp hours are known, size the batteries at twice this amount to ensure the batteries are not regularly over-discharged.

To compute the amp-hour requirements, the amp-hour ratings of each appliance powered by the unit must be added together. Use the figures from the nameplate label on the appliances, then use the formula $WATTS = VOLTS \times AMPS$. Then divide the calculated wattage of the load by the system battery voltage to determine the amperage the load will draw from the batteries.

$$\underbrace{(\text{AC current}) \times (\text{AC voltage})}_{\text{Watts}} / (\text{battery voltage}) = \text{DC amps}$$

Example:

To determine DC amps when AC amps are specified on the label:

Nameplate label specifies 6 amps at 120 Vac.

The system battery voltage is 24 volts DC.

- First determine the wattage by using the formula:

$$WATTS = VOLTS \times AMPS = 120 \times 6 = 720 \text{ watts.}$$

- Then divide the wattage by the system battery voltage to determine the DC amperage.

$$720 / 24 = 30 \text{ amps DC}$$

To determine DC amps when watts are specified on the label:

Nameplate label specifies 720 watts.

The system battery voltage is 24 volts DC.

$$(\text{watts}) / (\text{battery voltage}) = \text{DC amps}$$

$$(720 / 24 = 30 \text{ DC amps})$$

Estimating Battery Requirements (continued)

NOTE: Motors typically require 3–6 times their running current when starting. Check the manufacturer's data sheets for their starting current requirements. If large motors will be started from the inverter, increase the battery-bank size to allow for the higher start-up current.

Multiply the amperage by the number of hours the load will operate to roughly calculate amp hours. Double this figure to reach the 50% battery capacity level.

Refer to the example and work sheet on the following pages as a guide to determine the battery-bank's amp-hour requirements.

Complete the following steps to calculate the battery-bank capacity requirements. Use the blank table on the next page to enter the values for your system. A sample table is shown below.

***NOTE: Refrigerators and ice-makers typically run only about 1/3 of the time, therefore, the running wattage is 1/3 of the total wattage of the appliance. Divide the total wattage of the appliance by 3 and enter it in Step 2.**

Appendix B - Battery Information

Estimating Battery Requirements (continued)

AC Appliance	Step 1	Step 2	Step 3	Step 4
	Appliance Running Watts	(x) Hours used each day	(x) Days used each week	(÷ 7 =) Average Daily Watt-Hour Requirement
Microwave	600	0.5	7	300
Lights (x4)	40	6	7	240
Hair Dryer	750	0.25	3	81
Television	100	4	7	400
Washer	375	1	2	107
Refrigerator*	480/3 = 160	24	7	3,840
Vacuum Cleaner	1,200	1	1	171
5,139	15,417	30,834	37,001	1,542
Step 6	Step 7	Step 8	Step 9	Step 10
Total Daily Watt Hours Required	Autonomy Battery Size	Rough Battery Size (Watt Hours)	Safe Battery Size (Watt Hours)	Safe Battery Size (Amp Hours)
5,139	15,417	30,834	37,001	1,542

Table B-1
Sample - Estimating Battery Requirements

Appendix B - Battery Information

Estimating Battery Requirements (continued)

- Step 1 Determine the loads the inverter will power and list them in the Step 1 column.
- Step 2 Enter the running wattage of each appliance in the Step 2 column.
- Step 3 Determine the number of hours (or fraction of hours) the appliance is used each day. Enter this figure in the Step 3 column.
- Step 4 Determine the number of days the appliance will be used during the week. Enter this figure in the Step 4 column.
- Step 5 Divide the number (entered into each row of the Step 4 column) by 7 to obtain the AVERAGE DAILY WATT HOURS REQUIRED figure. Enter these figures in the Step 5 column.
- Step 6 Add all the figures entered into the AVERAGE DAILY WATT HOURS REQUIRED (Step 5) column and enter this number into the TOTAL DAILY WATT HOURS REQUIRED (Step 6) column in the second table.
- Step 7 Multiply the TOTAL DAILY WATT HOURS REQUIRED (Step 6) figure by the number of days of autonomy (days between recharging expected, usually between 1 to 5. The examples use 3). Enter this figure into the AUTONOMY BATTERY SIZE (Step 7) column.
- Step 8 Multiply the AUTONOMY BATTERY SIZE (Step 7) figure by 2 to provide a 50% maximum battery discharge level. Enter this figure in the ROUGH BATTERY SIZE (WATT HOURS) (Step 8) column.
- Step 9 Multiply the ROUGH BATTERY SIZE (WATT HOURS) figure (Step 8) by 1.2 and enter this figure in the SAFE BATTERY SIZE (WATT HOURS) (Step 9) column. This figure allows for an efficiency of 80%.
- Step 10 Divide the SAFE BATTERY SIZE (WATT HOURS) (Step 9) figure by the DC system voltage (i.e., 12, 24 or 48 volts). Enter this number in the SAFE BATTERY SIZE (AMP HOURS) (Step 10) column. Use this figure to determine the number of batteries required to reach the amp-hour rating.

Appendix B - Battery Information

Estimating Battery Requirements (continued)

AC Appliance	Step 1	Step 2	Step 3	Step 4
	Appliance Running Watts	(x) Hours used each day	(x) Days used each week	(÷ 7 =) Average Daily Watt-Hour Requirement
Step 6	Step 7	Step 8	Step 9	Step 10
Total Daily Watt Hours Required	Autonomy Battery Size	Rough Battery Size (Watt Hours)	Safe Battery Size (Watt Hours)	Safe Battery Size (Amp Hours)

Table B-2
Estimating Battery Requirements - Worksheet

Estimating Battery Requirements (continued)

Typical Appliance Wattages

The following chart lists some common appliances and their *estimated* wattage. These are only rough estimates and are not intended as a replacement for the actual label ratings found on the appliances. Be sure to check these labels for accurate wattage values.

Typical Appliance Wattage			
Appliance	Watts	Appliance	Watts
Fluorescent type light	10	Blender	400
Computer	200-300	Toaster	1000
Microwave (compact)	600-800	Hot Plate	1800
Microwave (full size)	1500	Washer/Dryer	375-1000
Stereo or VCR	50	3/8" Drill	500
Color TV (19")	150	Hair Dryer or Iron	1000
*Refrigerator (3 cu ft)	180	Vacuum Cleaner	1200
*Refrigerator (12 cu ft)	480	Coffee Maker	1200

**Refrigerators and icemakers typically run only 1/3 of the time; therefore, the running wattage is 1/3 of the total wattage of the appliance.*

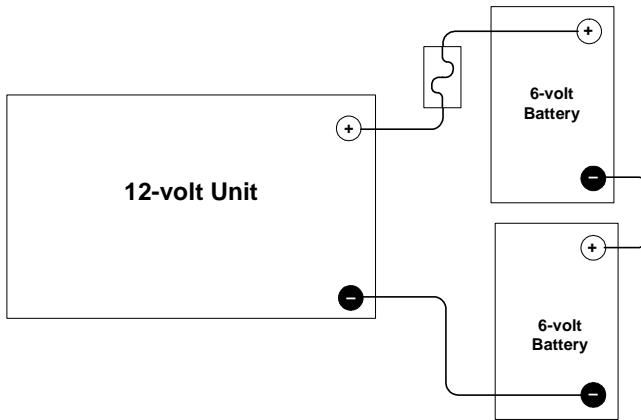
Table B-3
Typical Appliance Wattage

Battery Configurations

The battery-bank must be wired to match the unit's DC input voltage specifications (12 Vdc). In addition, the batteries can be wired to provide additional run time. The various wiring configurations are as follows:

Series

Wiring batteries in "series" increases the total bank output voltage. This voltage **MUST** match the DC requirements of the unit or damage may occur to both the unit and/or the batteries.



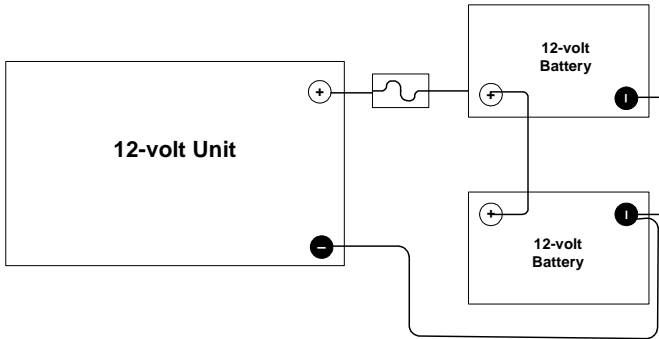
Battery Wiring configured in Series

Figure B-1
Series Configuration for Battery Connections

Battery Configurations (continued)

Parallel

Wiring the batteries in “parallel” increases the total run time the batteries can operate the AC loads. The more batteries connected in parallel the longer the loads can be powered from the unit.

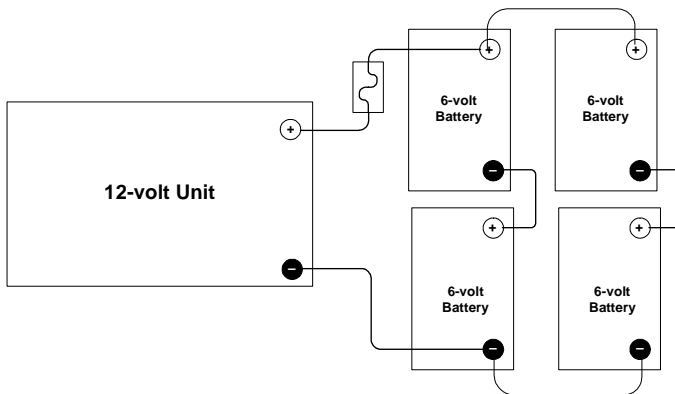


Battery Wiring configured in Parallel

Figure B-2
Parallel Configuration for Battery Connections

Series-Parallel

“Series-parallel” configurations increase both the battery voltage (to match the unit’s DC requirements) and run-time for operating the AC loads.



Battery Wiring configured in Series-Parallel

Figure B-3
Series-Parallel Configuration for Battery Connections

Battery Care and Maintenance

Replenish Water Levels

Liquid lead-acid batteries require periodic water refills in each battery cell. Only use distilled water in a battery, as tap or mineral water may contain contaminants which will upset the battery chemistry and may damage the battery.

When filling the battery, clean the surface first to prevent dirt from entering the cell. Fill the cell to just above the plates or to the bottom of the internal collar inside the battery. *Never* fill the cells to the top or acid will leak out during charging.

Check the water level in the batteries frequently when performing an equalize charge and add water if necessary. Always follow the safety steps covered in the front of the manual.

Clean Battery Cables and Posts



WARNING:
BEFORE ATTEMPTING TO CLEAN THE BATTERY POSTS, TURN OFF THE DC CIRCUIT BREAKER. USE ONLY INSULATED TOOLS AND REMOVE ALL JEWELRY.

Battery posts must be clean to reduce the resistance between the battery post and cable connection. A buildup of dirt or oxidation may eventually lead to the cable terminal overheating during periods of high current draw.

Use a stiff wire brush and remove all dirt and corrosion from the battery terminals and cables. Use an alkaline solution of baking soda and water to clean the terminals and neutralize any battery acid on the terminals or cable lugs.



CAUTION: *Never let a baking soda solution get into the battery as it will neutralize the acid resulting in permanent damage.*

Battery Care and Maintenance (continued)

Check Battery's State-of-Charge

The battery's state-of-charge should be checked monthly and only when the battery is not powering heavy loads or being actively charged. If the batteries are readily accessible, measure the voltage across the individual battery terminals. There should be less than a 0.2 volt difference between each battery.

To determine the individual cell voltage, divide the voltage by the number of cells in the battery (i.e., 12.6 volts divided by 6 cells = 2.1 volts per cell). If a greater difference is measured, the batteries may need to be equalized (liquid lead-acid types only) or replaced.

All batteries in the bank should measure the same voltage. The voltage should match the following table for the entire battery bank output. These values indicate the overall battery's state-of-charge for the entire bank. Individual cell voltages (if available) are also shown as a percentage of charge.

The values given are for a temperature of 77 °F (25 °C). Cooler temperatures produce lower voltage measurements.

Appendix B - Battery Information

Battery Care and Maintenance (continued)

Check Battery's State-of-Charge (continued)

Percent of Full Charge	System Voltage		Individual Cell Voltage
	12 V	24 V	
100%	12.7	25.4	2.12
90%	12.6	25.2	2.10
80%	12.5	25.0	2.08
70%	12.3	24.6	2.05
60%	12.2	24.4	2.03
50%	12.1	24.2	2.02
40%	12.0	24.0	2.00
30%	11.8	23.6	1.97
20%	11.7	23.4	1.95
10%	11.6	23.2	1.93
0%	≤ 11.6	≤ 23.2	≤ 1.93

Table B-4
Battery State-of-Charge

Limited Warranty

What does this warranty cover and how long does it last?

This Limited Warranty is provided by Xantrex Technology, Inc. ("Xantrex") and covers defects in workmanship and materials in your Trace UR-UPS. This warranty lasts for a Warranty Period of two years from the date of purchase at point of sale to you, the original end user customer.

What will Xantrex do?

Xantrex will, at its option, repair or replace the defective product free of charge, provided that you notify Xantrex of the product defect within the Warranty Period, and provided that Xantrex through inspection establishes the existence of such a defect and that it is covered by this Limited Warranty.

Xantrex will, at its option, use new and/or reconditioned parts in performing warranty repair and building replacement products. Xantrex reserves the right to use parts or products of original or improved design in the repair or replacement. If Xantrex repairs or replaces a product, its warranty continues for the remaining portion of the original Warranty Period or 90 days from the date of the return shipment to the customer, whichever is greater. All replaced products and all parts removed from repaired products become the property of Xantrex.

Xantrex covers both parts and labor necessary to repair the product, and return shipment to the customer via a Xantrex-selected non-expedited surface freight within the contiguous United States and Canada. Alaska and Hawaii are excluded. Contact Xantrex Customer Service for details on freight policy for return shipments outside of the contiguous United States and Canada.

Limited Warranty (continued)

How do you get service?

If your product requires troubleshooting or warranty service, contact your merchant. If you are unable to contact your merchant, or the merchant is unable to provide service, contact Xantrex directly at:

Phone: 1-604-422-2777 (Direct)
1-800-670-0707 (Toll Free)
Fax: 1-604-420-2145
Email: Customerservice@xantrex.com
Website: www.xantrex.com

Direct returns may be performed according to the Xantrex Return Material Authorization Policy described in your product manual. For some products, Xantrex maintains a network of regional Authorized Service Centers. Call Xantrex or check our website to see if your product can be repaired at one of these facilities.

In any warranty claim, dated proof of purchase must accompany the product and the product must not have been disassembled or modified without prior written authorization by Xantrex.

Proof of purchase may be in any one of the following forms:

- the dated purchase receipt from the original purchase of the product at point of sale to the end user, or
- the dated dealer invoice or purchase receipt showing original equipment manufacturer (OEM) status, or
- the dated invoice or purchase receipt showing the product exchanged under warranty.

Limited Warranty (continued)

What does this warranty not cover?

This Limited Warranty does not cover normal wear and tear of the product or costs related to the removal, installation, or troubleshooting of the customer's electrical systems. This warranty does not apply to and Xantrex will not be responsible for any defect in or damage to:

- a) the product if it has been misused, neglected, improperly installed, physically damaged or altered, either internally or externally, or damaged from improper use or use in an unsuitable environment;
- b) the product if it has been subjected to fire, water, generalized corrosion, biological infestations, or input voltage that creates operating conditions beyond the maximum or minimum limits listed in the Xantrex product specifications including high input voltage from generators and lightning strikes;
- c) the product if repairs have been done to it other than by Xantrex or its authorized service centers (hereafter "ASCs");
- d) the product if it is used as a component part of a product expressly warranted by another manufacturer;
- e) the product if its original identification (trademark, serial number) markings have been defaced, altered, or removed.

Limited Warranty (continued)

DISCLAIMER

Product

THIS LIMITED WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY PROVIDED BY XANTREX IN CONNECTION WITH YOUR XANTREX PRODUCT AND IS, WHERE PERMITTED BY LAW, IN LIEU OF ALL OTHER WARRANTIES, CONDITIONS, GUARANTEES, REPRESENTATIONS, OBLIGATIONS AND LIABILITIES, EXPRESS OR IMPLIED, STATUTORY OR OTHERWISE IN CONNECTION WITH THE PRODUCT, HOWEVER ARISING (WHETHER BY CONTRACT, TORT, NEGLIGENCE, PRINCIPLES OF MANUFACTURER'S LIABILITY, OPERATION OF LAW, CONDUCT, STATEMENT OR OTHERWISE), INCLUDING WITHOUT RESTRICTION ANY IMPLIED WARRANTY OR CONDITION OF QUALITY, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE TO THE EXTENT REQUIRED UNDER APPLICABLE LAW TO APPLY TO THE PRODUCT SHALL BE LIMITED IN DURATION TO THE PERIOD STIPULATED UNDER THIS LIMITED WARRANTY.

IN NO EVENT WILL XANTREX BE LIABLE FOR ANY SPECIAL, DIRECT, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, LOSSES, COSTS OR EXPENSES HOWEVER ARISING WHETHER IN CONTRACT OR TORT INCLUDING WITHOUT RESTRICTION ANY ECONOMIC LOSSES OF ANY KIND, ANY LOSS OR DAMAGE TO PROPERTY, ANY PERSONAL INJURY, ANY DAMAGE OR INJURY ARISING FROM OR AS A RESULT OF MISUSE OR ABUSE, OR THE INCORRECT INSTALLATION, INTEGRATION OR OPERATION OF THE PRODUCT.

Limited Warranty (continued)

Exclusions

If this product is a consumer product, federal law does not allow an exclusion of implied warranties. To the extent you are entitled to implied warranties under federal law, to the extent permitted by applicable law they are limited to the duration of this Limited Warranty. Some states and provinces do not allow limitations or exclusions on implied warranties or on the duration of an implied warranty or on the limitation or exclusion of incidental or consequential damages, so the above limitation(s) or exclusion(s) may not apply to you. This Limited Warranty gives you specific legal rights. You may have other rights which may vary from state to state or province to province.

Information

WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, UNLESS SPECIFICALLY AGREED TO BY IT IN WRITING, XANTREX

(a) MAKES NO WARRANTY AS TO THE ACCURACY, SUFFICIENCY OR SUITABILITY OF ANY TECHNICAL OR OTHER INFORMATION PROVIDED IN MANUALS OR OTHER DOCUMENTATION PROVIDED BY IT IN CONNECTION WITH THE PRODUCT; AND

(b) ASSUMES NO RESPONSIBILITY OR LIABILITY FOR LOSSES, DAMAGES, COSTS OR EXPENSES, WHETHER SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL OR INCIDENTAL, WHICH MIGHT ARISE OUT OF THE USE OF SUCH INFORMATION.

THE USE OF ANY SUCH INFORMATION WILL BE ENTIRELY AT THE USER'S RISK.

Limited Warranty (continued)

WARNING: LIMITATIONS ON USE

NOTE: DO NOT RETURN PRODUCTS TO THIS ADDRESS. Please call your Xantrex Customer Service Representative for return mailing instructions.

The Trace UR-UPS is not intended for use in connection with life support systems and Xantrex makes no warranty or representation in connection with any use of the product for such purposes.

Xantrex Technology, Inc.
8999 Nelson Way
Burnaby, British Columbia
Canada
V5A 4B5

Return Material Authorization Policy

Before returning a product directly to Xantrex you must obtain a Return Material Authorization (RMA) number and the correct factory "Ship To" address. Products must also be shipped prepaid. Product shipments will be refused and returned at your expense if they are unauthorized, returned without an RMA number clearly marked on the outside of the shipping box, if they are shipped collect, or if they are shipped to the wrong location.

When you contact Xantrex to obtain service, please have your instruction manual ready for reference and be prepared to supply:

- The serial number of your product
- Information about the installation and use of the unit
- Information about the failure and/or reason for the return
- A copy of your dated proof of purchase

Shipping Instructions

1. Package the unit safely, preferably using the original box and packing materials. Please ensure that your product is shipped fully insured in the original packaging or equivalent. This warranty will not apply where the product is damaged due to improper packaging.
2. Include the following:
 - the RMA number supplied by Xantrex Technology Inc clearly marked on the outside of the box,
 - a return address where the unit can be shipped (post office boxes are not acceptable),
 - a contact telephone number where you can be reached during work hours, and
 - a brief description of the problem.
3. Ship the unit prepaid to the address provided by your Xantrex customer service representative.

If you are returning a product from outside of the USA or Canada

In addition to the above, you **MUST** include return freight funds and are fully responsible for all documents, duties, tariffs, and deposits.

If you are returning a product to a Xantrex Authorized Service Center (ASC)

A Xantrex return material authorization (RMA) number is not required. However, you must contact the ASC prior to returning the product or presenting the unit to verify any return procedures that may apply to that particular facility.

Appendix C - Product Warranty and Service Information

Service Information

Model Number: _____

Serial Number: _____

Purchase Date: _____

Problem: _____

Include a telephone number where you can be reached during business hours and a complete return shipping address (P.O. Box numbers are not acceptable).

Name: _____

Address: _____

City: _____

State / Province: _____

Zip / Postal Code: _____

Country: _____

Phone: _____

FAX: _____

Email Address: _____

A

AC Input 19, 20, 21, 22
AC input voltage 11
AC Transfer Voltage Sensitivity 8

B

Batteries

Battery Bank Sizing B-3
Estimating Battery Requirements B-3

Battery Care and Maintenance
Cleaning Cables and Posts B-12
State-of-charge B-14
Water Levels B-12

Battery Types

Absorbed Glass Mat B-2
Flooded Lead Acid (FLA) B-1
Gel Cell B-2
Golf Cart B-2
Industrial (electric forklift) B-2

Battery Depth-of-Discharge 8
Battery Type Selection 10, 12
Battery Voltage Meter 23

C

circuit board 10
Configuration Options 8
Connection to the Battery 17, 18
control panel 23

D

DC Wiring 15, 16, 17, 18
Depth-of-Discharge 8, 10, 13
 deep 13
 shallow 13

F

Features 1
Functions 1

G

GEN MODE 11
generators 11

I

Input 19, 20, 21, 22

J

jumpers 9, 10
 Jumper Enlargement 9
 Jumper Identification 10
 Jumper Placement 9
 Jumper Settings 10

M

mode of operation 23
Mounting 6, 7

P

Problem Loads
 Ceiling Fans 31
 Cell Phones 31
 Clocks 31
 Computers and Sensitive Electronics 33
 Consumer Electronics 31
 Decreasing Loads 33
 Dimmer Switches 31
 Fluorescent Bulbs 33
 Fluorescent Lights 33
 Heavy Loads 30
 Incandescent Lights 33
 Microwave Ovens 32
 Printers 32
 Rechargeable Devices 32
 Undersized Loads 33

S

- Search Sense Mode 32, 33, 34
 - Confirming Search Mode Operation 32
 - Potential Problem Loads related to
 - Search Sense Mo 32, 33, 34
 - Other loads 34
- Setting AC Transfer Sensitivity 11
- Setting Battery Type 12
- Setting Depth of Discharge 13, 14

T

- tools 5
- trademarks ii
- Transfer Sensitivity 11
- Transfer time 11
- Typical Appliance Wattages B-9

U

- UPS MODE 11

Xantrex Technology Inc.

1 800 670 0707 Toll Free

1 604 422 2777 Direct

1 604 420 2145 Fax

www.xantrex.com