



PRICE: \$25.00

**INV2500 and INV5000  
TELECOM INVERTERS  
OPERATING MANUAL**

**[www.unipowertelecom.com](http://www.unipowertelecom.com)**

**Manual No. INV-700-2**

12/04/01 INV2500/5000-Man

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# CONTENTS

<b><u>SECTION</u></b>	<b><u>TOPIC</u></b>	<b><u>PAGE</u></b>
1.0	Introduction	1
2.0	Important Features	1
3.0	Product Line	3
4.0	Safety Warnings	3
5.0	Warranty	4
6.0	Unpacking and Inspection	4
7.0	Description of Operation	5
8.0	Front and Back Panel Descriptions	5
9.0	Electrical Specifications	7
10.0	Mechanical Dimensions of Shelves	8
11.0	Safety and Industry Standards	8
12.0	Operating Information	8
13.0	Parallel Operation	13
14.0	Installation and Testing	15
15.0	Single and Multiple Inverter Application	17
16.0	Replacing An Inverter	18
17.0	Maintenance	19
18.0	Troubleshooting Guide	20

## ILLUSTRATIONS

<b><u>FIGURE</u></b>	<b><u>TITLE</u></b>	<b><u>PAGE</u></b>
1	INV2500 and INV5000 Models	2
2	Front & Back of INV2500	6
3	Front & Back of INV5000	6
4	Mechanical Dimensions of Shelves	9
5	INV2500 Inverter Output Waveforms	11
6	INV2500/INV5000 Overload Characteristic	12
7	Connections for ORing Form C Relay Outputs on INV5000	12
8	INV2500 Series Inverters Connected in Parallel	14
9	Four INV2500s in Parallel Using AC Distribution Panel	14
10	Two 115VAC INV5000s in Parallel Using AC Distribution Panel	16
11	Output Connections for INV5000	16

## INV2500 AND INV5000 TELECOM INVERTERS OPERATING MANUAL

### 1.0 INTRODUCTION

- 1.1 This Operating Manual should be read through carefully before installing and operating the INV2500 or INV5000 Series inverters.
- 1.2 The INV2500 is a 2500 volt-ampere telecom inverter which converts a nominal 48VDC input into a 115VAC output at 60Hz. The INV5000 is a 5000VA inverter which converts a nominal 48VDC input into 115 or 230VAC at 60Hz or 230VAC at 50Hz. The INV2500 comes as a single, stand-alone unit. A 19-inch compatible shelf which can also be mounted in a 23-inch rack and holds one or two INV2500s is also available. The INV5000 comes in a 19-inch shelf which can also be mounted in a 23-inch rack. Both the INV2500 and INV5000 are two mounting positions (3.5 inches) high. See Figure 1.
- 1.3 The 48VDC nominal input has a range of 42 to 56VDC, and full load output is 115VAC at 22 amperes RMS for the INV2500. For the INV5000 the output is 115VAC at 44 amperes RMS or 230VAC at 22 amperes RMS. The inverters achieve 90% efficiency and 7VA per cubic inch power density. Input and output are both circuit breaker protected. The inverters have high surge capability for starting loads such as motors, but the output breaker quickly trips if power attempts to flow back into a faulted inverter.
- 1.4 These inverters can be paralleled for higher output power or for N+1 redundant applications. They are fully isolated from the battery. Front panel LEDs indicate inverter status, and Form C relay alarm contacts are available on the back. The units are self-cooled by internal fans.

### 2.0 IMPORTANT FEATURES

The following is a summary of the important features of the INV2500 and INV5000 inverters:

- ◆ Two Mounting Positions High: 3.5 Inches
- ◆ 2500VA Output for INV2500
- ◆ 5000VA Output for INV5000
- ◆ 7VA per Cubic Inch Power Density
- ◆ 115VAC Output at 22 or 44 Amperes
- ◆ 230VAC Output at 22 Amperes



**(a). INV2500 Inverter**



**(b). INV5000 Inverter**

**Figure 1. INV2500 and INV5000 Inverter Models**

- ◆ Low Distortion 50 or 60Hz Sine Wave
- ◆ 42 to 56VDC Input
- ◆ Fully Isolated from Battery Input
- ◆ 90% Typical Efficiency
- ◆ Up to 300% Surge Capability
- ◆ Powers Reactive Loads
- ◆ Circuit Breaker Input & Output Protection
- ◆ N+1 Redundant Operation
- ◆ 19- or 23-Inch Rack Mounting
- ◆ Overtemperature Protection
- ◆ Form C Relay Alarm Contacts
- ◆ LED Status Indicators
- ◆ Mating Connector Kit with INV2500
- ◆ Rear Safety Cover on INV5000

### 3.0 PRODUCT LINE

**Table 3-1 Telecom Inverter**

MODEL	INPUT	OUTPUT	FREQ.
INV2500	48VDC	115VAC@22A	60Hz
INV5000-115/60	48VDC	115VAC@44A	60Hz
INV5000-230/50	48VDC	230VAC@22A	50Hz
INV5000-230/60	48VDC	230VAC@22A	60Hz

**Table 3-2 Inverter Shelf (for INV2500)**

MODEL	SIZE	HEIGHT	CAPACITY
INVR2U	19 inches	2U (3.5 Inches)	2 INV2500s

### 4.0 SAFETY WARNINGS

- 4.1** These telecom inverters have hazardous external and internal voltages. They should be handled, tested and installed only by qualified technical persons who are trained in the use of power systems and are well aware of the hazards involved.
- 4.2** The input and output terminals are at hazardous voltage potentials. Do not touch these areas when power is applied.
- 4.3** When operating these inverters, the chassis ground terminal must be connected to safety ground to minimize electrical shock hazard and to ensure low EMI (electromagnetic interference).

- 4.4** The internal voltages are at hazardous potentials. The inverter covers should not be removed. There are no user-serviceable components in these units. Removing the covers of the inverters will void the warranty.

## **5.0 WARRANTY**

All products of UNIPOWER Telecom, a division of UNIPOWER Corporation, are warranted for two (2) years from date of shipment against defects in material and workmanship. This warranty does not extend to products which have been opened, altered or repaired by persons other than persons authorized by the manufacturer or to products which become defective due to acts of God, negligence or the failure of customer to fully follow instructions with respect to installation, application or maintenance. This warranty is extended directly by the manufacturer to the buyer and is the sole warranty applicable. EXCEPT FOR THE FOREGOING EXPRESS WARRANTY, THE MANUFACTURER MAKES NO WARRANTY, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. As the sole and exclusive remedy under this warranty, the manufacturer, at its option, may repair or replace the non-conforming product or issue credit, provided the manufacturer's inspection establishes the existence of a defect. To exercise this remedy, the buyer must contact the manufacturer's Customer Service Department to obtain a Return Material Authorization number and shipping instructions. Products returned without prior authorization will be returned to buyer. All products returned for repair must be shipped freight prepaid to UNIPOWER. If the buyer fails to fully comply with the foregoing, the buyer agrees that no other remedy (including, but not limited to, incidental or consequential damages for lost profits, lost sales, injury to person or property or any other incidental or consequential losses) shall be available to the buyer.

## **6.0 UNPACKING AND INSPECTION**

- 6.1** This INV2500 or INV5000 was carefully tested, inspected and packaged for shipment from our factory. Upon receipt of the unit it should be carefully unpacked and inspected for any damage in shipment.
- 6.2** If there is evidence of damage, do not attempt to test the unit. The freight carrier should be notified immediately and a claim for the cost of the rectifier system should be filed with the carrier for direct reimbursement. Be sure to include the model and serial number of the damaged unit in all correspondence with the freight carrier. Also save the shipping carton and packing material as evidence of damage for the freight carrier's inspection.
- 6.3** UNIPOWER Telecom will cooperate fully in case of any shipping damage investigation.
- 6.4** Always save the packing materials for later use in shipping the unit. Never ship the rectifier system without proper packing.

## 7.0 DESCRIPTION OF OPERATION

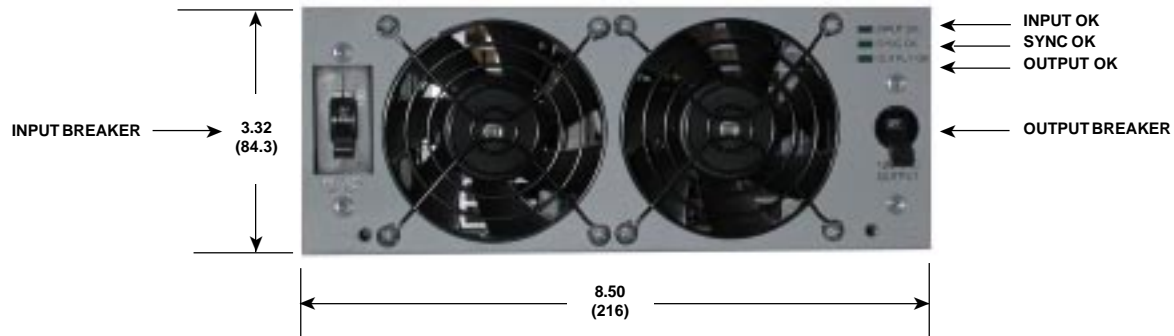
- 7.1** The INV2500 and INV5000 Series employ MOSFET and IGBT power semiconductor switches with advanced, high-frequency, pulse modulation techniques to produce a low-distortion, 50 or 60Hz sine wave output with 90% efficiency and 7VA per cubic inch power density. A synchronization circuit lets two or more inverters operate in parallel with their outputs in phase-synchronization and current shared.
- 7.2** The INV5000 consists of two INV2500s operated in parallel for 115VAC output or operated in series for a 230VAC output. The parallel or series connection of the units is made internally. Each of the two inverters has its own input and output breakers, indicator LEDs and Form C relay contacts.

## 8.0 FRONT AND BACK PANEL DESCRIPTIONS

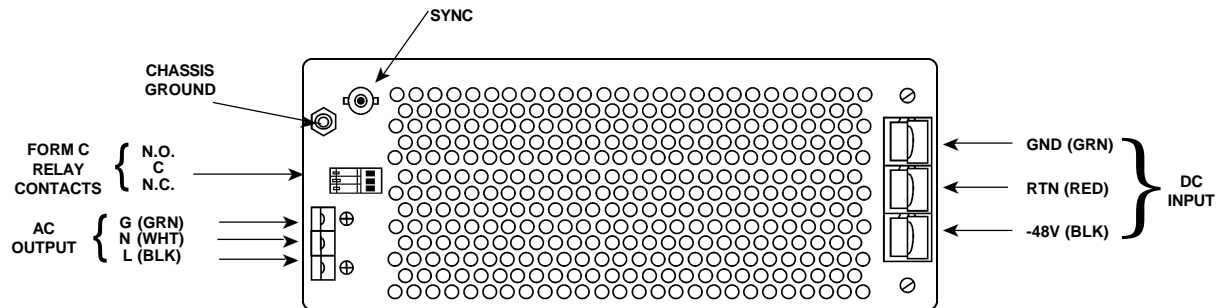
- 8.1** Figure 2 shows the front and back of an INV2500. On the left side of the front panel of the INV2500 is the input circuit breaker. To the right are the two cooling fans and the output circuit breaker. Above the output breaker from the top are the green LED indicators for Input OK, Sync OK and Output OK.
- 8.2** On the INV2500 back panel at the upper left is the sync terminal which is a BNC connector. Below that is a no. 8-32 stud and nut for chassis ground connection, then a 3-terminal Type 602 Spring Con connector for easy connection of wires to the Form C Relay contacts. Below this are three Anderson-Type connectors for the AC output (top to bottom): green (ground), white (neutral) and black (line). On the right side of the inverter are three larger Anderson connectors for the DC input. From top to bottom they are: green (ground), red (DC Return) and black (-48V Input).
- 8.3** Figure 3 shows the front and back of an INV5000. Each front half (side A or side B) of this inverter has an identical layout to the INV2500. The back panel has a transparent plastic safety cover.
- 8.4** On the INV5000 back panel to the left are the AC output screw terminals. At the center are the Form C relay contacts N.O., C and N.C. for each side (A and B) of the inverter. Below these is the BNC sync connector. To the right are the input bus bars with no. 1/4-20 studs. At the far right is the no. 10-32 stud chassis ground connection.



**INV2500 FRONT VIEW**

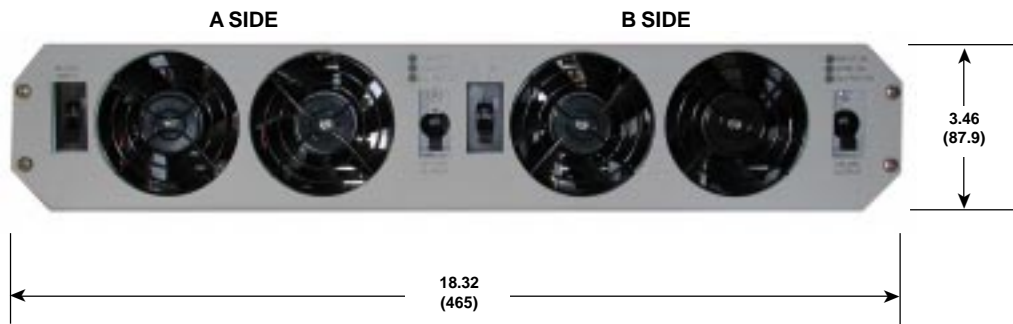


**INV2500 BACK VIEW**

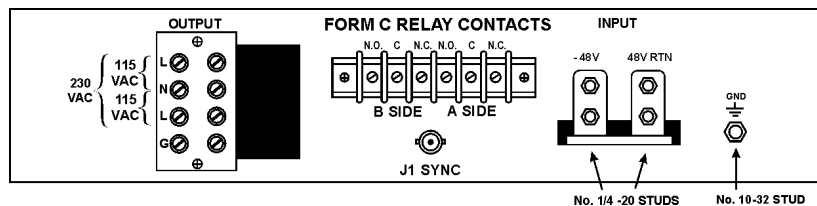


**Figure 2. Front and Back of INV2500**

**INV5000 FRONT VIEW**



**INV5000 BACK VIEW**



**Figure 3. Front and Back of INV5000**

## 9.0 ELECTRICAL SPECIFICATIONS

Specifications typical at 48V input, full load and 25°C unless otherwise noted. Asterisk (\*) means specification is same as center column.

	INV2500	INV5000-115	INV5000-230
<b>INPUT</b>			
Voltage Range .....	*	42-56 VDC .....	*
Input Current, Full Load, 48VDC .....	<60A DC .....	<120ADC .....	<120ADC
Input Current, No Load, 48VDC .....	<1A DC .....	<2ADC .....	<2ADC
Input Protection .....	*	100A Circuit Breaker .....	*
EMI Filter, Conducted .....	*	FCC2078 pt.15J Curve A .....	*
		EN55022 Curve A	
Voice Band Noise/ A-H Battery .....	<32dBmC/240 .....	<32dBmC/480 .....	<32dBmC/480

<b>OUTPUT</b>			
Voltage, Full Load .....	115VAC .....	115VAC .....	230VAC
Voltage, No Load .....	120VAC .....	120VAC .....	240VAC
Current, Max. ....	22A RMS .....	44A RMS .....	22A RMS
Frequency, ± 0.1% .....	60Hz .....	60Hz .....	50 or 60Hz
Total Harmonic Distortion .....	*	<2% .....	*
Load Crest Factor .....	*	2.8 to 1 .....	*
Output Protection .....	*	25A Circuit Breaker(s) .....	*
Surge Capability .....	*	Up to 300% .....	*
Reactive Loads .....	*	+90° to - 90° Phase Angle .....	*
Efficiency .....	*	90% .....	*

<b>SAFETY STANDARDS</b> .....	*	UL1950, CSA22.2 No.950, .....	*
		EN60950	

### STATUS INDICATORS

Input OK .....	*	Green LED .....	*
Sync OK .....	*	Green LED .....	*
Output OK .....	*	Green LED .....	*
Form C Relay Alarm Contacts .....	*	Inverter Fail Alarm .....	*

### ENVIRONMENTAL

Operating Temp. Range .....	*	0°C to 70°C .....	*
Output Current Derating .....	*	2.5%/°C, 50°C to 70°C .....	*
Storage Temp. Range .....	*	-40°C to +85°C .....	*
Humidity .....	*	0% to 95%, Non-Condensing .....	*
Cooling .....	*	Internal Fans .....	*

### PHYSICAL SPECIFICATIONS

Case Material .....	*	Aluminum .....	*
Finish, Front Panel & Shelf .....	*	Powder Coat Gray .....	*
Dimensions, Inches (mm)			
INV2500 .....	3.32 H x 8.50 W x 12.00 D		
	(84.3 x 216 x 305)		
INVR2U Shelf .....	3.46 H x 18.32 W x 12.44 D		
	(87.9 x 465 x 316)		
INV5000 with Rear Cover .....	3.46 H x 18.32 W x 18.00 D .....	*	
	(87.9 x 465 x 457)		
Rack Mounting Width .....	*	19 or 23 Inches .....	*

## 10.0 MECHANICAL DIMENSIONS OF SHELVES

Figure 4 shows the mechanical specifications for the INVR2U shelf and the INV5000 in its shelf. The INVR2U is 12.44 inches (316mm) deep; the INV5000 shelf is 18.00 inches (457mm) deep with its rear cover or 16.38 inches (416 mm) deep without the rear cover.

## 11.0 SAFETY AND INDUSTRY STANDARDS

11.1 The INV2500 and INV5000 inverters meet the following safety certifications:

STANDARD	AGENCY
UL1950	UL
CSA22.2 No.950	CUL
EN60950	DEMKO

11.2 The INV2500 and INV5000 inverters are CE marked to indicate conformance to the European Union's Low Voltage Directive.

11.3 Input conducted EMI meets FCC20780 part 15J Curve A and EN55022 Curve A.

11.4 Input voice band noise is less than 32dBnC for an INV2500 with a 240 ampere-hour battery or an INV5000 with a 480 ampere-hour battery.

## 12.0 OPERATING INFORMATION

12.1 **Input Voltage.** These telecom inverters operate off a nominal 48VDC input source which may be a battery or other DC source. The input voltage range is 42 to 56VDC. Input connections on the back of the INV2500 are to Anderson type connectors, no. 5916 with 5952 contacts. Input connections on the back of the INV5000 are to bus bars with no. 1/4-20 studs.

12.2 **Output Voltage.** The output voltage for an INV2500 is 115VAC at full load; for an INV5000 it is 115 or 230VAC at full load. See Figure 5(a). For zero load the output voltage is 120 or 240VAC. Frequency is 50 or 60Hz,  $\pm 0.1\%$ . The output voltage has total harmonic distortion of less than 2.0%. The load current crest factor is 2.8 to 1, and surge capability is up to 300%. The output will drive reactive loads with up to  $\pm 90^\circ$  phase angle. The output connectors are Anderson no. PP15/45 with 261G2 contacts for the INV2500 and screw

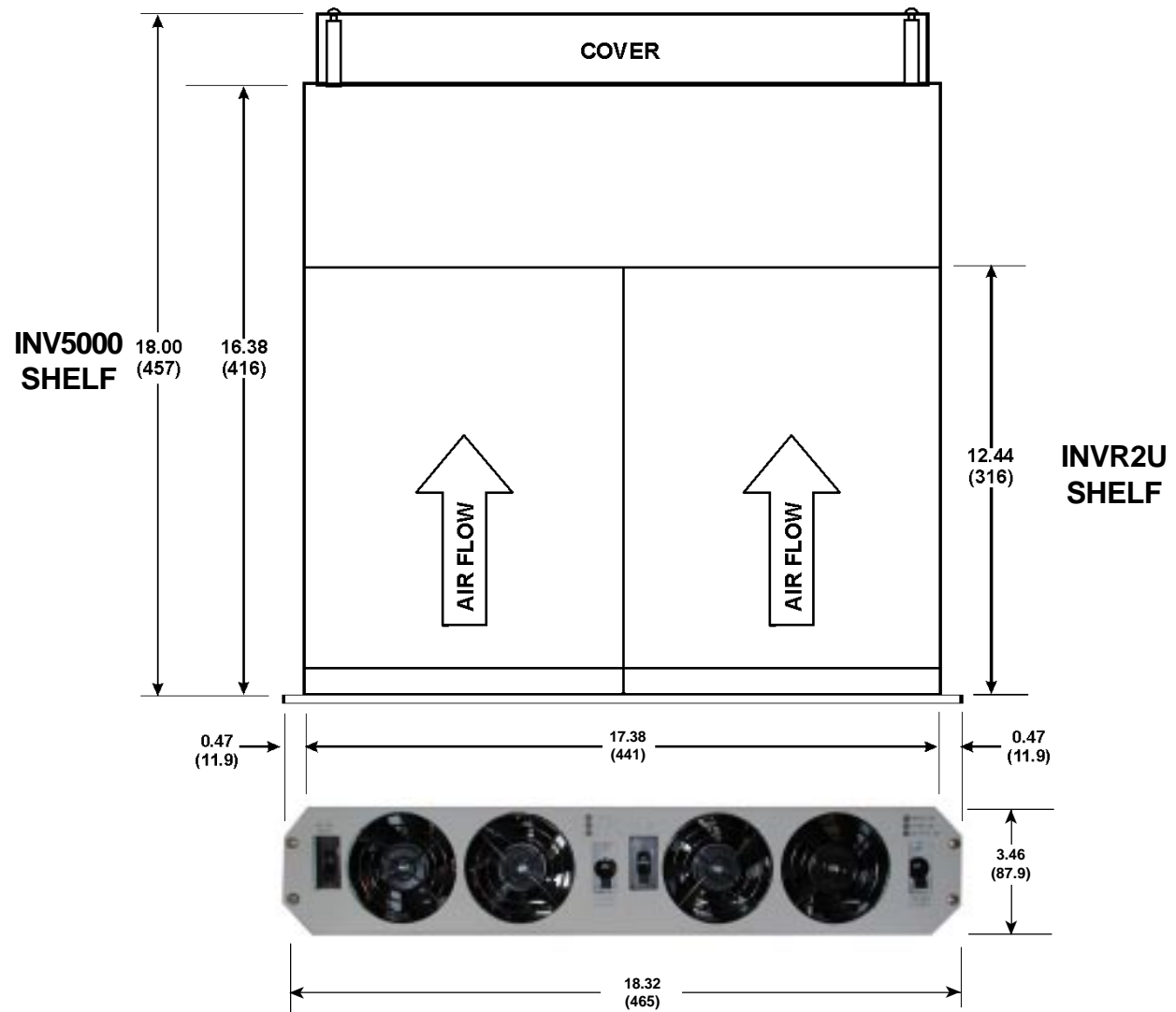


Figure 4. Mechanical Dimensions of Shelves

terminals for the INV5000.

**12.3 Output Power.** Maximum output power for an INV2500 is 115VAC at 22A RMS giving a maximum of 2530 volt-amperes. For an INV5000 it is 115VAC at 44A or 230VAC at 22A RMS, giving a maximum of 5060 volt-amperes. Exceeding these values may cause electronic shutdown of the output. Full output power is produced at up to 50°C ambient temperature. Above this, output current must be derated at 2.5%/°C. Maximum operating temperature is 70°C, at which the output current must be derated by 50%.

**12.4 Overload Characteristic.** These inverters incorporate electronic shutdown circuitry; shutdown takes place during an overload, before the output circuit breaker trips. Figure 5 shows INV2500 output voltage and current waveforms for a full load step, sudden overload, and short circuit. Figure 6 shows shutdown time versus output current for both the INV2500 and INV5000. Below is a table that shows the same data in a different format:

**Table 12-1. Typical Load Current vs. Shutdown Time**

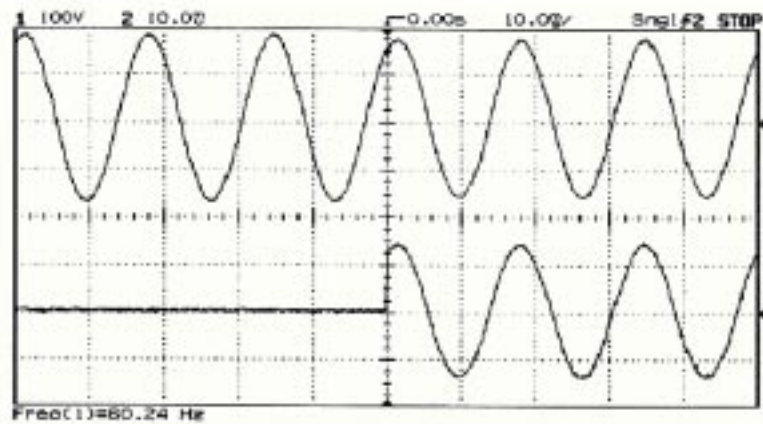
PERCENT OF RATED LOAD	SHUTDOWN TIME
114-173%	10 sec.
173-223%	1 sec.
223-318%	0.25 sec.

As the table shows, the INV2500 and INV5000 are capable of handling large output surge currents, specifically more than three times rated output current for 1/4 second, more than twice rated output current for 1 second and more than 1.5 times rated output current for 10 seconds. If the surge exceeds approximately 318% of rated output current or exceeds the shutdown times shown in the table, the output will be shut down and must be reset by turning both input and output circuit breakers off. After this, the input breakers(s) should be turned back on (up position); after the Output OK LED(s) come on the output breaker(s) should be turned back on (up position).

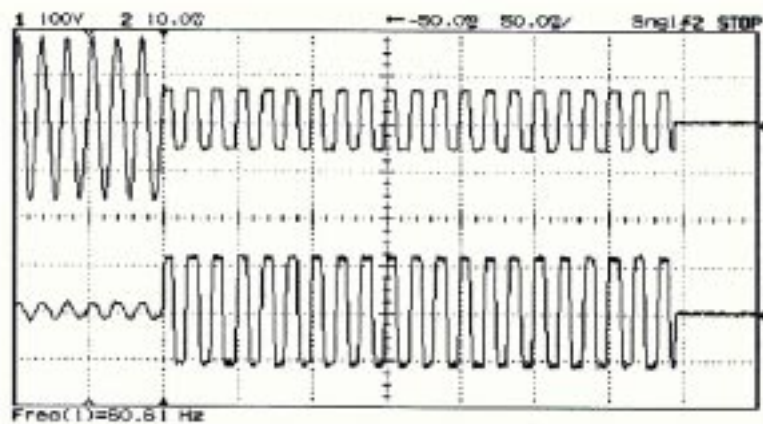
**12.5 Grounding.** The DC input ground, AC output ground, AC neutral and chassis ground are all in common. The chassis ground should be connected to system ground.

**12.6 Status Indicators.** Three green LEDs indicate the operating status of the inverter. They are (from top to bottom): Input OK, Sync OK and Output OK.

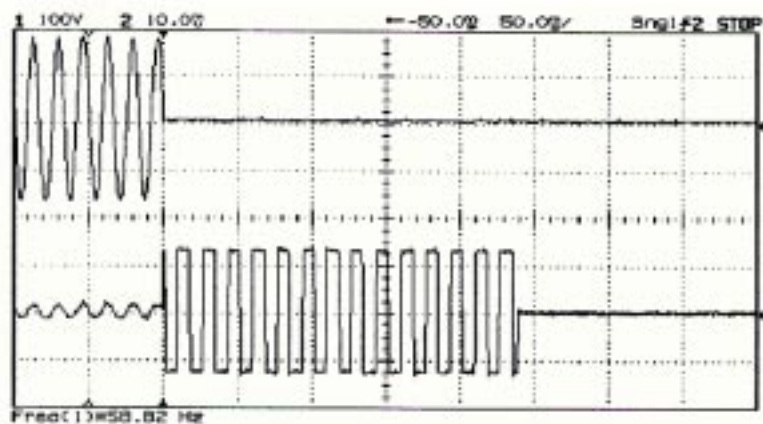
**12.7 Form C Relay Contacts.** These contacts have normally open (N.O.) and



(a) Full Load Step. Vo (top) & Io (bot@20A/cm).



(b) Sudden Overload Applied. Vo (top) & Io (bot @ 50A/cm).



(c) Short Circuit Applied. Vo (top) & Io (bot @ 50A/cm).

Figure 5. INV2500 Inverter Output Waveforms

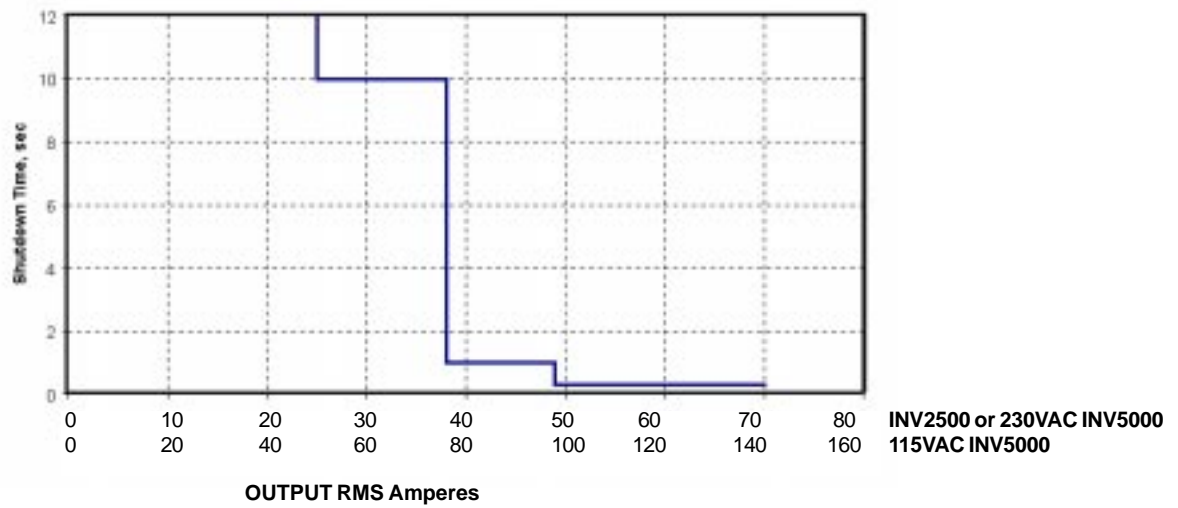


Figure 6. INV2500/INV5000 Overload Characteristic.

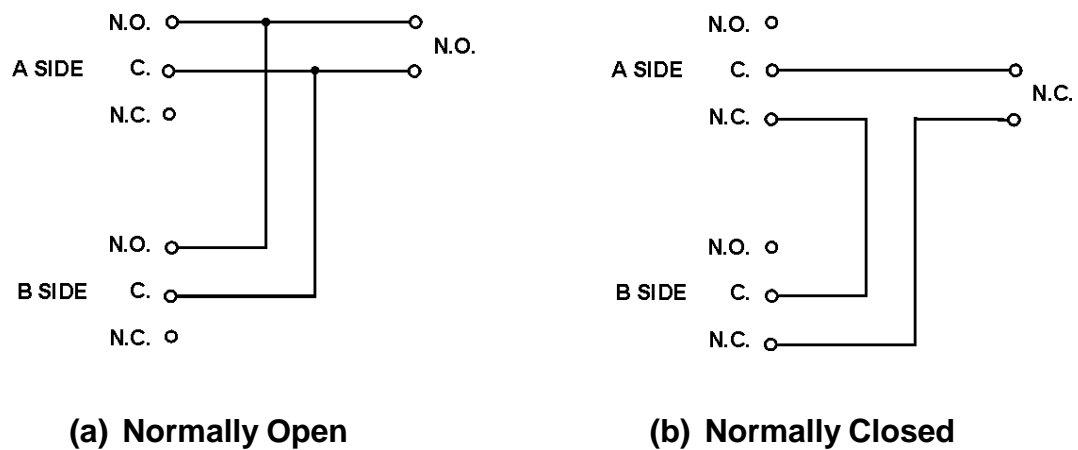


Figure 7. Connections for ORing Form C Relay Outputs on INV5000

normally closed (N.C.) positions for normal operation of each inverter. See Figures 2 and 3 for connections. Note that for the INV5000 there is a separate set of contacts for each half (A and B sides) of the inverter. If it is desired to monitor the INV5000 as a whole, the two sets of contacts may be connected as shown in Figure 7 to give an OR function for either set of contacts.

- 12.8 Connector Kit.** A complete Mating Connector Kit (No. 775-1438-0000) is supplied with each INV2500. Each kit contains Anderson mating input and output connectors, a 12-inch cable with BNC connectors and a BNC tee adaptor.

## 13.0 PARALLEL OPERATION

- 13.1** The INV2500 and INV5000 Series inverters are designed to operate in parallel for higher output current. This is done by connecting all inputs in parallel and all outputs in parallel, although the DC inputs could come from two separate sources. In addition, the sync terminals must be connected together by means of a cable with BNC connectors. The sync terminal is used only for parallel connection of two or more inverters. See Figure 8. For more than two inverters, BNC tee adaptors are required. Current sharing between paralleled inverters is  $\pm 10\%$ .

- 13.2** Alternatively, separate sources may be used for the inputs to these inverters while the outputs are connected in parallel. In either case, output loads should have individual distribution circuit breakers. The following table shows output current and total volt-amperes for inverters connected in parallel.

**Table 13-1. Output For Paralleled Inverters**

NO.OF INV2500 INVERTERS	KVA RATING	OUTPUT AMPS	NO.OF INV5000 INVERTERS	KVA RATING	115VAC AMPS	230VAC AMPS
1	2.5	22	1	5.0	44	22
2	5.0	44	2	10.0	88	44
3	7.5	66	3	15.0	132	66
4	10.0	88	4	20.0	176	88

- 13.3** Figure 9 shows four INV2500s connected in parallel to give 10KVA of AC output. The units are connected to a Unipower Telecom DPAC1U AC Distribution Panel which distributes power to as many as eight AC circuits, each protected by a circuit breaker. Note that for each INV2500 the input ground, output ground, chassis ground and AC neutral output are all connected in common inside the inverter. Contact Unipower Telecom for a data sheet on the DPAC1U or see [www.unipowertelecom.com](http://www.unipowertelecom.com).



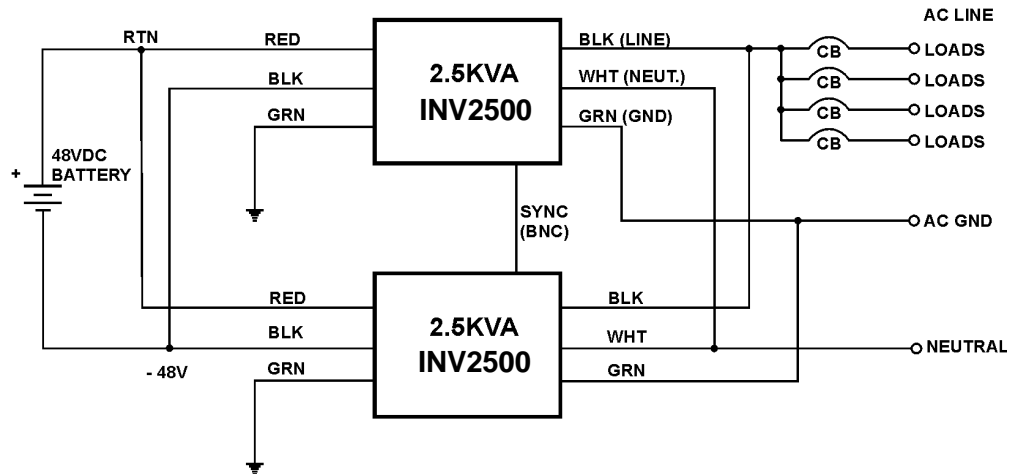


Figure 8. INV2500 Series Inverters Connected in Parallel

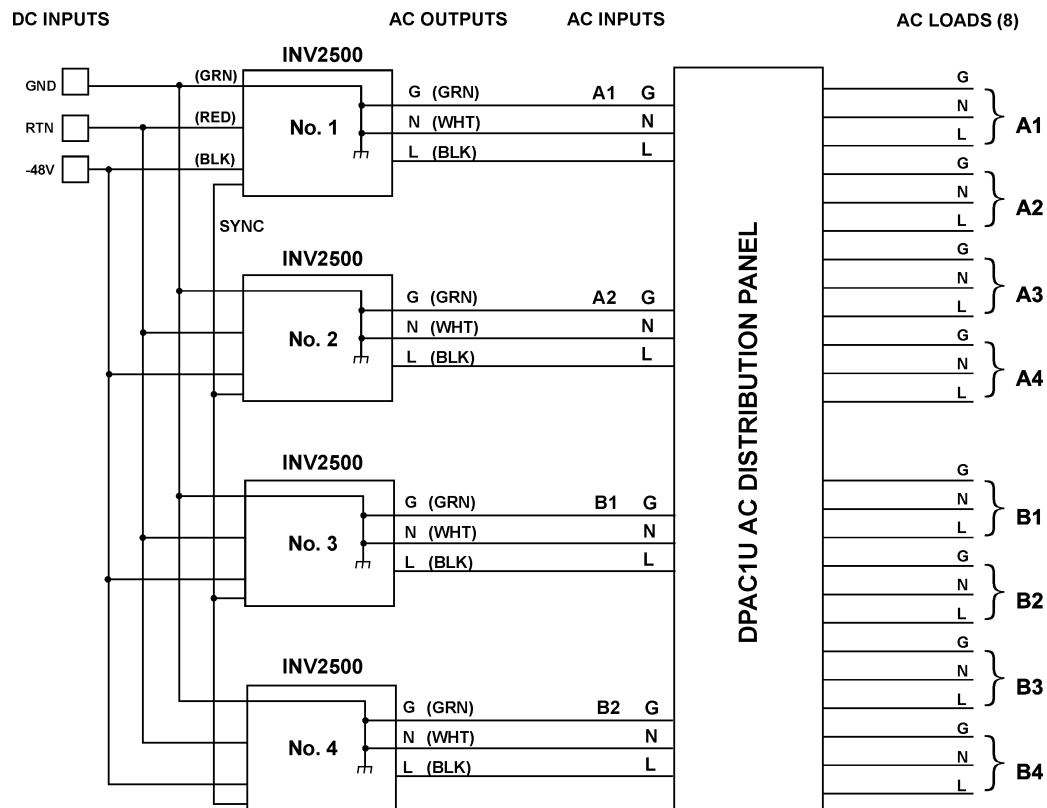


Figure 9. Four INV2500s In Parallel Using AC Distribution Panel.

- 13.4** Figure 10 shows two INV5000s connected in parallel to give 10KVA of AC output at 115VAC. Note that only 115VAC INV5000s can be used with the DPAC1UT distribution panel and not the 230VAC INV5000s. 230VAC INV5000s require breakers on both line sides, and this is not available with the DPAC1UT. As with the INV2500, the input ground, output ground, chassis ground and AC neutral are all connected in common inside the INV5000 inverter. Note also that only the “T” Option of the DPAC1U can be used with the INV5000 inverters and that as shown in Figure 10, the A side AC input terminals must be strapped in parallel, i.e., A1G to A2G, A1N to A2N and A1L to A2L; in the same way, the B side AC input terminals must also be strapped in parallel.

## **14.0 INSTALLATION AND TESTING**

- 14.1** The inverter or inverters may be initially tested either in a rack or on a bench. For 23-inch rack mounting use panel extenders.
- 14.2** Put both input and output circuit breakers in the off (down) position. See Figure 3. For the INV5000, remove the rear safety cover.
- 14.3** For the INV2500, connect the input battery -48VDC and Return terminals to the inverter input red and black terminals, respectively, by means of the Anderson connectors (no. 5916 housings with no. 5952 contacts). Connect the input ground (green connector) and chassis ground to the system ground. For the INV5000, connect the input battery to the -48VDC and 48VDC return input bus bars by means of the 1/4-20 studs. Connect the input ground (10-32 stud) to the system ground. Make sure the correct polarity is used and make sure the Anderson connectors on the INV2500 are seated all the way in. Reversed input polarity could cause damage to the inverter.
- 14.4** For the INV2500, connect a three-wire AC output cable to the AC output line (black), neutral (white) and ground (green) terminals by means of the Anderson connectors (no. PP15/45 housings with no. 261G2 contacts). For the INV5000, connect the AC output cable to the proper output screw terminals. See Figure 11 for the correct connection for 115 or 230VAC output versions. Connect a load of approximately 10 amperes across the output of the INV2500 or INV5000.
- 14.5** To power up the INV2500, turn the DC input circuit breaker on by moving the toggle to the up position. The fans and Input OK and Sync OK LEDs should

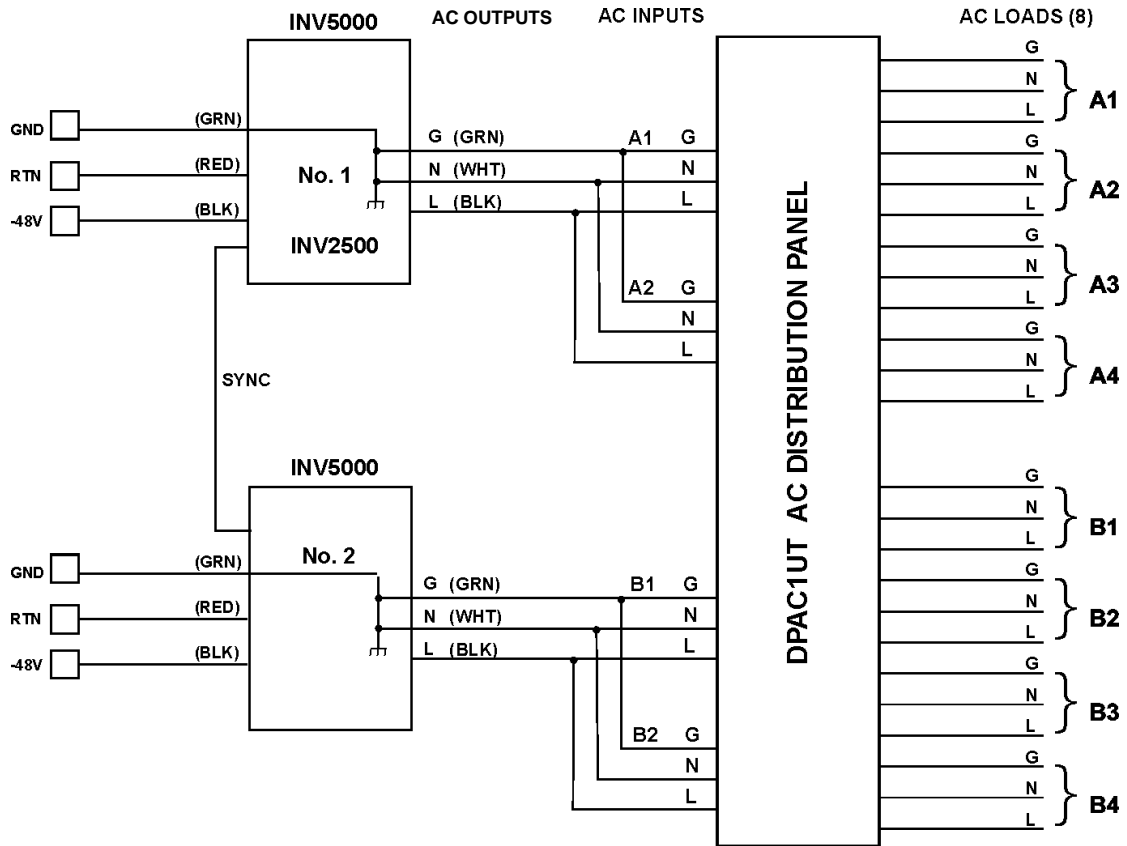


Figure 10. Two 115VAC INV5000s in Parallel Using AC Distribution Panel

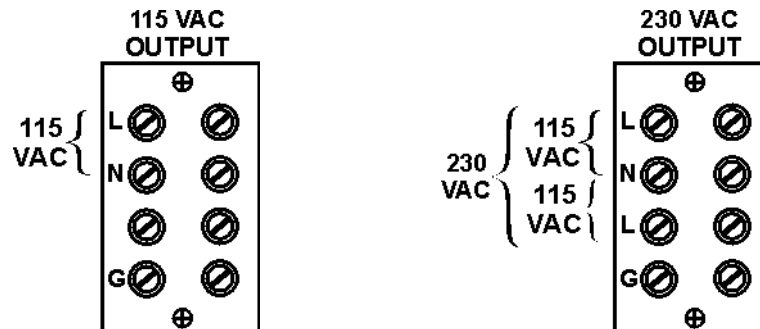


Figure 11. Output Connections for INV5000

come on followed by the Output OK LED approximately four seconds later. After the Output OK LED is on, turn on the AC output circuit breaker by placing the toggle in the up position. Check the AC voltage across the load with a digital AC voltmeter. The voltage should be between 115 and 120VAC depending on the amount of load.

- 14.6** To power up the INV5000, turn the A side (left) DC input circuit breaker on by moving the toggle to the up position. The A side fans and input OK and Sync OK LEDs should come on followed by the Output OK LED approximately four seconds later. After the Output OK LED is on, turn on the A side AC output breaker by placing the toggle in the up position. Next, turn the B side (right) DC input breaker on. The B side fans and Input OK and Sync OK LEDs should come on followed by the Output OK LED approximately four seconds later. After the Output OK LED is on, turn on the B side AC output breaker. Check the AC voltage across the load with a digital AC voltmeter. The voltage should be between 115 and 120VAC or between 230 and 240VAC, depending on the model.
- 14.7** Check the Form C Relay contacts with an ohmmeter. See Figure 3. Measure the resistance between the N.O. contact(s) and C contact(s). It (they) should indicate an open. Measure the resistance between the N.C. contact(s) and the C contact(s). It (they) should indicate a short.
- 14.8** Turn off the AC output circuit breaker(s) first, followed by the DC input breaker(s), by placing the toggles in the down position. Test each inverter in the manner described above.

## **15.0 SINGLE AND MULTIPLE INVERTER APPLICATION**

- 15.1** In the actual application of the INV2500 or INV5000 inverter, follow the procedure in sections 14.2 through 14.6, except the inverter should be connected to its actual load. The loads connected to the output of the inverter should always have their own individual circuit breakers as shown in Figure 8. Make connections to the Form C relay contacts as required. Then, for the INV5000, re-install the rear safety cover.
- 15.2** For two or more INV2500s or INV5000s in parallel, make the input and output connections to the inverters as described in Sections 14.3 and 14.4. See Figures 3, 9 and 10. Put all output distribution circuit breakers in the off position. Connect the sync terminals together with BNC connectors and cables. For more than two inverters in parallel, one or more BNC tee adapters will be required.

- 15.3** Take one of the inverters and turn the DC input circuit breaker on; then after the Output OK LED has come on turn the AC Output circuit breaker on. This sequence must be performed for the INV5000 A side and then the B side. Repeat this for each paralleled inverter in turn until all inverters are on. Make sure that the three green LEDs are on for each inverter.
- 15.4** With all inverters on, turn on each AC output distribution circuit breaker. The inverters will automatically share output currents to an accuracy of  $\pm 10\%$ .

## 16.0 REPLACING AN INVERTER

- 16.1** To replace an INV2500 or INV5000 inverter while it is operating in parallel with other inverters in an N+1 redundant configuration, go through the following steps.
- 16.2** **CAUTION:** This replacement must be done carefully and only by a qualified technical person who is trained in the use of power systems. During this replacement, **the DC input and AC output terminals are hot.** Only the insulated connector housings should be touched on the INV2500. For the INV5000, a nut driver with insulated handle should be used to disconnect the DC input. Be careful not to touch any of the metal contact terminals.
- 16.3** Perform the following steps on the inverter to be removed:
- 16.3.1** Turn off the output breaker(s) (down position).
  - 16.3.2** Turn off the input breaker(s) (down position).
  - 16.3.3** Disconnect the sync BNC connector and the Form C relay contact wires.
  - 16.3.4** Carefully disconnect the DC input connections (these are still hot!)
  - 16.3.5** Disconnect the AC output connections.
  - 16.3.6** Remove the inverter from its shelf, rack or other mounting.
- 16.4** To put a new inverter in place, perform the following steps:
- 16.4.1** Make sure the input and output breakers of the new inverter are in the off (down) position.

- 16.4.2** Install the replacement inverter in the shelf, rack or other mounting.
- 16.4.3** Reconnect the AC output connections.
- 16.4.4** Carefully reconnect the DC input connections (these are hot!) See CAUTION in paragraph 16.2.
- 16.4.5** Reconnect the sync BNC connector and the Form C relay contact wires.
- 16.4.6** Turn on the DC input breaker (A side breaker for INV5000).
- 16.4.7** After the Output OK LED comes on, turn on the AC output breaker (A side breaker for the INV5000).
- 16.4.8** For the INV5000, next turn on the B side DC input breaker. After the Output OK LED comes on, turn on the B side AC output breaker.

## **17.0 MAINTENANCE**

No routine maintenance is required on the INV2500 or INV5000 Series inverters except for a periodic cleaning of dust and dirt around the front fans and rear ventilation holes. A small vacuum nozzle should be used for this.

## 18.0 TROUBLESHOOTING GUIDE

**18.1** If you encounter difficulty in getting the inverter(s) to operate, go through the following troubleshooting guide.

### 18.2 Table 18-1. Inverter Troubleshooting Guide

SYMPTOM	POSSIBLE CAUSES	ACTION TO TAKE
Input OK LED does not come on.	Bad connection to input battery; input breaker not on.	Check the connection to battery; check battery voltage; check that input breaker is on.
Sync OK LED does not come on for paralleled inverters.	Bad connection to sync terminals.	Check that sync connection has been made to all paralleled inverters; check the BNC connectors.
No AC output; Output OK LED does not come on.	Bad output connection; output breaker not on.	Check output connection to load; check that output breaker is on; check that AC distribution breakers are on.
No AC output. Output OK LED is off.	Short circuit or overload on output.	Remove short circuit or overload. Turn off input and output circuit breakers. Turn input circuit breaker back on, wait for the Output OK LED to come on, then turn the output circuit breaker on.
No output. Both circuit breakers on. Input and Output OK LEDs off.	Input battery voltage is below range.	Check battery voltage. Recharge battery or install new battery. Turn the inverter back on.

**18.3** If none of the above actions solves the problem, call UNIPOWER Telecom at 954-346-2442 Ext. 400 for help.