



# ***Owner's Manual***

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***Series 1000  
Inverter / Power Backup Systems***

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**Use this manual with the following models only.**

Model 1000-080, 1000-081 with circuit board 2355-010.

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## 1. Important Information

This manual contains important safety and operating instructions and specifications for DKS Model 1000 Inverter / Backup Power System. This manual is the property of the owner of the equipment and must be left in their possession after the installation of the product is complete. **SAVE THESE INSTRUCTIONS!**

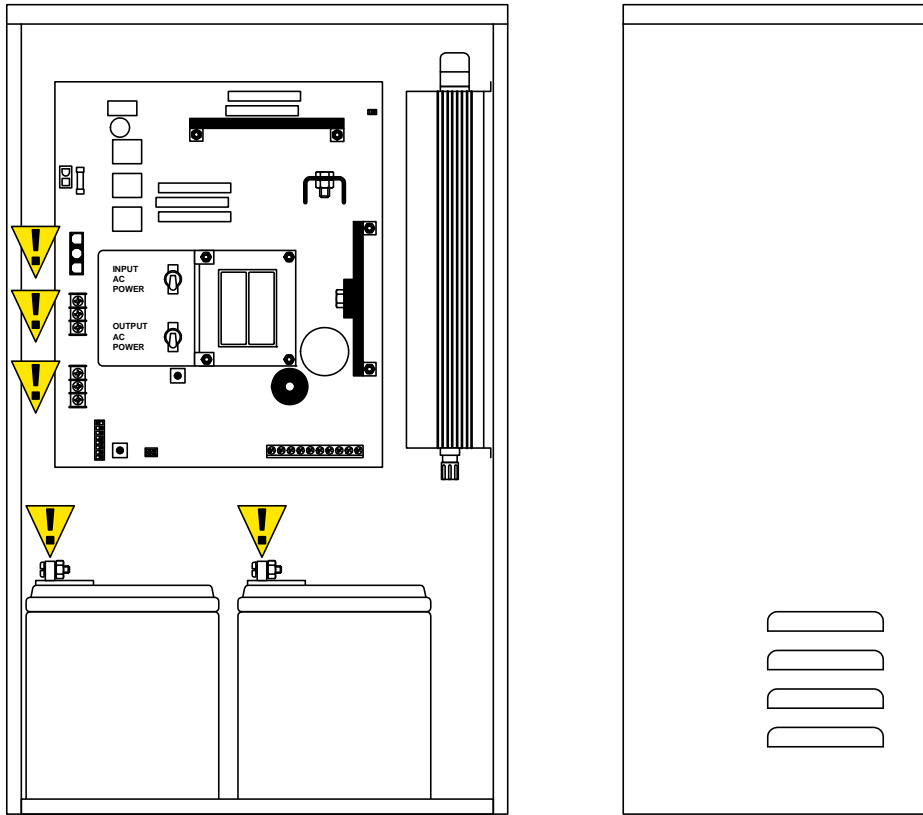
The 1000 Watt Inverter (1000-080) can be used to power a single, 1/2 HP gate operator system when in continuous duty mode, or can be used with two (2) 1/2 HP gate operators when open upon power failure mode is used.

The 1500 Watt Inverter (1000-081) can be used to power a bi-parting, 1/2 HP gate operator system; or it can be used to power a single, 1 HP gate operator system.

The DKS Model 1000 Power Inverter uses a modified sine wave as the AC output. Because of this, vehicular gate operators that use a current sensor device (ERD) as an inherent entrapment protection system may experience false entrapment inputs when the inverter powers the gate operator. DKS gate operators that use an ERD have been specifically designed to work within the limits of the modified sine wave.

## 2. Important Precautions

- **CAUTION** – The Model 1000 produces lethal voltages. It should be installed by a qualified electrician and operated with care and attention. The batteries are capable of supplying hazardous current. Follow the instructions carefully.
- **CAUTION – Risk of Energy Hazard, 12 V, 35 Ampere-hour battery.** Dangerous voltages are present even when the AC is off. Remove personal metal items such as rings, bracelets, necklaces, and watches when working with electrical circuits. These items can cause a short-circuit current high enough to weld a ring, or the like, to metal causing severe burns.
- **CAUTION** – Disconnect the charging source prior to connecting or disconnecting the batteries. Do not install or connect batteries to this unit until instructed to do so. Failure to comply with this instruction can cause damage or complete failure of the inverter unit.
- **CAUTION** - To reduce risk of injury, use only the type of batteries specified. **Maintenance-Free, Rechargeable, Nonspillable, Sealed Lead-Acid (SLA), 12-Volt, 35.0 AH.**
- **BATTERIES MUST HAVE SCREW TYPE TERMINALS. DO NOT USE BATTERIES WITH CLAMP TYPE TERMINALS.**
- **CAUTION** – Do not dispose of batteries in a fire. The battery may explode. Batteries should be taken to a recycling center.
- **CAUTION** – Do not open or mutilate the batteries. Released electrolyte is harmful to skin and eyes. It is toxic.
- Never charge a frozen battery.
- Someone should be within range of your voice to come to your aid when you work near batteries.
- NEVER smoke or allow a spark or flame in vicinity of the batteries.
- Be extra cautious when working with metal tools on and around batteries. Use tools with insulated handles. Do not lay tools or metal parts on top of the batteries. The potential exists to short-circuit the batteries or other electrical parts that may result in a spark that could cause an explosion.



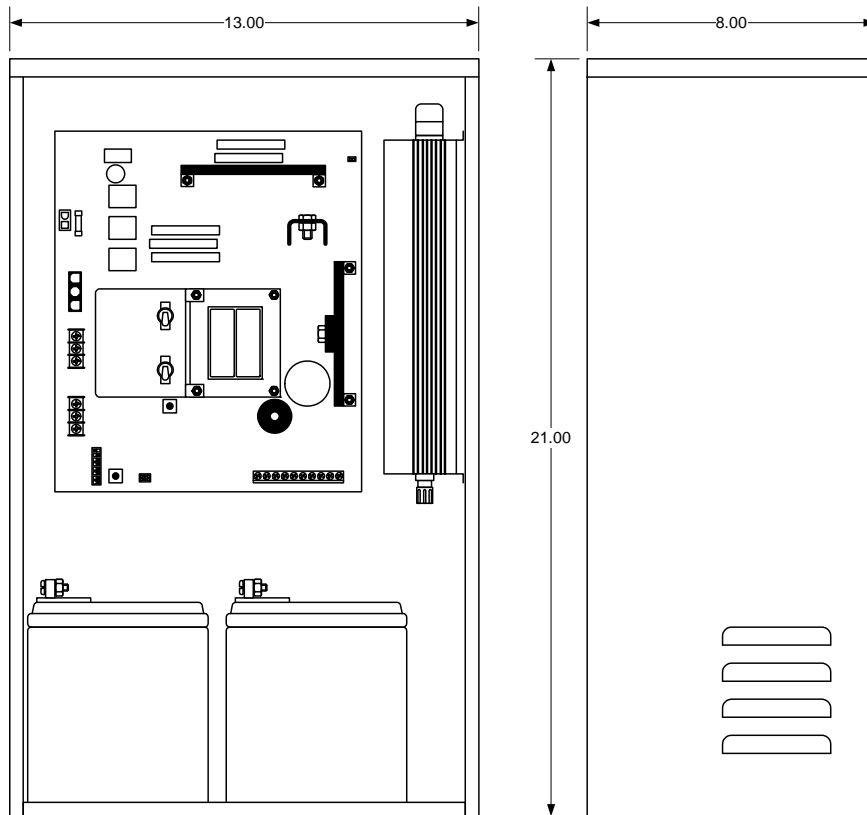
**CAUTION – RISK OF ELECTRICAL SHOCK PRESENT!**

CAUTION – Risk of electrical shock – hazardous live parts inside this unit are energized from the battery supply even when AC power is disconnected.

CAUTION – Risk of electrical shock. AC Input and AC Output terminals can be energized even with AC INPUT and AC OUTPUT switches turned off.

### 3. Specifications

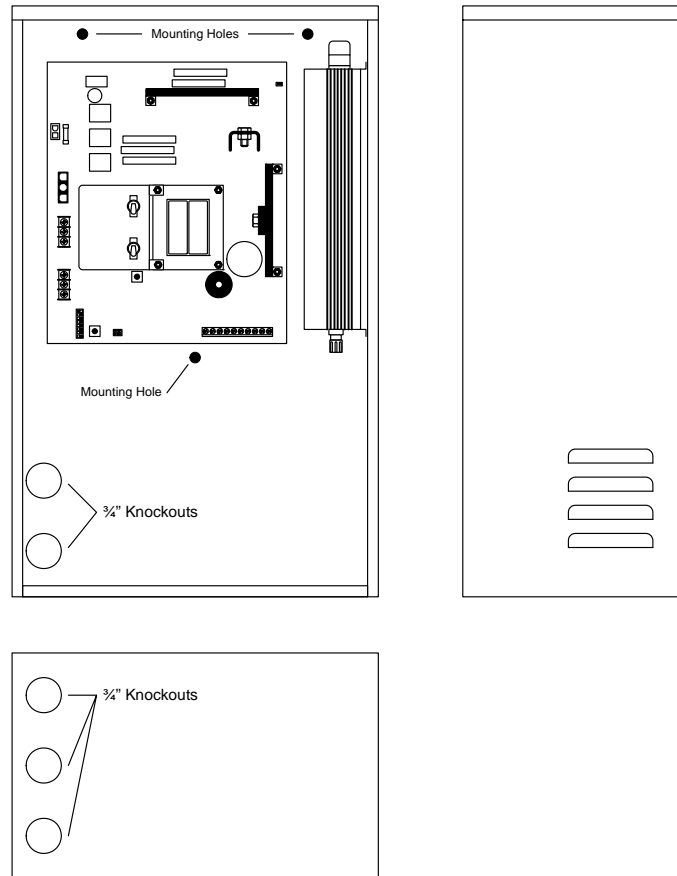
Continuous Power Output:	1000 Watt (1000-080) 1500 Watt (1000-081)
Output Power Surge:	3000 Watt (1000-080) 3500 Watt (1000-081)
AC Output Voltage:	120 VAC
Regulation:	± 10%
Output Wave Form:	Modified Sine Wave
DC Input Voltage:	10 – 15 VDC
Low Battery Alarm:	10.5 VDC ± .5 V (1000-080) 9.5 VDC ± .5 V (1000-081)
Low Battery Shutdown:	9.5 VDC ± .5 V
Frequency:	60 Hz
Efficiency:	90%
No Load Current Draw:	< 0.6 A
Over Temp Protection:	140°F (60°C)
Operating Temp Range:	23°F (-5°C) to 126°F (52°C)
Overload Protection:	Yes
Input Short Protection:	Yes



## 4. Mounting

The Model 1000 inverter has three (3) mounting holes provided on the back of the cabinet. The mounting holes should be used to mount the model 1000 to a vertical surface. In addition, there are five (5) 3/4" conduit knockouts; three (3) on the bottom and two (2) on the back. These should be used for wiring.

**IMPORTANT:** Do not drill any additional holes into the Model 1000 housing. Drilling produces metal filings, which can cause shorts on the circuit board and will void the warranty.



### **Location**

Prior to installing the Model 1000, careful thought must be given as to where the unit will be installed. The system operates best when it can be installed as physically close as possible to the equipment that it is intended to operate during power outages. This reduces line loss.

The effective capacity of a battery is reduced when cold. This phenomenon is more significant with lead-acid type batteries than with other batteries. When the internal temperature of a lead-acid battery is 32°F (0°C), the capacity can be reduced by as much as 50%. If extremely cold temperatures are expected, you should consider installing the Model 1000 in a heated equipment room.

The Model 1000 should be protected from high temperatures as well. High battery temperatures will result in short battery life. Install the backup system in a shaded area or inside an air-conditioned equipment room if extremely high temperatures are the norm.

## 5. Read Before Wiring

**WARNING!** Do not connect batteries until installation and wiring is complete. The batteries will be the last component to be connected.

Wiring of the Model 1000 should be performed by a qualified licensed electrical contractor to insure that the installation complies with local codes and ordinances.

The output of the Model 1000 should at no time be connected to public power or a generator.

Use No. 12 AWG copper wire for AC input and AC output connections.

**GROUNDING INSTRUCTIONS** - This backup power supply must be connected to a grounded, permanent wiring system.

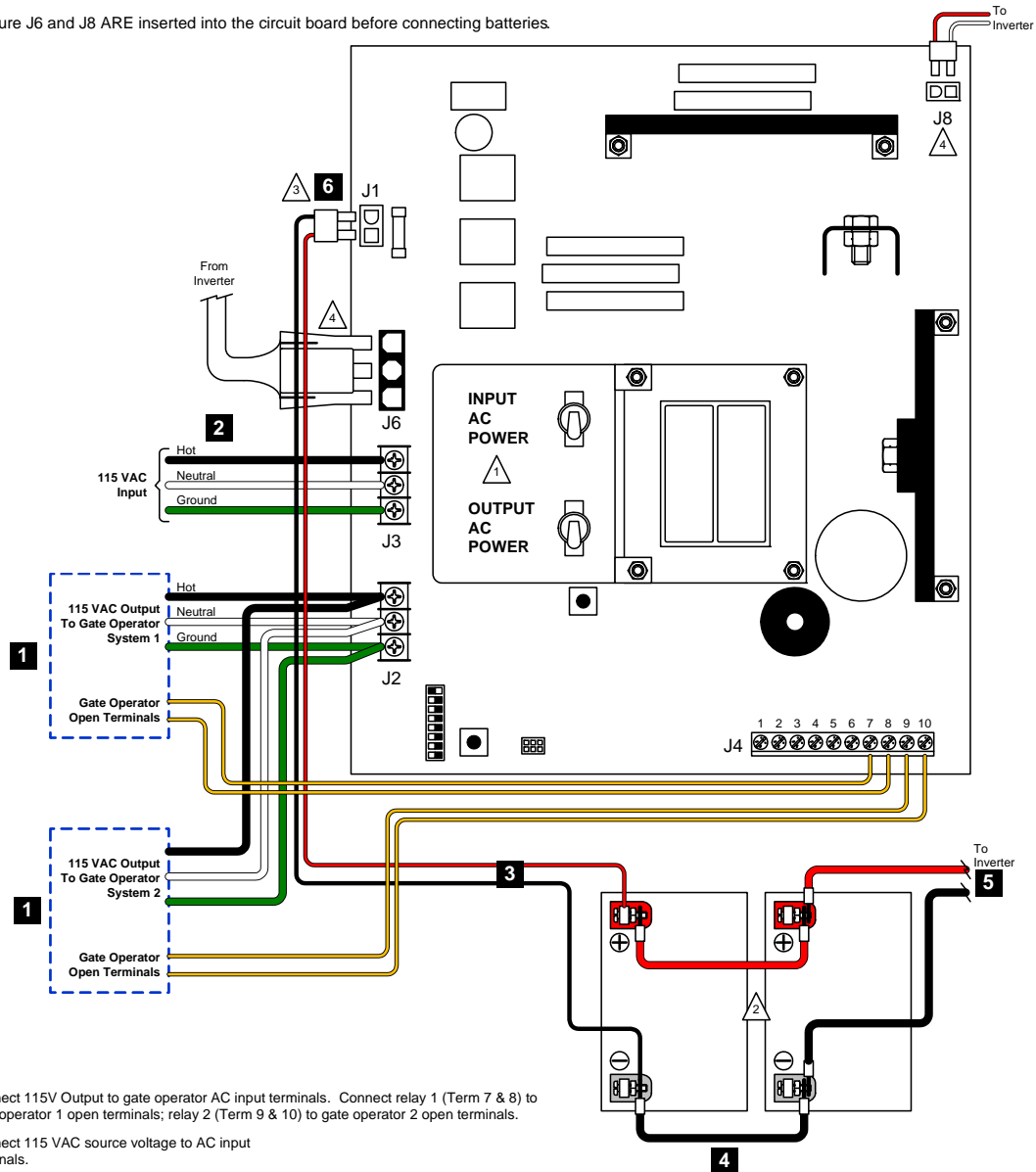
**WARNING!! THE INVERTER IN THIS BACKUP POWER SYSTEM IS NOT REVERSE-POLARITY PROTECTED!!** If the positive terminal of the battery is connected to the negative terminal of the inverter and vice versa, the probable result is failure of every power FET in the inverter. To compound your misfortune, this type of failure is very obvious **AND IS NOT COVERED UNDER THE WARRANTY.** Pay close attention and double check when making the battery connections. **CONNECTING THE BATTERY CABLES WILL CAUSE AN ARC USUALLY ACCOMPANIED BY A "SNAP". THIS IS NORMAL - DON'T LET IT SCARE YOU.**

**WARNING!!** Never disconnect the batteries while the system is delivering power or the battery charger is operating. Always turn the system OFF first.

## 6. Wiring Instructions

1. Check to be sure that both the Input AC Power and Output AC Power switches are in the OFF position.
2. Insure that plug **J1 IS NOT** plugged into the circuit board at this time.
3. Insure that plugs **J6 and J8 ARE** plugged into the circuit at this time.
4. Connect 115 VAC Output J2 to gate operator AC power input terminals: H to Hot, N to Neutral, G to Ground.
5. Connect 115 VAC utility power to J3: Black to H (Hot), White to N (Neutral), Green to G (Ground).
6. Connect the Normally Open (N.O.) relay contacts, J4 terminals 7 & 8, to the gate operator open terminals.
7. Connect the RED wire from J1 to the POSITIVE battery terminal. Connect the BLACK wire from J1 to the NEGATIVE battery terminal.
8. If two (2) batteries are being used, they must be connected in parallel; POSITIVE to POSITIVE; NEGATIVE to NEGATIVE.
9. **OBSERVE BATTERY POLARITY!** Connect the RED battery cable to the POSITIVE (Red) terminal on the inverter. Connect the BLACK battery cable to the NEGATIVE (Black) terminal on the inverter.
10. **Be sure ALL battery connections are tight.**
11. **Insert J1 into the circuit board.**

- ⚠️ 1 Insure that both AC Power Input and AC Power Output switches are in the OFF(down) position before connecting any wires.
- ⚠️ 2 1000 Watt inverters (1000-080) can use one (1) or two (2) batteries; 1500 Watt inverters (1000-081) use two (2) batteries.
- ⚠️ 3 Insure that J1 **IS NOT** plugged into the circuit board. This plug is inserted only after the batteries are connected.
- ⚠️ 4 Insure J6 and J8 **ARE** inserted into the circuit board before connecting batteries.



- 1 Connect 115V Output to gate operator AC input terminals. Connect relay 1 (Term 7 & 8) to gate operator 1 open terminals; relay 2 (Term 9 & 10) to gate operator 2 open terminals.
- 2 Connect 115 VAC source voltage to AC input terminals.
- 3 Connect RED wire from J1 to POSITIVE terminal on battery. Connect BLACK wire from J1 to NEGATIVE terminal on battery. **Be sure that J1 IS NOT plugged into the board at this time!**
- 4 If using two batteries, connect batteries in PARALLEL: Positive to Positive; Negative to Negative. **DO NOT CONNECT BATTERY TO INVERTER AT THIS TIME.**
- 5 Connect battery to inverter terminals: Positive to RED terminal; Negative to BLACK terminal. **Insure that J1 IS NOT plugged into the circuit board.**
- 6 Insure all wiring is connected to the circuit board and inverter, and that the battery is connected to the inverter. Plug J1 into the circuit board.

DOORKING, INC., INGLEWOOD, CA 90301			
Title: 1000 Inverter Wire Connections			
Date: 4/09	Dwg. No. M1000-Wire	Rev. A	

## 7. LED Status Indicators

The Model 1000 has 12 LED indicators to show the status of the inverter, batteries and to assist in troubleshooting.

LED	Description
<b>UTIL OPER</b>	GREEN LED indicating that the 115 VAC power output at J2 is sourced from the utility company and the inverter is in stand-by mode.
<b>INV ON</b>	YELLOW LED indicating that primary (utility company) power is unavailable and the 115 VAC power at J2 is being sourced from the inverter.
<b>B BAD</b>	RED LED blinks when the battery has been tested to be low, comes on steady when battery is bad.
<b>B OK</b>	GREEN LED indicates that the battery has been tested and is good.
<b>BULK</b>	YELLOW LED indicates that the battery is being bulk charged; blinking indicates that the battery is at 90% of full charge.
<b>TRICK</b>	GREEN LED indicates that the battery is fully charged and the system is applying a trickle charge to it to maintain the full charge.
<b>TEMP</b>	RED LED indicates that the battery is not being charged because the temperature is outside the battery safe operating range: 23°F (-F°C) to 126°F (52°C).
<b>SHDN</b>	RED LED located in the upper left of the circuit board. This LED is ON when the system has shut down the inverter because of low battery voltage.
<b>110V ON</b>	RED LED (2) indicates that 115 VAC is present at the power output terminal (J2).
<b>DIAGNOSTIC</b>	GREEN LED indicates the status of the charge state. Used by DK technicians for troubleshooting.
<b>HRT BEAT</b>	GREEN LED blinking indicates that the microprocessor is operating.

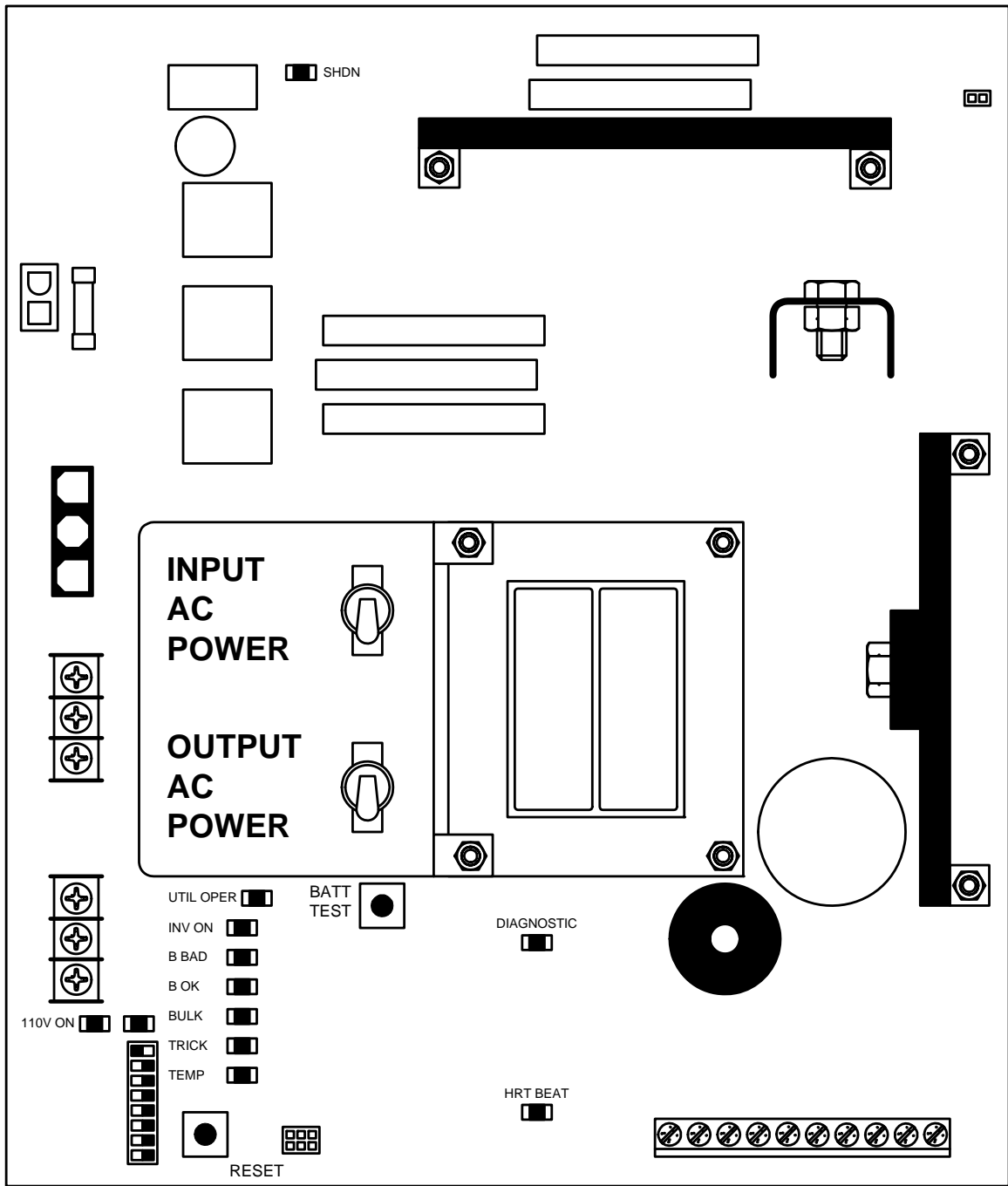
## 8. Test / Reset Buttons

### BATT TEST

Pressing the BATT TEST push button will initiate a quick test of the battery and its charge state. The test takes 20-30 seconds to complete. When the BATT TEST button is pressed, the B OK led will turn off. When the test is complete, the B OK led will turn on.

### RESET

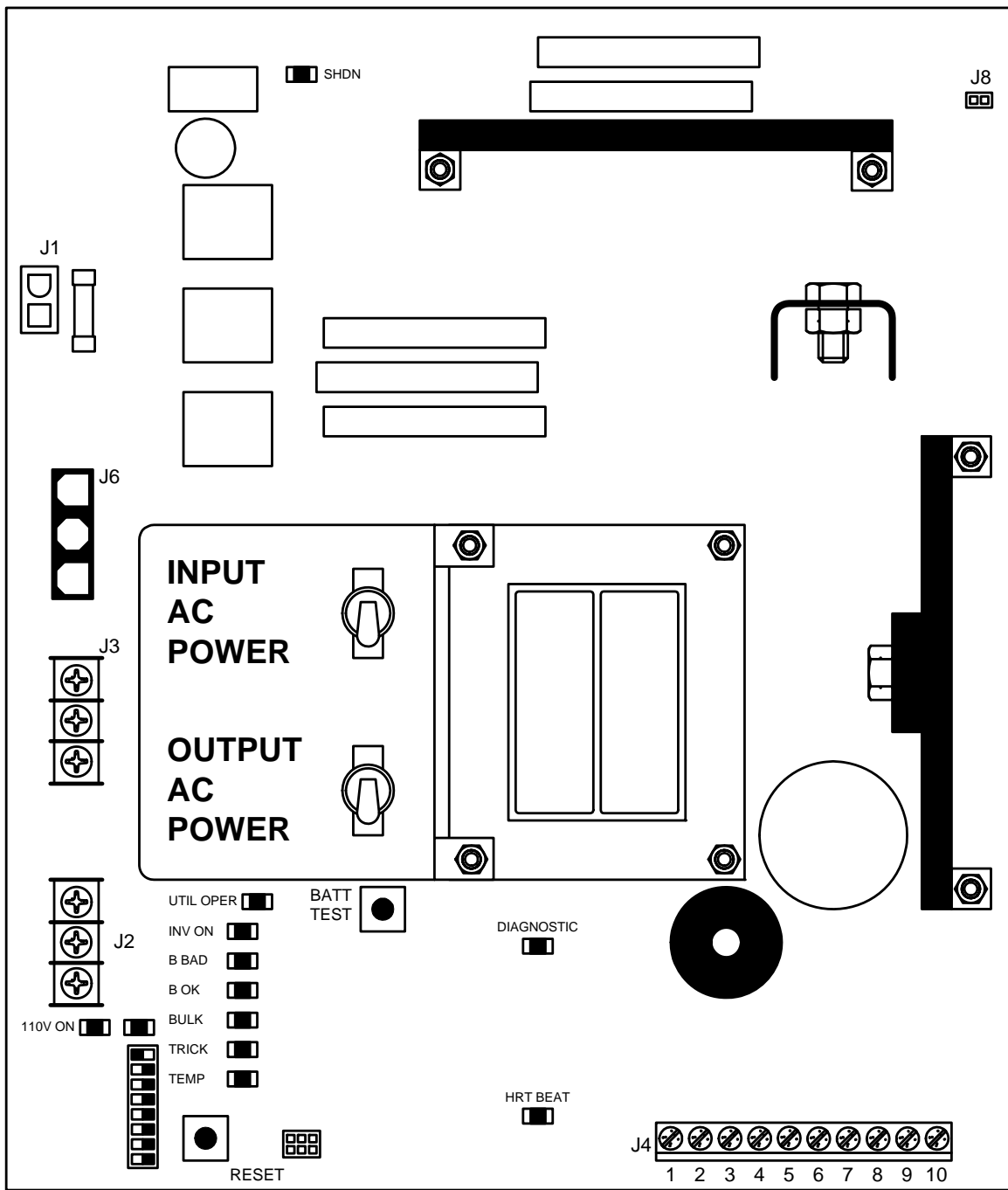
Pressing the RESET push button will reset the circuit board to its start-up state.



## 9. Switch Settings / Terminal Description

Switch Settings (settings in <b>bold</b> are default settings)			
SW #	Description	OFF	ON
1	Low Battery Shutdown	<b>HIGH – Shutdown occurs at a higher battery voltage. Use with heavier gates.</b>	LOW – Shutdown occurs at a lower battery voltage. Use with two battery systems and/or lighter gates.
2	Battery Test	<b>Battery Test OFF.</b>	Battery test automatically every few days to determine battery condition.
3	Number of Batteries	Two (2) batteries.	One (1) battery.
4	Beep Alert	<b>Beep Alert is OFF.</b>	Beeps every 30 seconds when battery charging has failed or the board is in a shutdown condition.
5	Relay Activation on AC Power Loss	When primary AC (Utility power) is lost – relays will activate immediately to open gate, then the system will enter a shut down condition.	<b>When primary AC (Utility power) is lost – the system will provide AC power to the gate operator(s) until the battery is too weak to continue operation. At this time, the system will activate each relay individually 55 seconds apart, and then shut down.</b>
6	Low Battery	When battery is too weak to sustain operation – system shuts down.	<b>When battery is too weak to sustain operation – activate relay to open gate then shut down.</b>
7	Relay Activation on AC Power Restore	Relays are not activated.	<b>Relays activate for 1/2-sec. when primary AC (Utility power) returns or when board powers up from a shutdown condition.</b>
8	Not Used	N/ A	<b>Leave this switch in the ON position.</b>

Terminals (J4)	
No.	Description
1	RS-232 Serial Data (D9 – Pin 2)
2	RS-232 Busy (D9 – Pin 4)
3	RS-232 Ground (D9 – Pin 5)
4	Signal Ground (not earth ground)
5	Not Used
6	Not Used
7	Relay 1 Normally Open
8	Relay 1 Common
9	Relay 2 Normally Open
10	Relay 2 Common



## 10. Status Report

The Model 1000 Inverter has a status report function that can be downloaded to a PC using a DB-9 connector and the RS-232 Serial port (refer to the table on page 14 for DB-9 wire connections). This feature can be used for troubleshooting purposes. The Model 1000 communicates at 300 baud, 8 data bits, no parity, 1 stop bit. A byte will be sent per functional change (see status report table below).

Status Report Table		
ASCII Character	Hex Value	Description
0	30	AC failure detected
1	31	AC present detected
2	32	System switched to battery operation
3	33	System switched to AC operation
4	34	System shut down because of low battery
5	35	Battery test initiated by timer
6	36	Battery test initiated by push button
7	37	Battery tested good
8	38	Battery tested weak
9	39	Battery tested bad
:	3A	Battery charge failed because of bad battery
;	3B	Battery charge ended good
<	3C	Temperature outside of operating range

## 11. Replacement Items / Accessories

<b>Part Number</b>	<b>Description</b>
1000-048	12 Volt, 35 AH Battery and Cable Assembly. Order this to add a second battery to the 1000 Watt inverter system.
	12 Volt, 35 AH replacement battery.
1000-044	Battery Cables.
2355-010	Circuit Board
	1000 Watt replacement inverter module.
	1500 Watt replacement inverter module.