

*eLITE Series*

# ***MODEL ELS***

**OWNERS MANUAL**



## ***2KVA - 18KVA***

***SINGLE PHASE***

***UNINTERRUPTIBLE POWER SUPPLY***

IMPORTANT - SAVE THESE INSTRUCTIONS  
THIS MANUAL CONTAINS IMPORTANT INSTRUCTIONS FOR  
MODELS ELS-(XXX)-2KW THROUGH ELS-(XXX)-18KW THAT  
SHOULD BE FOLLOWED DURING INSTALLATION  
AND MAINTENANCE OF THE UPS AND BATTERIES.



#### Caution

The following symbol indicates that caution should be taken when performing the process required in this manual. Damage to the unit or personal harm could happen if proper precautions are not taken.



#### Shock Hazard

The following symbol indicates that there is a risk of electrical shock if proper precautions are not followed. Only qualified personnel should perform the actions required in this manual.

### ABOUT THIS MANUAL

When viewing electronically, click on the subject to jump to that page.  
Clicking the header on the front page will launch the Controlled Power web site.  
Clicking anywhere else on the front page will also jump to the Table of Contents.  
Clicking any blue text will take you to that section of our website.

Click on the  at the top of each page to return to the Table of Contents.

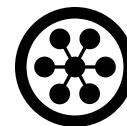
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# GENERAL DESCRIPTION



The Model ELS is a single phase, continuous duty, line interactive, single conversion Inverter designed to supply reliable, clean and regulated power for critical loads. An efficient ferro-resonant transformer, microprocessor controlled solid state pulse width modulation inverter and long lasting battery pack provide immunity to all line disturbances and power interruptions with no break in AC output power. When using the inverter, you are assured your service will not be interrupted.

## Features & Benefits

The “ELS” can be used with all data control center applications.

- Uninterrupted, regulated, continuous sinewave output.
- Integral constant voltage transformer isolates and regulates output voltage.
- Integral status and alarm panel.
- Overload and short-circuit proof.
- Standard AC and DC input protection.
- Standard internal and optional external bypass switches.
- Advanced digital monitoring system.
- Automatic, self-testing and data logging.
- Remote communications via alarm signals, RS232, or optional fax modem.
- Integral batteries.
- Alternate runtime capability.
- Three-stage temperature-compensated battery charger.
- Front-access design.
- Optional remote status panel and automatic phone dialer.
- Generator-compatible.

## Standards

- ANSI / IEEE C62.41 Category B3
- NFPA 101
- NFPA 111 Stored Electrical Energy Emergency and Standby Power Systems. Meets SEPSS / ECE / Level 1 and Level 2 criteria for types O, U, A, B, and 10; and Classes up to and including Class 1.5
- NFPA 70 National Electric Code
- FCC Article 15, J, Class A

## Specifications

- Input Operating Voltage Range: +10%, -15% without battery usage
- Input Frequency: 60 Hz, +/- 2.5 Hz
- Output Sinewave Voltage: Maximum 3% harmonic distortion, any single harmonic
- Input current total harmonic distortion caused by electronic ballasts and non-linear loads: Less than 10%
- Power Factor: Self-correcting to >0.95
- Line Voltage Regulation: +/- 3%
- Load Regulation: Typically better than +/- 3%
- Isolation: Galvanic
- Standard Unit Operating Temperature: 0 deg C to +40 deg C
- Total System MTBF: 100,000 hours
- Common Mode Noise Rejection: 120 dB
- Transverse Mode Noise Rejection: 70 dB
- NEMA 1 enclosure

## Batteries

- Sealed, maintenance-free, lead-calcium batteries.
- Long life, 5-year pro-rated warranty (when enrolled in a service plan).
- Optional 20-year maintenance-free batteries and 20-year high-temperature NiCad batteries available — consult factory.

## Output Distribution

- Output Circuit Breaker Pole Spaces Available:  
Without Trip Indicator Alarm / Light: 20  
With Trip Indicator Alarm / Light: 10

## Safety

- UL 924 Emergency Lighting Equipment
- UL 924 Auxiliary Power Supplies
- UL / C-UL 1778 Uninterruptible Power Supplies
- NFPA 101, NFPA 111, NEC, and local codes



## GENERAL DESCRIPTION CONTINUED

### Advanced Digital Monitoring

The user-friendly Intellistat™ monitor provides quick, full access to all of the monitor features, and also allows all programming to be done directly from the keypad. An easy to read LCD indicates all the electrical parameters, as well as the functional status of the inverter. A virtual keypad allows the entry of date / time values, system setpoints and password information into the monitor, without the need for an external computer and cable.

**The Intellistat™** - Intelligent status monitoring an inverter's operational status is critical for maintaining the building's operational efficiency, as well as for monitoring the power feeding the systems. With this in mind, Controlled Power Company designed the model **"ELS"** with state of the art monitoring features to provide complete system diagnostics and testing with access to all electrical system parameters.

### Features

- LCD display of all electrical parameters.
- NFPA compliant automatic battery testing and logging.
- User programmable automatic system testing.
- System alarm annunciation.
- Audible alarm with alarm silence.
- Alarm status display.
- Email / Cell phone status notification.
- Optional fax / email / voice / web page reporting of test results.
- Date and time display.
- Auto logging of test results / events
- Multi layer password protection.
- Remote monitoring capabilities.
- Programmable local interfaces.
- Logs up to 25 events.
- Non volatile clock and memory.
- Programmable alarm set points.

### Inverter Status and Alarm Indicators

- High / Low Input Voltage
- High / Low Output Voltage
- High Output Volt-Amperes
- High / Low Output Frequency
- High / Low Battery Voltage
- High Battery Charge Current
- System Normal
- General Alarm
- System on Battery
- Low Battery Warning
- Low Battery Shutdown
- Battery Test in Process
- Auto Battery Test Failed / Passed
- Off Bus Status
- Output Circuit Breaker Open
- Charger Fail / DC Open Circuit
- System in Static or Manual Bypass
- REPO Activated

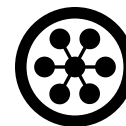
### Measured Parameters

- Input Voltage
- Output Voltage
- Output Current
- Output Volt-Amperes
- Output Watts
- Output Power Factor
- Output Percent Load
- Output Frequency
- Battery Voltage
- Battery Charger Current
- Battery Capacity Remaining
- Battery Temperature

### Automatic System Tests

The Intellistat™ Monitor automatically performs a user defined (date and time) 5 minute system test every 30 or 90 days; as well as a user defined (date and time) annual 30, 60 or 90 minute system test. For all of these tests, the Intellistat™ Monitor logs the test results with the date and time, as well as a "pass" or "fail" indication. Manual System tests are also available.

# RECEIVING THE UNIT



**INSPECTION, PLACEMENT, INSTALLATION, SETUP AND  
START-UP SHOULD BE PERFORMED BY QUALIFIED  
PERSONNEL ONLY**



## INSPECTION

Upon receipt of your inverter, visually inspect the unit(s) for shipping damage. If shipping damage has occurred, the purchaser should promptly notify the carrier and file a claim with the carrier. The factory should be notified if the damages may impair the operation of the unit. Reference front cover or accompanying paper work for factory contact information. Do not remove the debris shield from the top of the unit until ready for start up.

Note: Open the front door of the enclosure(s) and inspect inside the unit for shipping damage.

## IMPORTANT NOTICE

This shipment has been carefully inspected, checked and properly packaged at our company.

When it was delivered to the carrier it was in good condition and technically it became your property at that time. Thus, any damage, whether obvious or hidden, must be reported to the transportation company within FIVE days of receipt of the shipment at your premises to avoid forfeiting claims for damages.

### FOR ALL SHIPMENTS DAMAGED IN TRANSIT

Leave the items, packing material and carton "AS IS". Notify your carrier's local office and ask for immediate inspection of the carton and contents.

After inspection has been made by the carrier, and you have received acknowledgement in writing as to the damage, notify our Customer Service Department to make any required repair arrangements.

It is your responsibility to follow the above instructions or the carrier will not honor any claims for damage. Also, if there are any shortages or questions regarding this shipment, please notify us within FIVE days.

Please note that we cannot be responsible for any service work or back-charges unless authorized by us in writing, before the work is performed.

## STORAGE



**WHILE IN STORAGE BATTERIES MUST BE CHARGED  
FOR 24 HOURS EVERY 6 MONTHS. WHILE IN STORAGE  
LEAVE DC CIRCUIT BREAKER IN THE OFF (OPEN) POSITION.**



If it is necessary to store the unit, be sure to place it in a clean dry area. **For extended storage, the batteries must be charged for 24 hours every 6 months. Failure to do so will result in weak or bad batteries which WILL NOT be covered under the warranty.** Charging is accomplished by installing the batteries, turning the unit on and allowing the inverter to run. See "*Installation - Battery Installation and Wiring*" for details on installing batteries and the "*Setup Procedure*" and "*Start-up Procedure*" for turning the inverter on. **While storing, leave the DC Circuit Breaker in the OFF (Open) position.** Make sure proper ventilation is available any time the inverter is on.



## RECEIVING THE UNIT CONTINUED

### REMOVING THE INVERTER FROM THE PALLET



**\*\*\* CAUTION \*\*\***  
**CABINETS AND BATTERIES ARE EXTREMELY HEAVY**  
**USE PROPER EQUIPMENT WHEN REMOVING**  
**THE CABINETS FROM THE SKID**



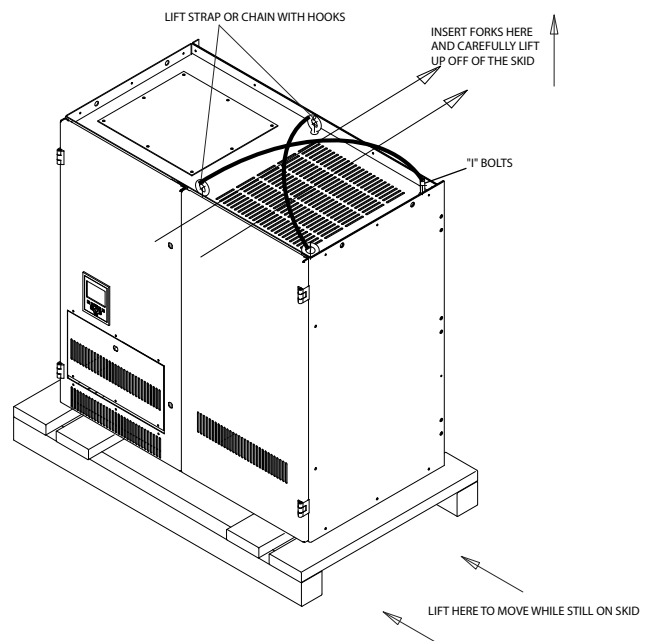
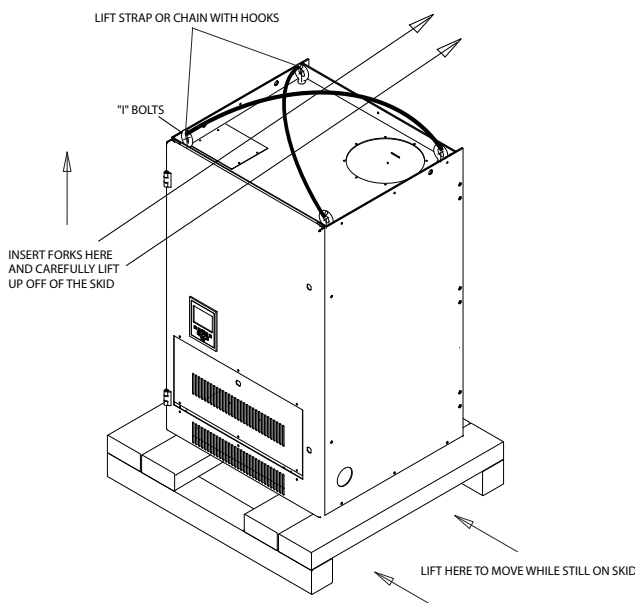
**\*\*\*\*\* SHOCK HAZARD \*\*\*\*\***  
**DO NOT SHORT BATTERY TERMINALS**



**TOOLS REQUIRED:** 1/2" Socket, Forklift, dolly, lifting strap or heavy chain with hooks.

#### Removing the inverter from the skid.

1. Remove the plastic wrapping and banding and discard.
2. Remove batteries from pallet with the use of a dolly or other lifting device be sure to place them in a safe location.
3. Using a forklift and a chain, place the forks over the inverter from the front or back side.
4. Secure the lifting strap or heavy chain to the "I" bolts on the top of the cabinet and the forks on the forklift. See Illustration below.
5. Carefully lift the inverter from the skid.
6. Set the inverter cabinet down until you are ready for installation.
7. Use this same method when moving or stacking the inverter and battery cabinets into there final position. Remove "I" bolts after final placement. **Do not remove the debris shield from the top of the unit until ready for start up.**



See "Appendix - A Cabinet Placement Configurations" for proper cabinet placement. Also see *Preliminary Installation - Cabinet Dimensions, Accesses and Clearances* and *"Installation - Battery Installation and Wiring"*

# SAFETY PRECAUTIONS



**IMPORTANT SAFEGUARDS, READ AND FOLLOW ALL SAFETY INSTRUCTIONS.  
SAVE THESE INSTRUCTIONS.**



**\*\*\*\*\* CAUTION \*\*\*\*\***



**A BATTERY CAN PRESENT A RISK OF ELECTRICAL SHOCK AND HIGH SHORT CIRCUIT CURRENT.  
THE FOLLOWING PRECAUTIONS SHOULD BE OBSERVED WHEN WORKING ON BATTERIES:**

- REMOVE WATCHES, RINGS, OR OTHER METAL OBJECTS.
  - USE TOOLS WITH INSULATED HANDLES.
  - WEAR RUBBER GLOVES AND BOOTS.
- DO NOT LAY TOOLS OR METAL PARTS ON TOP OF BATTERIES.
- DISCONNECT CHARGING SOURCE PRIOR TO CONNECTING OR DISCONNECTING BATTERY TERMINALS.



**\*\*\*\*\* CAUTION \*\*\*\*\***



**USE CAUTION WHEN HANDLING OR SERVICING BATTERIES. BATTERY ACID CAN CAUSE BURNS  
TO SKIN AND EYES. IF ACID IS SPILLED ON SKIN OR IN THE EYES, FLUSH WITH FRESH WATER AND  
CONTACT A PHYSICIAN IMMEDIATELY.**

**BATTERIES ARE VERY HEAVY. USE CAUTION WHEN LIFTING AND MOVING THEM. INSTALLATION  
SHOULD ONLY BE PERFORMED BY AUTHORIZED PERSONNEL.**

**DIAGRAMS FOR WIRING BATTERIES ARE SHOWN ON THE FOLLOWING PAGES. BE SURE TO WIRE  
BATTERIES PROPERLY. IMPROPER WIRING CAN CAUSE DAMAGE TO THE BATTERIES. WIRING  
SHOULD ONLY BE PERFORMED BY AUTHORIZED PERSONNEL.**

- FOLLOW ALL STANDARD AND LOCAL ELECTRICAL CODES.
- BE SURE INPUT POWER TO UPS IS PROPERLY GROUNDED.
- DO NOT ALLOW WATER OR FOREIGN OBJECTS TO GET INSIDE UPS.
- DO NOT PLACE OBJECTS OR LIQUIDS ON TOP OF THE UPS.
- DO NOT LOCATE UPS NEAR RUNNING WATER OR WHERE THERE IS EXCESSIVE HUMIDITY.
- DO NOT USE OUTDOORS.
- DO NOT MOUNT NEAR GAS OR ELECTRIC HEATERS.
- EQUIPMENT SHOULD BE MOUNTED IN LOCATIONS AND AT HEIGHTS WHERE IT WILL NOT READILY  
BE SUBJECTED TO TAMPERING BY UNAUTHORIZED PERSONNEL.
- THE USE OF ACCESSORY EQUIPMENT NOT RECOMMENDED BY THE MANUFACTURER MAY CAUSE  
AN UNSAFE CONDITION.
- DO NOT USE THIS EQUIPMENT FOR OTHER THAN INTENDED USE.
- SERVICING OF BATTERIES SHOULD BE PERFORMED OR SUPERVISED BY PERSONNEL  
KNOWLEDGEABLE OF BATTERIES AND THE REQUIRED PRECAUTIONS.
- KEEP UNAUTHORIZED PERSONNEL AWAY FROM BATTERIES.
- DO NOT SHORT BATTERY TERMINALS.
- DO NOT DISPOSE OF BATTERY OR BATTERIES IN A FIRE. THE BATTERY MAY EXPLODE.
- ONLY REPLACE BATTERIES WITH IDENTICAL SPECIFICATION OF ORIGINAL BATTERIES SUPPLIED  
WITH THE SYSTEM.
- DO NOT OPEN OR MUTILATE THE BATTERY OR BATTERIES. RELEASED ELECTROLYTE IS HARMFUL  
TO THE SKIN AND EYES. IT MAY BE TOXIC.
- READ AND FOLLOW ALL SAFETY INSTRUCTIONS. SAVE THESE INSTRUCTIONS.



# ***PRELIMINARY INSTALLATION***

## **INSTALLATION CONSIDERATIONS**

This unit is intended for installation in a temperature controlled, indoor area free of conductive contaminants.

Prior to installing the Inverter, be sure to take into consideration the site you have selected. Inverters produce heat and therefore require ventilation as well as accessibility. Consider these factors:

- Ventilation
- Size of the Inverter
- Weight Load
- Audible Noise Requirements
- Remote Emergency Power Off (Repo)
- Monitors
- Options
- Clean Environment
- Input Source Voltage
- Receiving Facilities
- Distribution of Power
- Room Temperature
- Clearances
- Accessibility
- Excessively Long Power Runs
- Proper Ground Techniques

## **CHOICE OF LOCATION**

The unit has been completely inspected and extensively tested under various load conditions prior to shipment. Care to install it at a proper location will assure long trouble-free operation.

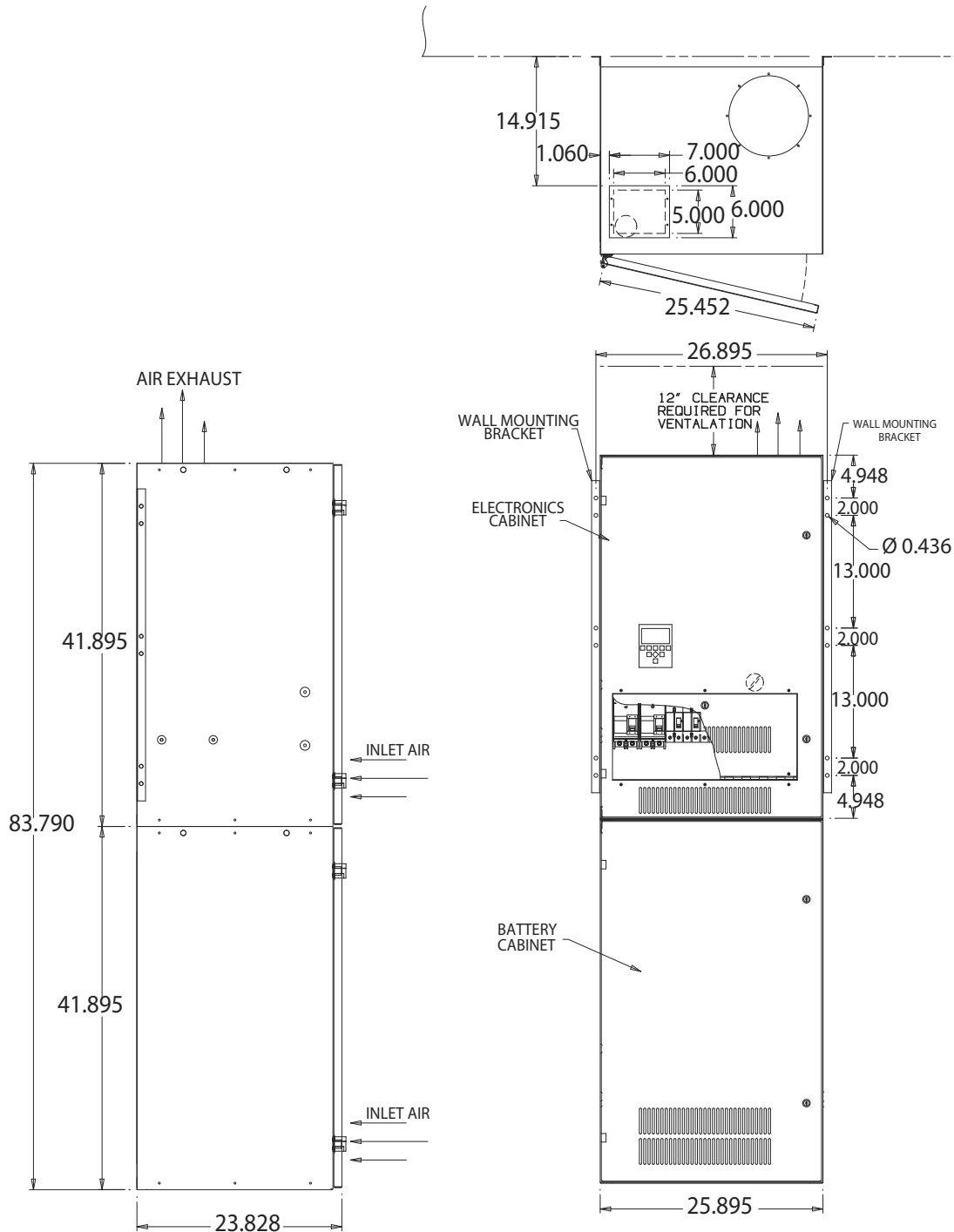
The unit is air cooled with the air intake at the bottom and exhausts at the top, front or at the sides. Therefore, it should be installed in a clean, dry place with enough clearance to allow a free flow of air. Allow enough space for maintenance on all four sides of the unit.



## SMALL INVERTER CABINET WITH SMALL BATTERY CABINET DIMENSIONS, ACCESSES AND CLEARANCES

### INVERTER PLACEMENT

Refer to the drawing below for installation clearances and ventilation requirements. The inverter should be placed in a dry, well ventilated or temperature controlled area. Be sure not to block any fan or air inlet areas of the inverter. Doing so will cause damage to the unit. There should be at least 48" of clearance at the front of the unit for serviceability and at least 12" at the top of the inverter cabinet for air flow.



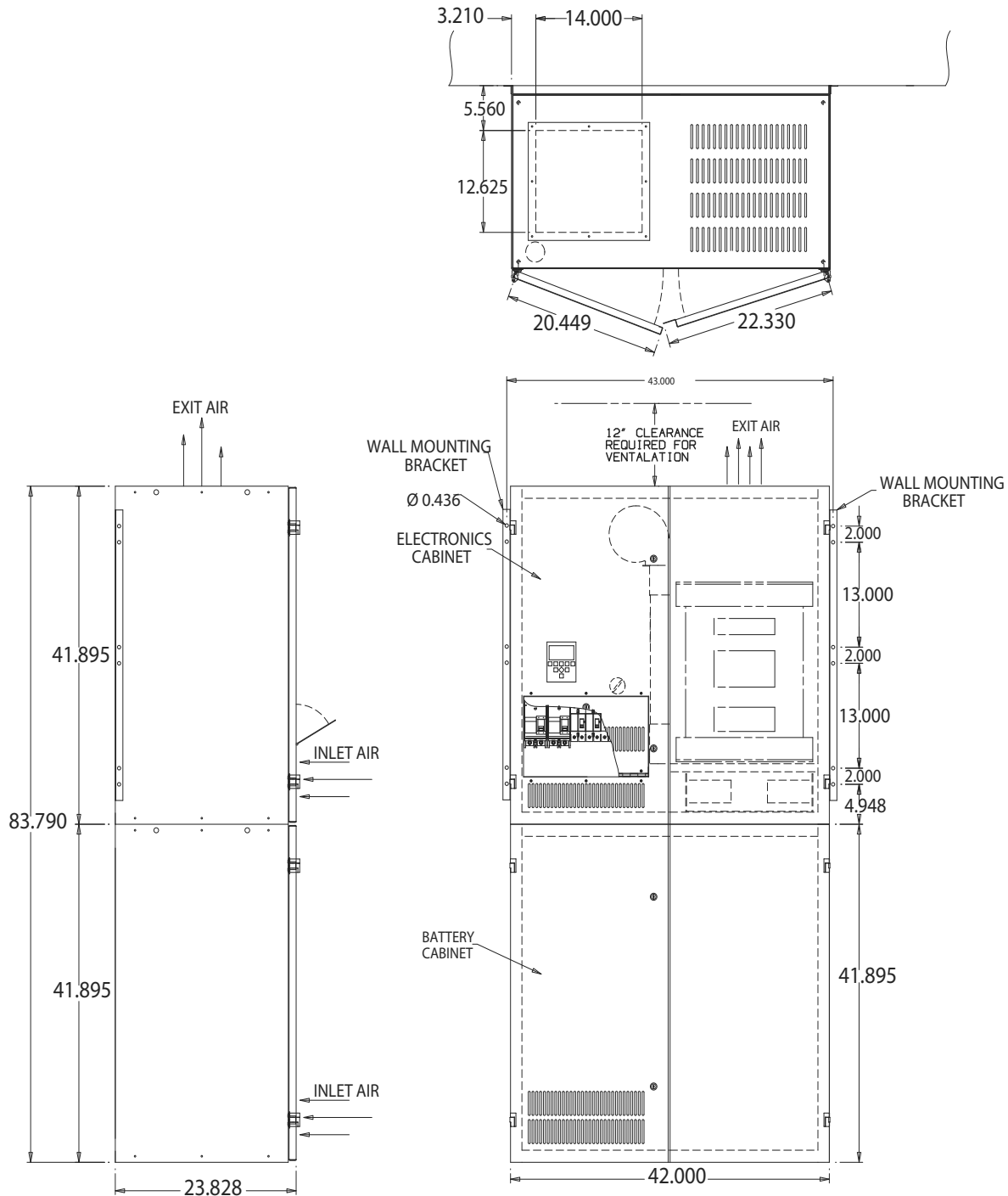


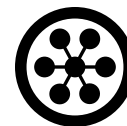
## PRELIMINARY INSTALLATION CONTINUED

### LARGE INVERTER CABINET WITH LARGE BATTERY CABINET DIMENSIONS, ACCESSES AND CLEARANCES

#### INVERTER PLACEMENT

Refer to the drawing below for installation clearances and ventilation requirements. The inverter should be placed in a dry, well ventilated or temperature controlled area. Be sure not to block any fan or air inlet areas of the inverter. Doing so will cause damage to the unit. There should be at least 48" of clearance at the front of the unit for serviceability and at least 12" at the top of the inverter cabinet for air flow.





## SECURING THE INVERTER AND BATTERY CABINETS



### \*\*\*CAUTION\*\*\*



**CABINETS AND BATTERIES ARE EXTREMELY HEAVY  
USE PROPER EQUIPMENT WHEN MOVING.**

**CHECK TO ASSURE THAT THE FLOOR IN THE INSTALLATION AREA IS  
CAPABLE OF SAFELY BEARING THE LOAD.**



**Do not remove the debris shield from the top of the unit until ready for start up.**



Refer to “*Preliminary Installation - Cabinet Placement Configurations*”.

Based on the desired cabinet configuration, remove the appropriate knockouts in the inverter and battery cabinets.

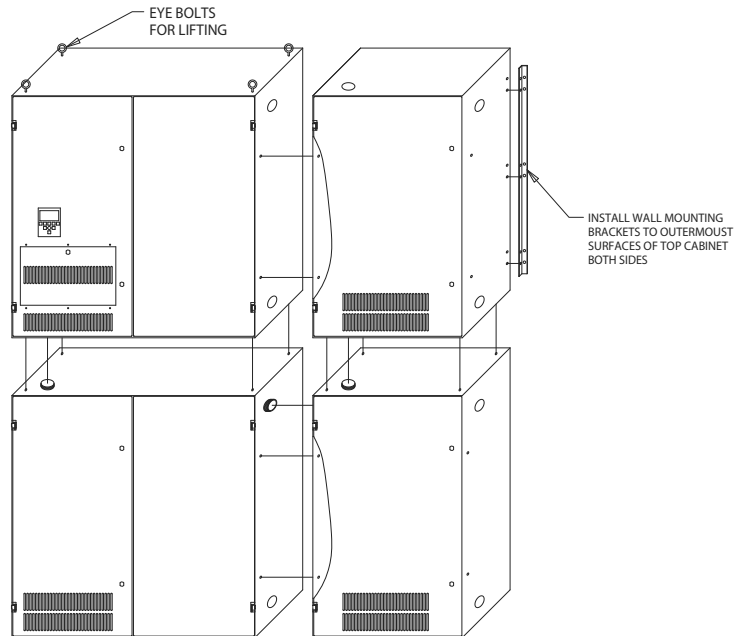
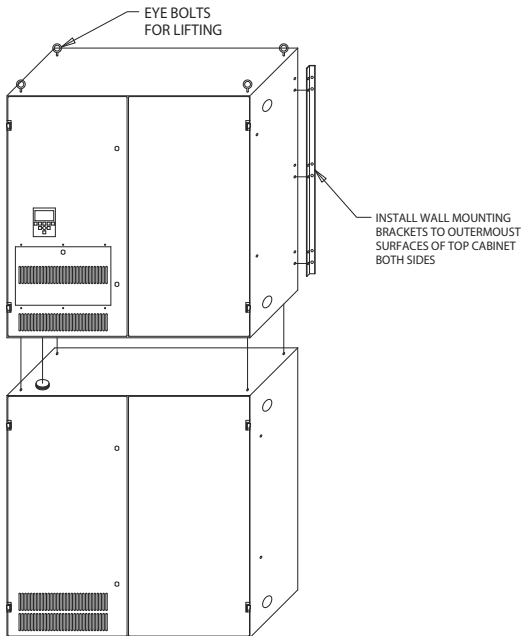
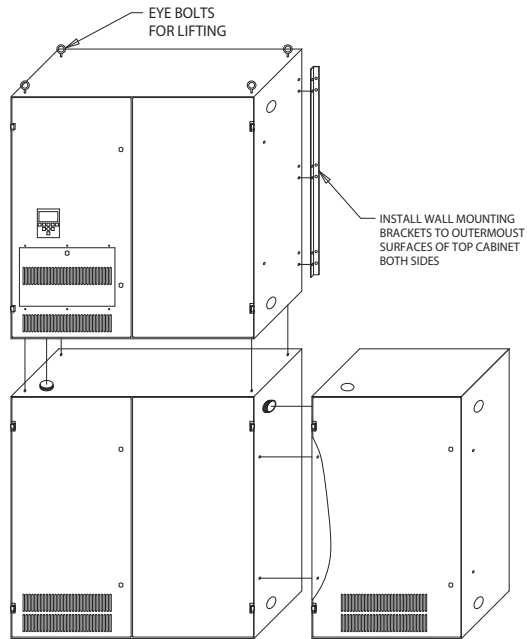
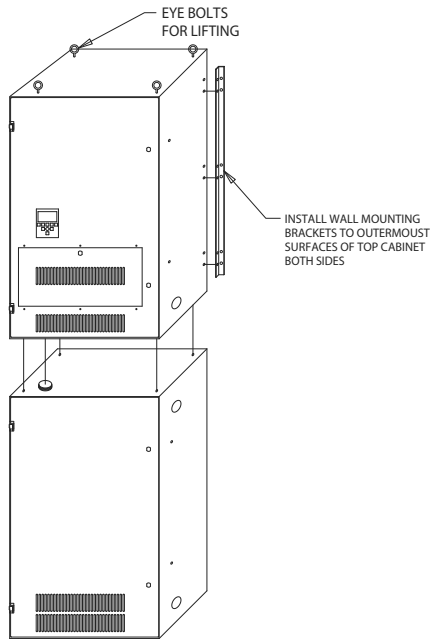
Follow the general sequence below to install the inverter and battery cabinets.

1. Locate all mounting hardware battery cables and chase/close nipples in the accessory box located inside the battery cabinet.
2. Arrange the lower cabinet(s) in their permanent location. If more than one cabinet is to be located on the lower level (Configurations B,C,D,E,F OR G), fasten them together using the supplied 3/8"-16 x 1 1/2" bolts. Locate the two mounting holes at the sides of the battery cabinet towards the front and use two bolts per side to secure together. Install the supplied chase nipple and plastic bushing in the knockouts to connect the lower cabinets together.
3. Secure the supplied wall mounting brackets to the inverter cabinet, or to the outermost sides of the upper cabinets. Use three supplied 3/8"-16 x 1" bolts per wall bracket.
4. Note: Only two wall mount brackets are supplied with the system, normally intended to secure the upper cabinets to the wall. Consult the factory if additional brackets are needed to secure the lower cabinets to the wall.
5. Place the upper cabinets in position and secure them together using the supplied 3/8"- 16 x 2 1/4" bolts. Locate the two mounting holes at the sides of the battery cabinet towards the front and use two bolts per side to secure together.
6. Secure the upper cabinets to the lower cabinets using the supplied 3/8"-16 x 2 1/4" bolts. Install from the floor of the upper cabinets into the top of the lower cabinets. Install the supplied close nipple and plastic bushing in the knockouts to connect the upper cabinets to the lower cabinets. Note that the capacitor bank located underneath the main transformer will have to be loosened and moved aside to gain access to the holes in the back of the inverter cabinet.
7. Secure the wall mounting brackets to the wall using an acceptable wall anchoring technique.



## PRELIMINARY INSTALLATION CONTINUED

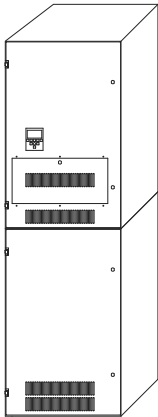
### SECURING THE INVERTER AND BATTERY CABINETS



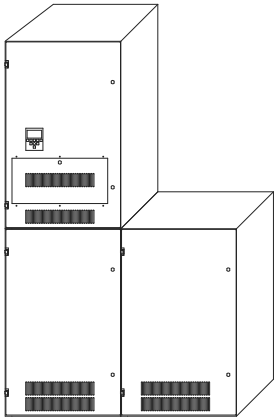
**NOTE: REMOVE “I” BOLTS FROM INVERTER CABINET AND MOUNT TO BATTERY CABINET FOR LIFTING.**



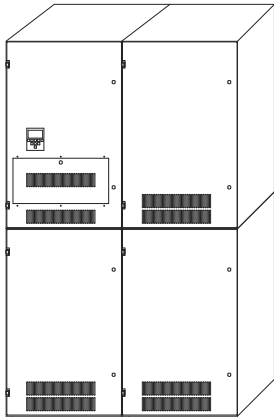
**CABINET PLACEMENT CONFIGURATIONS**



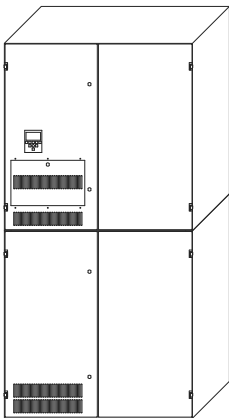
**A**



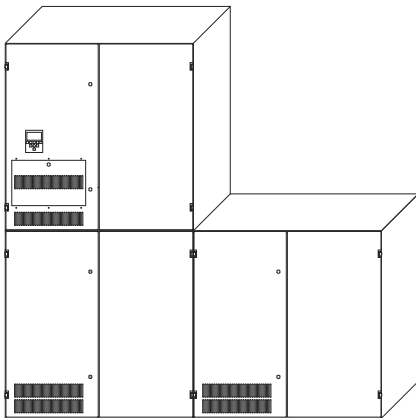
**B**



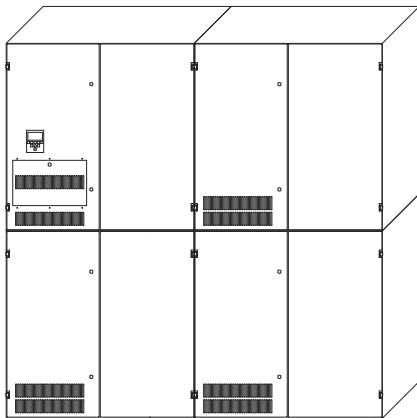
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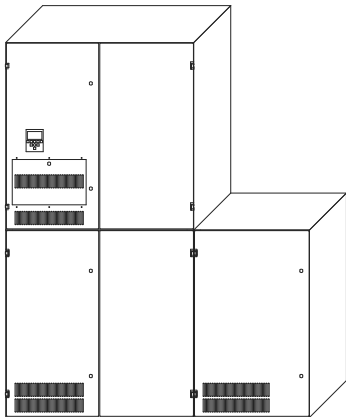
**D**



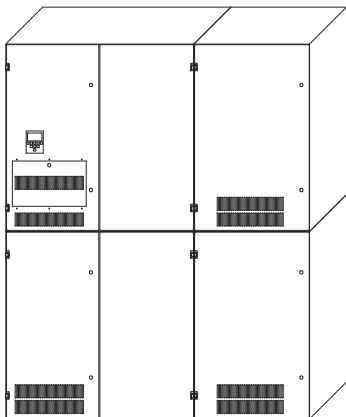
**E**



**F**



**G**



**H**



## PRELIMINARY INSTALLATION CONTINUED

### AC INPUT BREAKER MATRIX

| Kw  | Input Voltage | Input Circuit Breaker (Amps) |
|-----|---------------|------------------------------|
| 2   | 120           | 40                           |
| 2   | 208           | 25                           |
| 2   | 240           | 25                           |
| 2   | 277           | 20                           |
| 2   | 347           | 15                           |
| 2.5 | 120           | 40                           |
| 2.5 | 208           | 25                           |
| 2.5 | 240           | 25                           |
| 2.5 | 277           | 20                           |
| 2.5 | 347           | 15                           |
| 3.5 | 120           | 50                           |
| 3.5 | 208           | 30                           |
| 3.5 | 240           | 30                           |
| 3.5 | 277           | 25                           |
| 3.5 | 347           | 20                           |
| 5.3 | 120           | 80                           |
| 5.3 | 208           | 50                           |
| 5.3 | 240           | 50                           |
| 5.3 | 277           | 40                           |
| 5.3 | 347           | 30                           |
| 7.5 | 120           | 100                          |
| 7.5 | 208           | 60                           |
| 7.5 | 240           | 60                           |
| 7.5 | 277           | 50                           |
| 7.5 | 347           | 40                           |

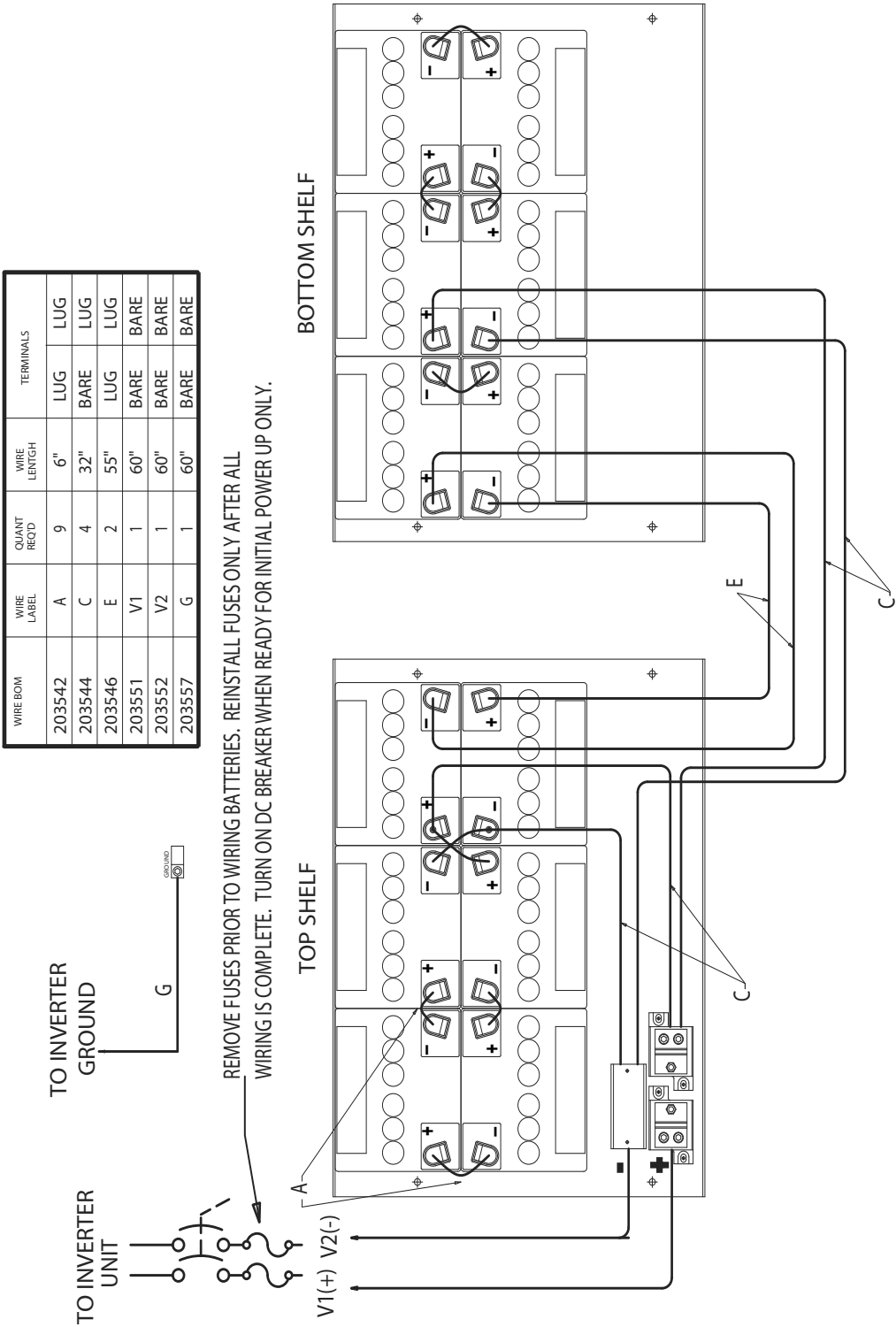
| Kw   | Input Voltage | Input Circuit Breaker (Amps) |
|------|---------------|------------------------------|
| 8.5  | 120           | 125                          |
| 8.5  | 208           | 70                           |
| 8.5  | 240           | 70                           |
| 8.5  | 277           | 50                           |
| 8.5  | 347           | 40                           |
| 10   | 208           | 80                           |
| 10   | 240           | 80                           |
| 10   | 277           | 60                           |
| 10   | 347           | 50                           |
| 12.5 | 208           | 100                          |
| 12.5 | 240           | 100                          |
| 12.5 | 277           | 80                           |
| 12.5 | 347           | 60                           |
| 14.5 | 208           | 125                          |
| 14.5 | 240           | 125                          |
| 14.5 | 277           | 90                           |
| 14.5 | 347           | 70                           |
| 16   | 208           | 125                          |
| 16   | 240           | 125                          |
| 16   | 277           | 90                           |
| 16   | 347           | 80                           |
| 18   | 208           | 125                          |
| 18   | 240           | 125                          |
| 18   | 277           | 110                          |
| 18   | 347           | 90                           |

Sizes based on 75° Celsius insulation type THHN wire, per N.E.C. Article 310, Table 310, Table 310-16, "Not more than three single insulated conductors rated 0 through 2000 volts, in a raceway in free air" (30° C ambient).



## BATTERY INSTALLATION AND WIRING

### 3 Strings of (4) 40 A/H Batteries in Small Battery Cabinet (48V Buss)



NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.



WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.

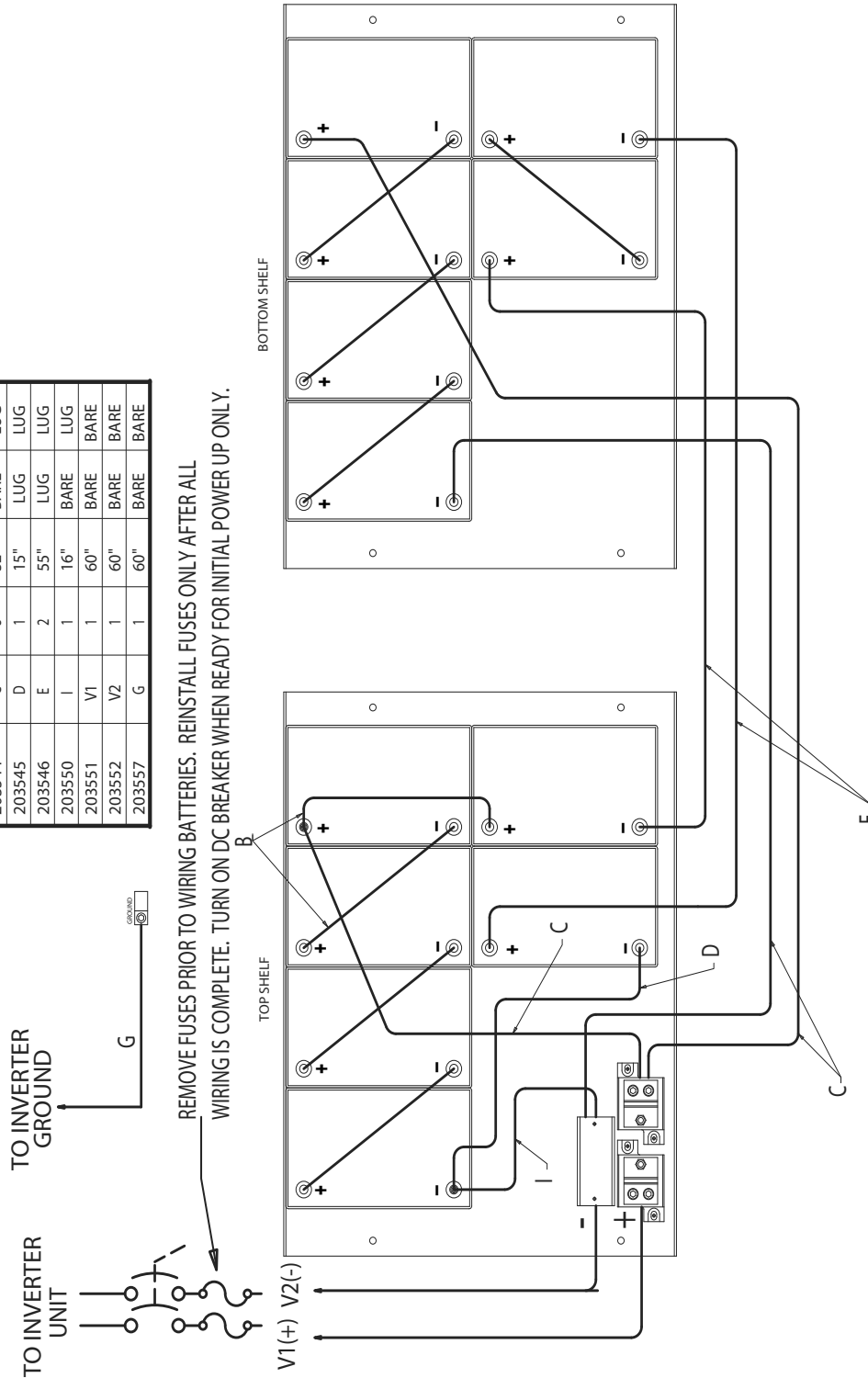


## INSTALLATION CONTINUED

### BATTERY INSTALLATION AND WIRING

3 Strings of (4) 55 A/H Batteries in Small Battery Cabinet (48V Buss)

| WIRE BOM | WIRE LABEL | QUANT REQD | WIRE LENGTH | TERMINALS |
|----------|------------|------------|-------------|-----------|
| 203543   | B          | 8          | 12"         | LUG       |
| 203544   | C          | 3          | 32"         | BARE LUG  |
| 203545   | D          | 1          | 15"         | LUG       |
| 203546   | E          | 2          | 55"         | LUG       |
| 203550   | I          | 1          | 16"         | BARE LUG  |
| 203551   | V1         | 1          | 60"         | BARE      |
| 203552   | V2         | 1          | 60"         | BARE      |
| 203557   | G          | 1          | 60"         | BARE      |



**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**

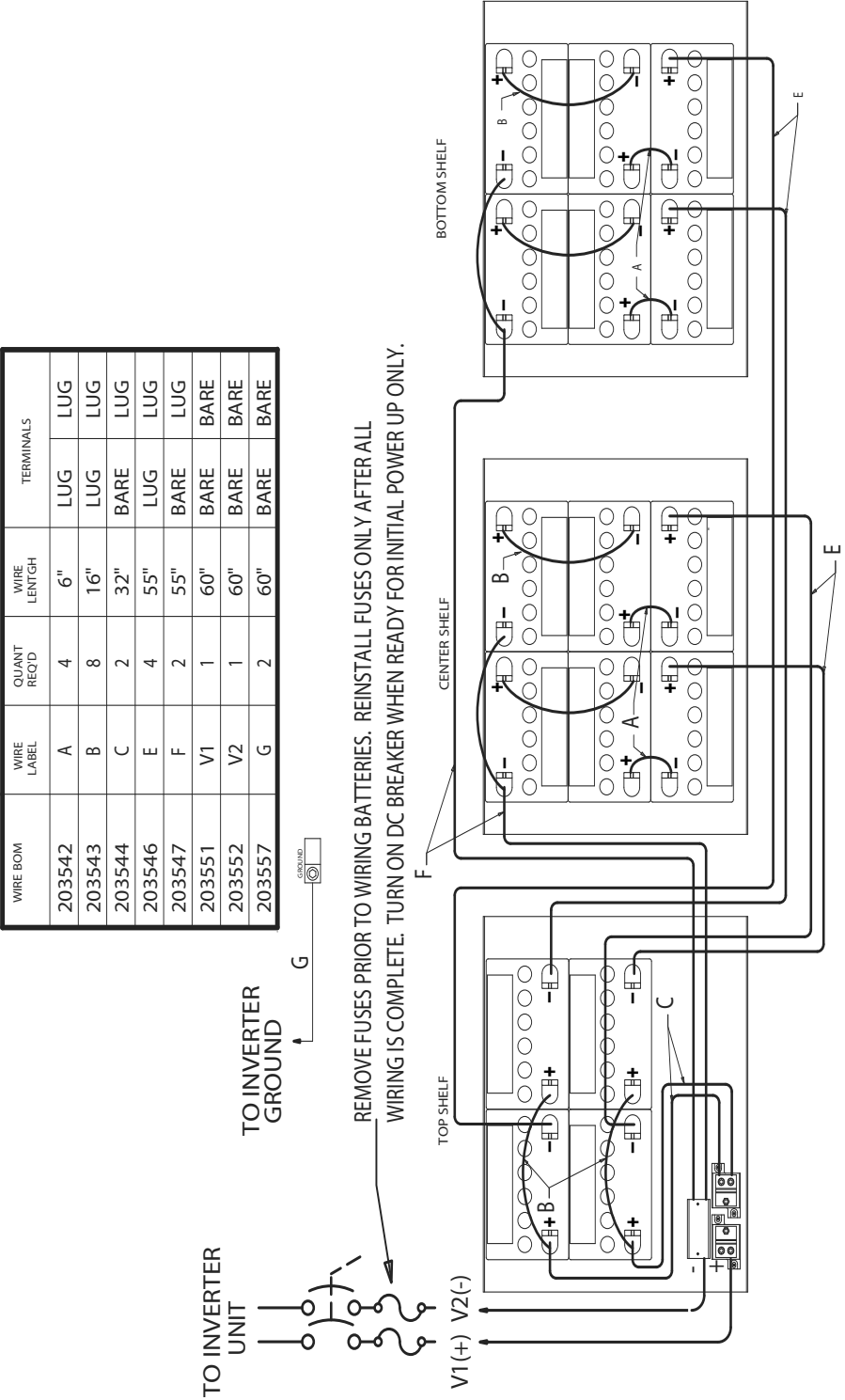


**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**



## BATTERY INSTALLATION AND WIRING

### 4 Strings of (4) 65 or 90 A/H Batteries in Small Battery Cabinet (48V Buss)



**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**

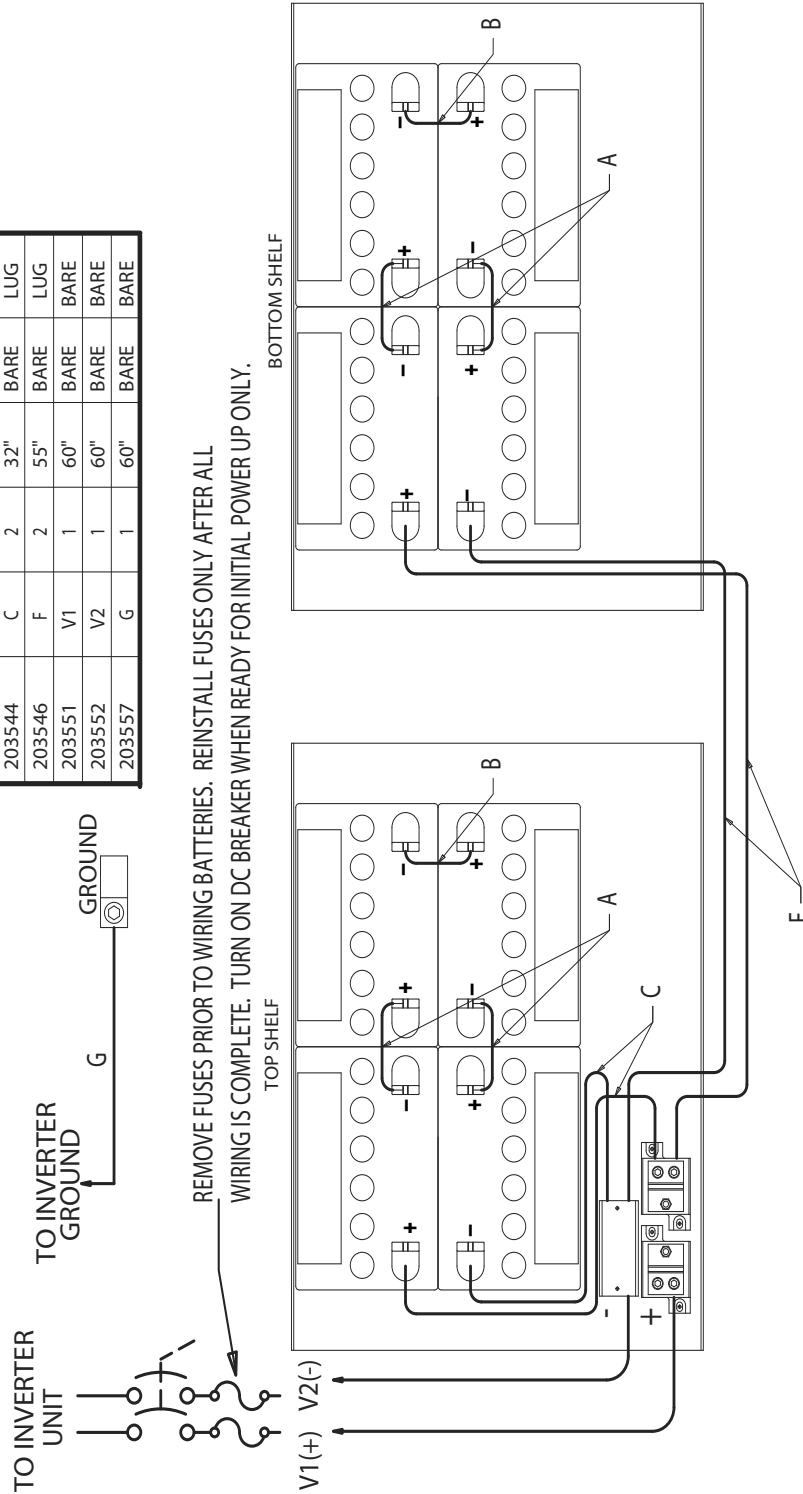


# INSTALLATION CONTINUED

## BATTERY INSTALLATION AND WIRING

2 Strings of (4) 65 or 90 A/H Batteries in Small Battery Cabinet (48V Buss)

| WIRE BOM | WIRE LABEL | QUANT REQD | WIRE LENGTH | TERMINALS |      |
|----------|------------|------------|-------------|-----------|------|
| 203542   | A          | 4          | 6"          | LUG       | LUG  |
| 203543   | B          | 2          | 12"         | LUG       | LUG  |
| 203544   | C          | 2          | 32"         | BARE      | LUG  |
| 203546   | F          | 2          | 55"         | BARE      | LUG  |
| 203551   | V1         | 1          | 60"         | BARE      | BARE |
| 203552   | V2         | 1          | 60"         | BARE      | BARE |
| 203557   | G          | 1          | 60"         | BARE      | BARE |

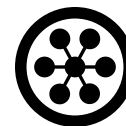


**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**

# INSTALLATION CONTINUED



## BATTERY INSTALLATION AND WIRING

1 String of (4) 120 A/H Batteries in Small Battery Cabinet (48V Buss)

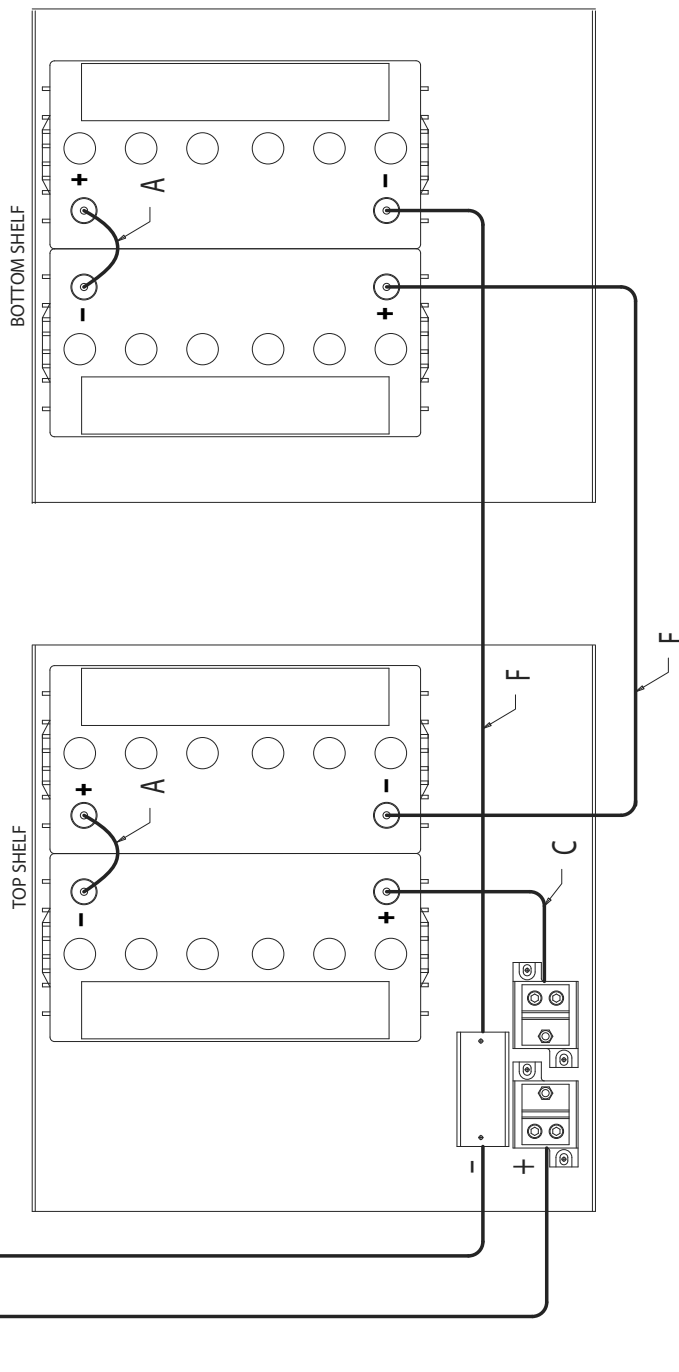
**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**

REMOVE FUSES PRIOR TO WIRING BATTERIES. REINSTALL FUSES ONLY AFTER ALL WIRING IS COMPLETE. TURN ON DC BREAKER WHEN READY FOR INITIAL POWER UP ONLY.

| WIRE BOM | WIRE LABEL | QUANT REQ'D | WIRE LENGTH | TERMINALS |
|----------|------------|-------------|-------------|-----------|
| 203542   | A          | 2           | 6"          | LUG LUG   |
| 203544   | C          | 1           | 32"         | BARE LUG  |
| 203546   | E          | 1           | 55"         | LUG LUG   |
| 203547   | F          | 1           | 60"         | BARE LUG  |
| 203551   | V1         | 1           | 60"         | BARE BARE |
| 203552   | V2         | 1           | 60"         | BARE BARE |
| 203557   | G          | 1           | 60"         | BARE BARE |



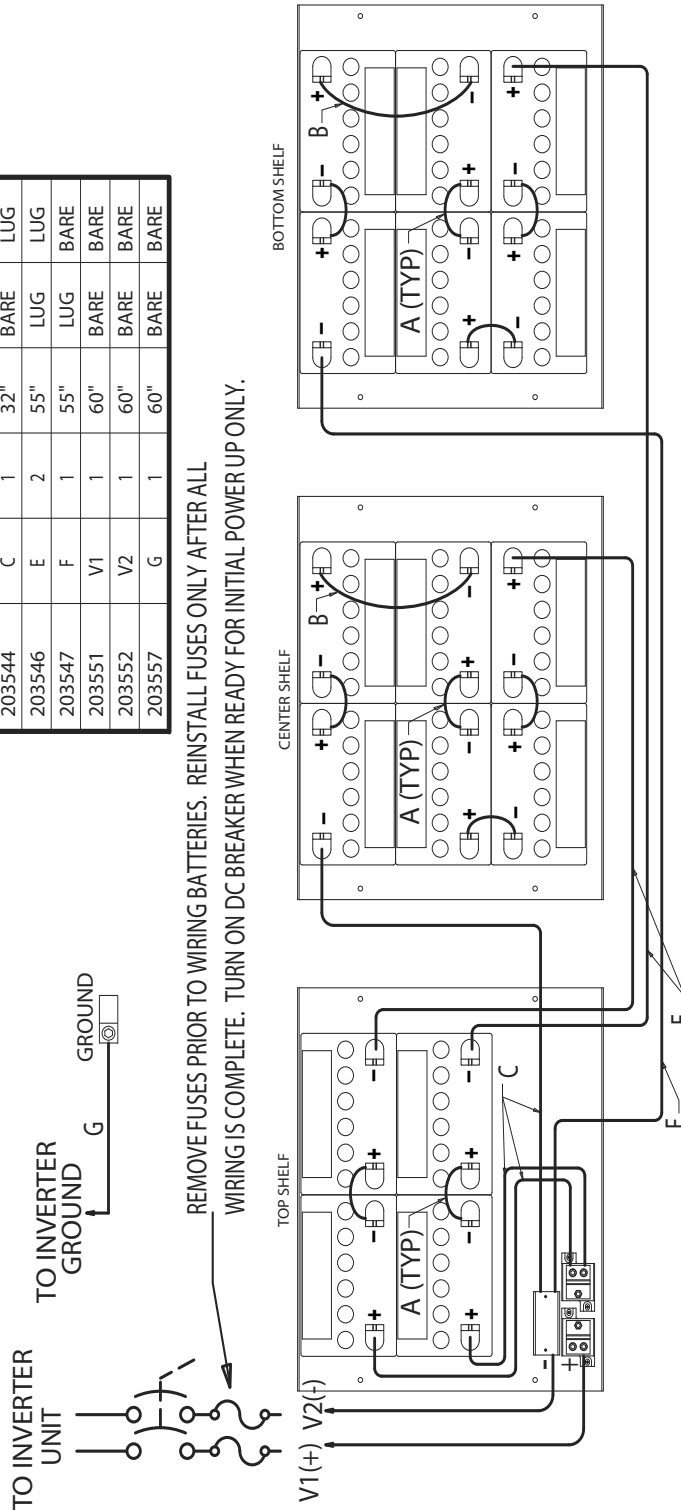


# INSTALLATION CONTINUED

## BATTERY INSTALLATION AND WIRING

2 Strings of (8) 65 or 90 A/H Batteries in Small Battery Cabinet (96V Buss)

| WIRE BOM | WIRE LABEL | QUANT REQD | WIRE LENGTH | TERMINALS |
|----------|------------|------------|-------------|-----------|
| 203542   | A          | 10         | 6"          | LUG       |
| 203543   | B          | 2          | 16"         | LUG       |
| 203544   | C          | 1          | 32"         | BARE      |
| 203546   | E          | 2          | 55"         | LUG       |
| 203547   | F          | 1          | 55"         | LUG       |
| 203551   | V1         | 1          | 60"         | BARE      |
| 203552   | V2         | 1          | 60"         | BARE      |
| 203557   | G          | 1          | 60"         | BARE      |



**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**



# INSTALLATION CONTINUED

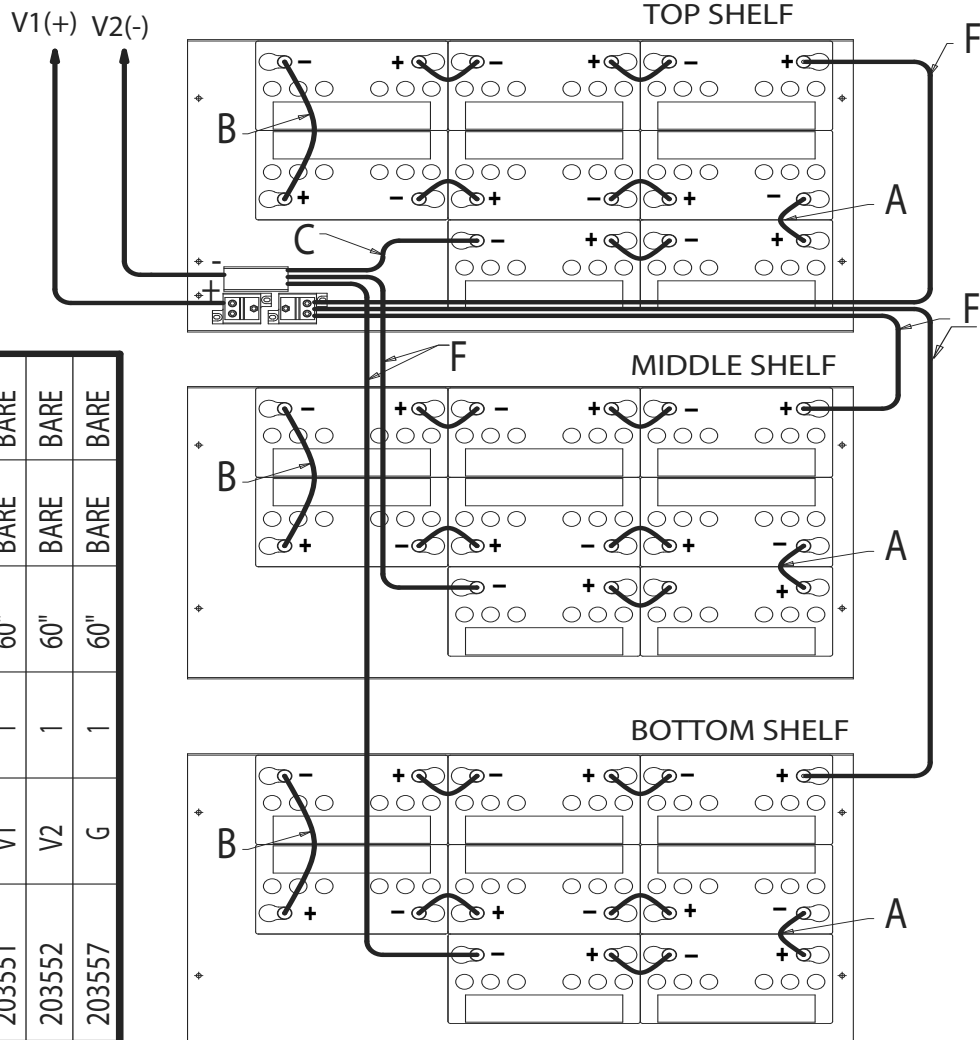
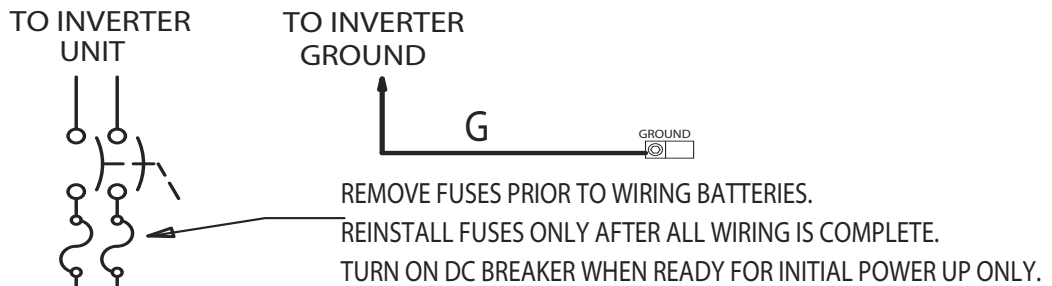


## BATTERY INSTALLATION AND WIRING 3 Strings of (8) 90 A/H Batteries in Large Battery Cabinet (96V Buss)

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**



| WIRE BOM | WIRE NUMBER | QUANT REQ'D | WIRE LENGTH | TERMINALS |
|----------|-------------|-------------|-------------|-----------|
| 203542   | A           | 18          | 6"          | LUG       |
| 203543   | B           | 3           | 12"         | LUG       |
| 203544   | C           | 1           | 32"         | BARE      |
| 203547   | F           | 5           | 55"         | BARE      |
| 203551   | V1          | 1           | 60"         | BARE      |
| 203552   | V2          | 1           | 60"         | BARE      |
| 203557   | G           | 1           | 60"         | BARE      |



## INSTALLATION CONTINUED

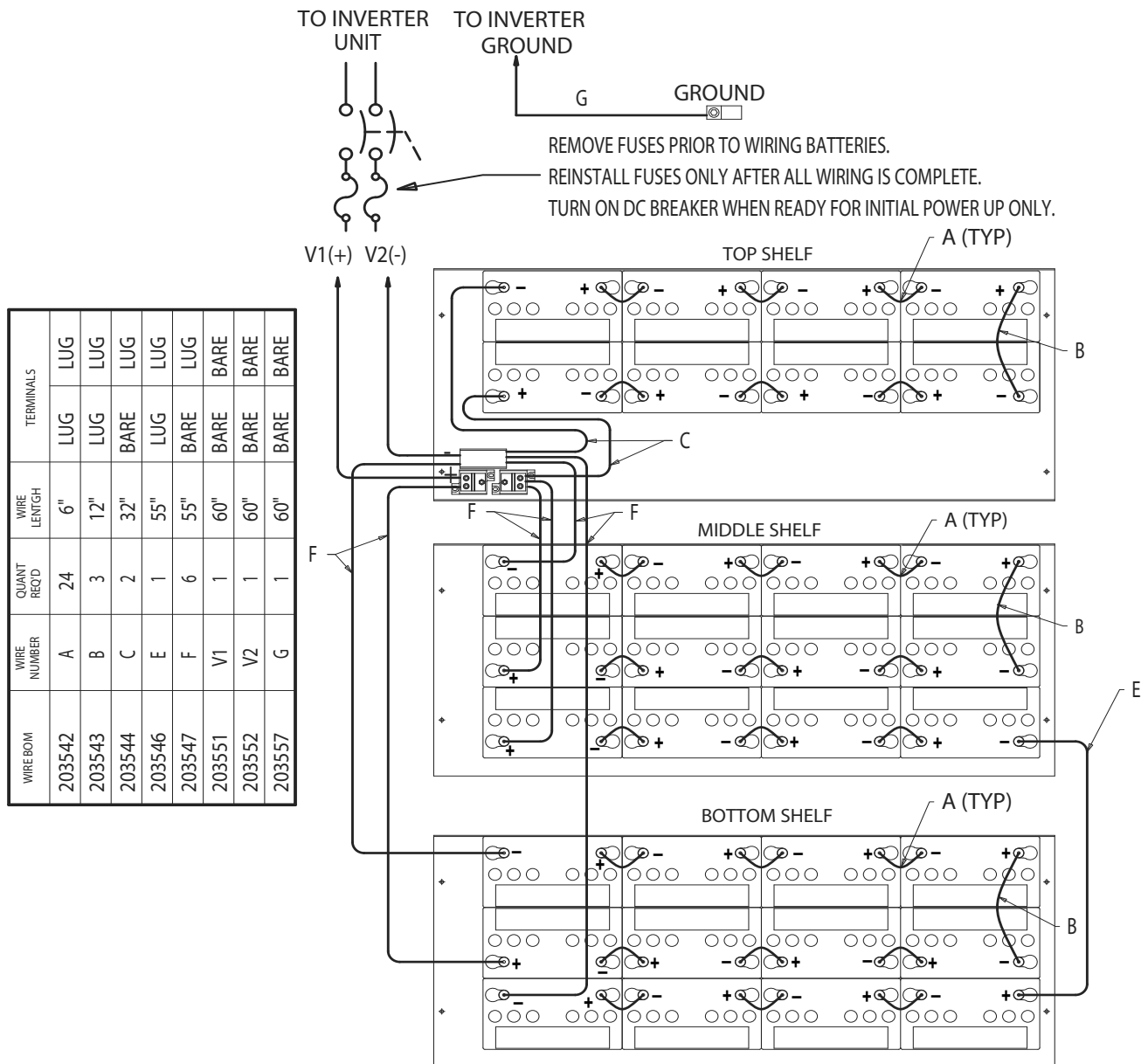
### BATTERY INSTALLATION AND WIRING

4 Strings of (8) 65 or 90 A/H Batteries in Large Battery Cabinet (96V Buss)

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**



# INSTALLATION CONTINUED



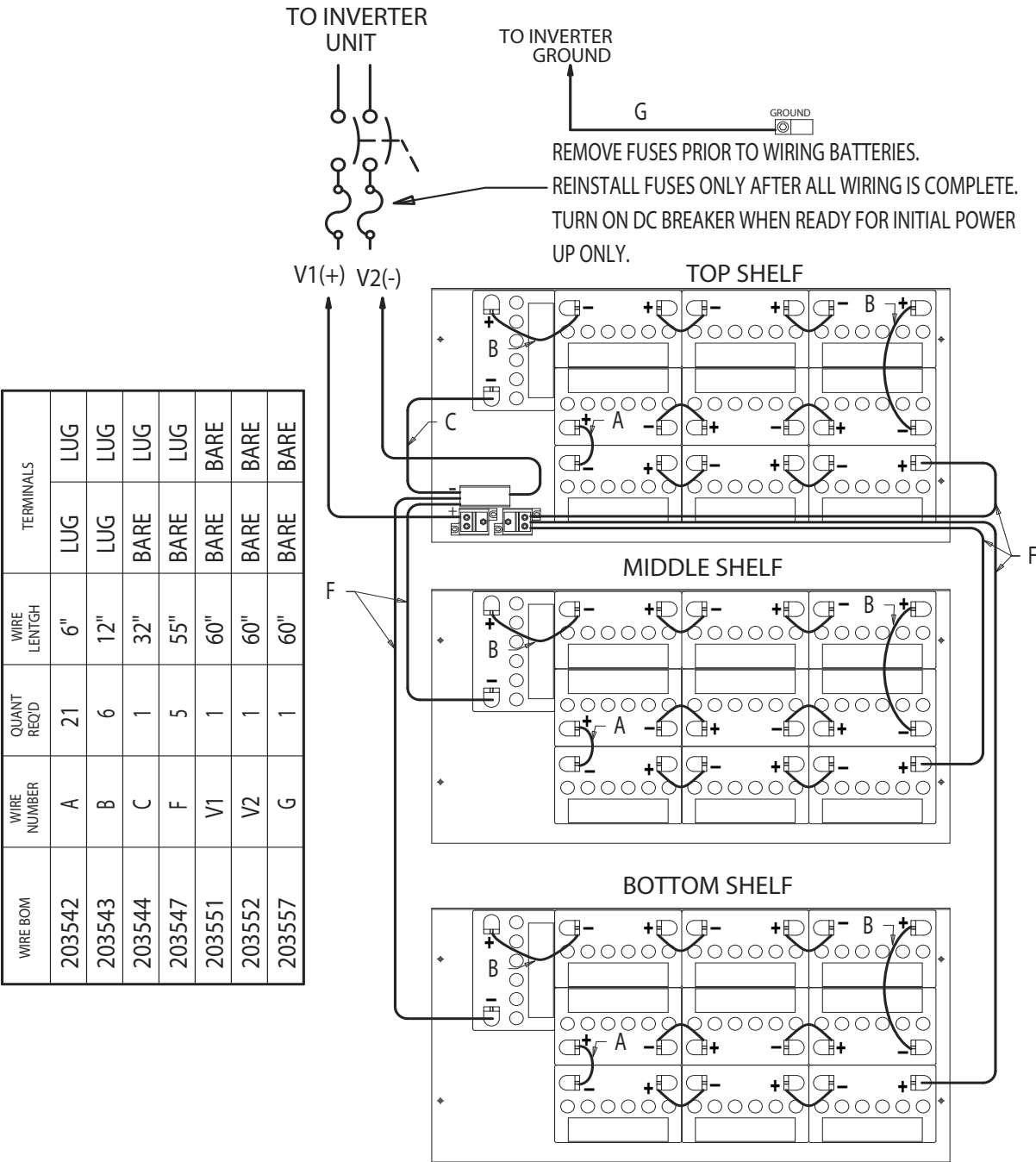
## BATTERY INSTALLATION AND WIRING

3 Strings of (10) 65 or 90 A/H Batteries in Large Battery Cabinet (120V Buss)

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**





## INSTALLATION CONTINUED

### BATTERY INSTALLATION AND WIRING

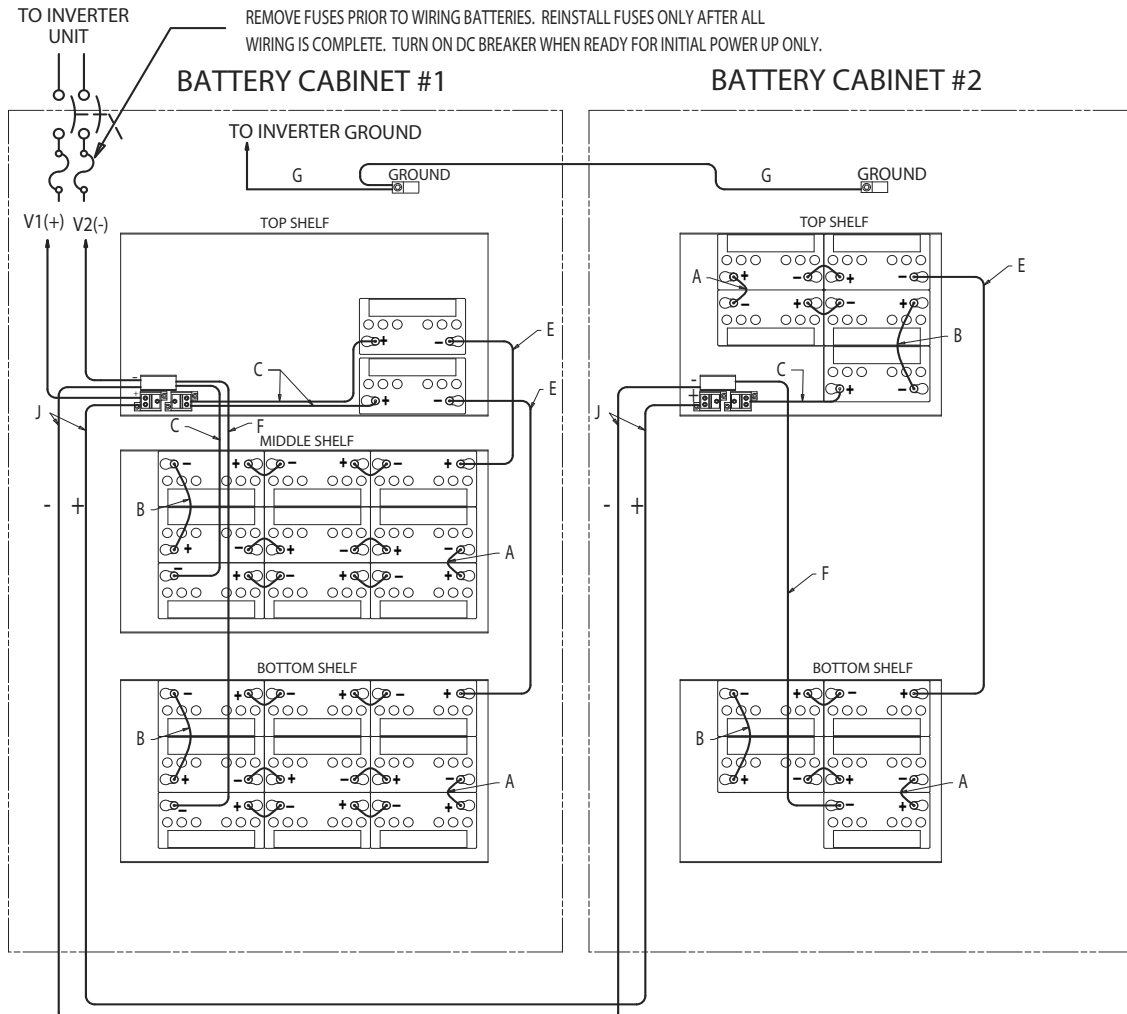
3 Strings of (10) 90 or 100 A/H Batteries in Large Battery Cabinet (120V Buss)

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**

| WIRE BOM | WIRE NUMBER | QUANT REQ'D | WIRE LENGTH | TERMINALS |      |
|----------|-------------|-------------|-------------|-----------|------|
| 203542   | A           | 20          | 6"          | LUG       | LUG  |
| 203543   | B           | 4           | 12"         | LUG       | LUG  |
| 203544   | C           | 3           | 32"         | BARE      | LUG  |
| 203546   | E           | 3           | 55"         | LUG       | LUG  |
| 203547   | F           | 2           | 55"         | BARE      | LUG  |
| 203548   | J           | 2           | 60"         | BARE      | BARE |
| 203551   | V1          | 1           | 60"         | BARE      | BARE |
| 203552   | V2          | 1           | 60"         | BARE      | BARE |
| 203557   | G           | 2           | 60"         | BARE      | BARE |



# INSTALLATION CONTINUED



## BATTERY INSTALLATION AND WIRING

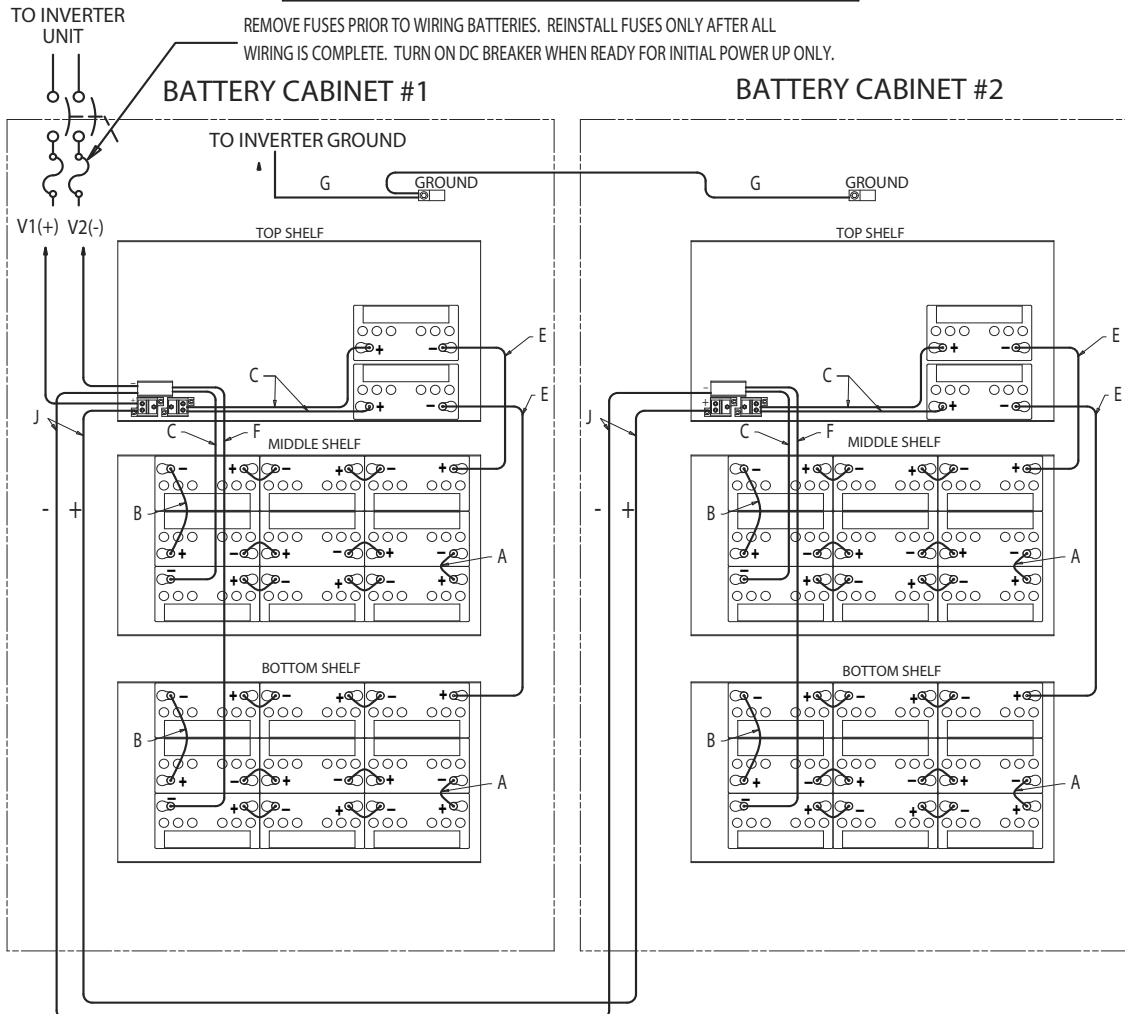
4 Strings of (10) 90 or 120 A/H Batteries in Large Battery Cabinet (120V Buss)

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**

| WIRE BOM | WIRE NUMBER | QUANT REQ'D | WIRE LENGTH | TERMINALS |      |
|----------|-------------|-------------|-------------|-----------|------|
| 203542   | A           | 28          | 6"          | LUG       | LUG  |
| 203543   | B           | 4           | 12"         | LUG       | LUG  |
| 203544   | C           | 6           | 32"         | BARE      | LUG  |
| 203546   | E           | 6           | 55"         | LUG       | LUG  |
| 203547   | F           | 2           | 55"         | BARE      | LUG  |
| 203548   | J           | 2           | 60"         | BARE      | BARE |
| 203551   | V1          | 1           | 60"         | BARE      | BARE |
| 203552   | V2          | 1           | 60"         | BARE      | BARE |
| 203557   | G           | 2           | 60"         | BARE      | BARE |





## INSTALLATION CONTINUED

### BATTERY INSTALLATION AND WIRING

5 Strings of (10) 100 A/H Batteries in Large Battery Cabinets (120V Buss)

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



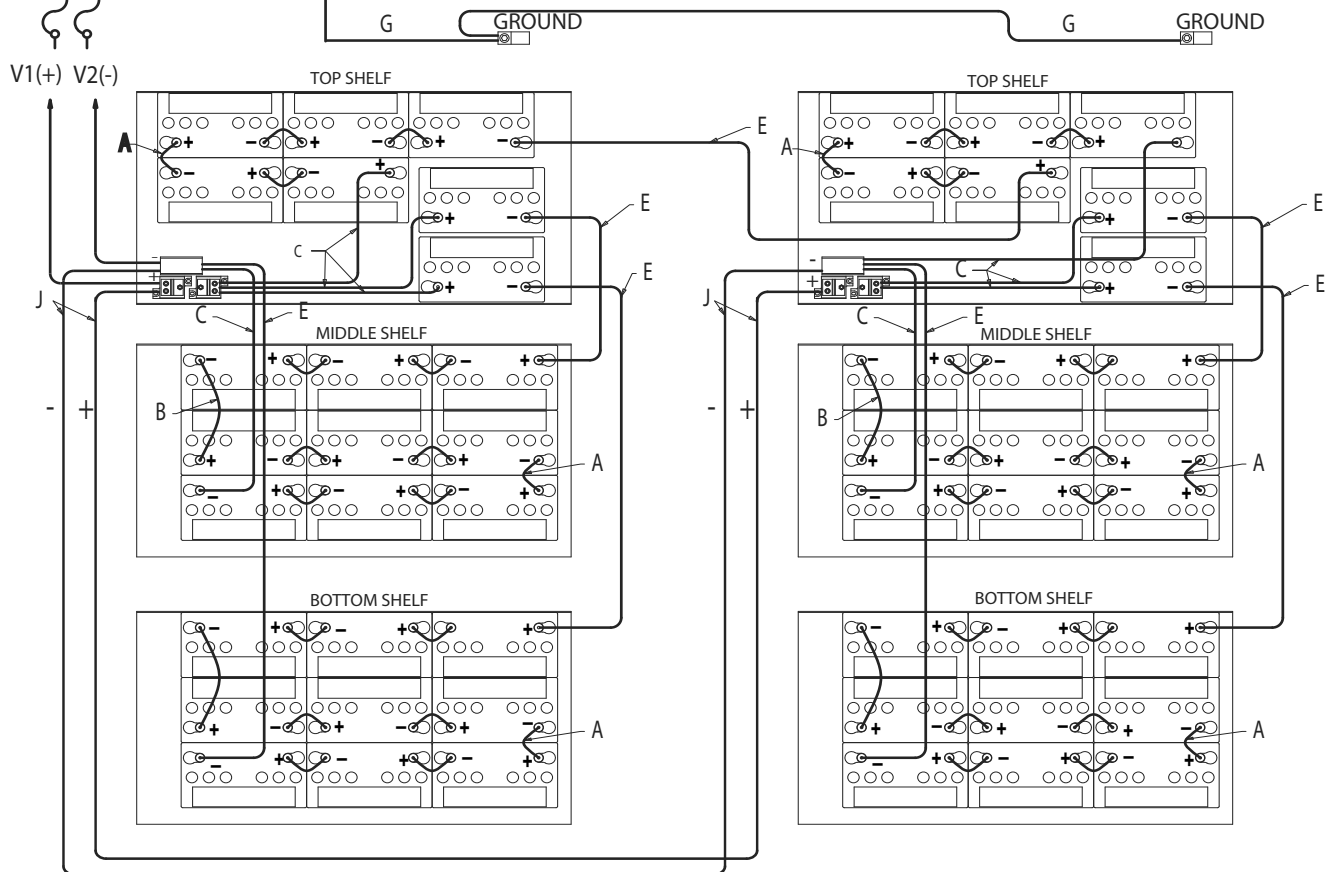
**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**

| WIRE BOM | WIRE NUMBER | QUANT REQ'D | WIRE LENGTH | TERMINALS |      |
|----------|-------------|-------------|-------------|-----------|------|
| 203542   | A           | 36          | 6"          | LUG       | LUG  |
| 203543   | B           | 4           | 12"         | LUG       | LUG  |
| 203544   | C           | 8           | 32"         | BARE      | LUG  |
| 203546   | E           | 7           | 55"         | LUG       | LUG  |
| 203548   | J           | 2           | 60"         | BARE      | BARE |
| 203551   | V1          | 1           | 60"         | BARE      | BARE |
| 203552   | V2          | 1           | 60"         | BARE      | BARE |
| 203557   | G           | 2           | 60"         | BARE      | BARE |

TO INVERTER UNIT

REMOVE FUSES PRIOR TO WIRING BATTERIES. REINSTALL FUSES ONLY AFTER ALL WIRING IS COMPLETE. TURN ON DC BREAKER WHEN READY FOR INITIAL POWER UP ONLY.

TO INVERTER GROUND



# INSTALLATION CONTINUED



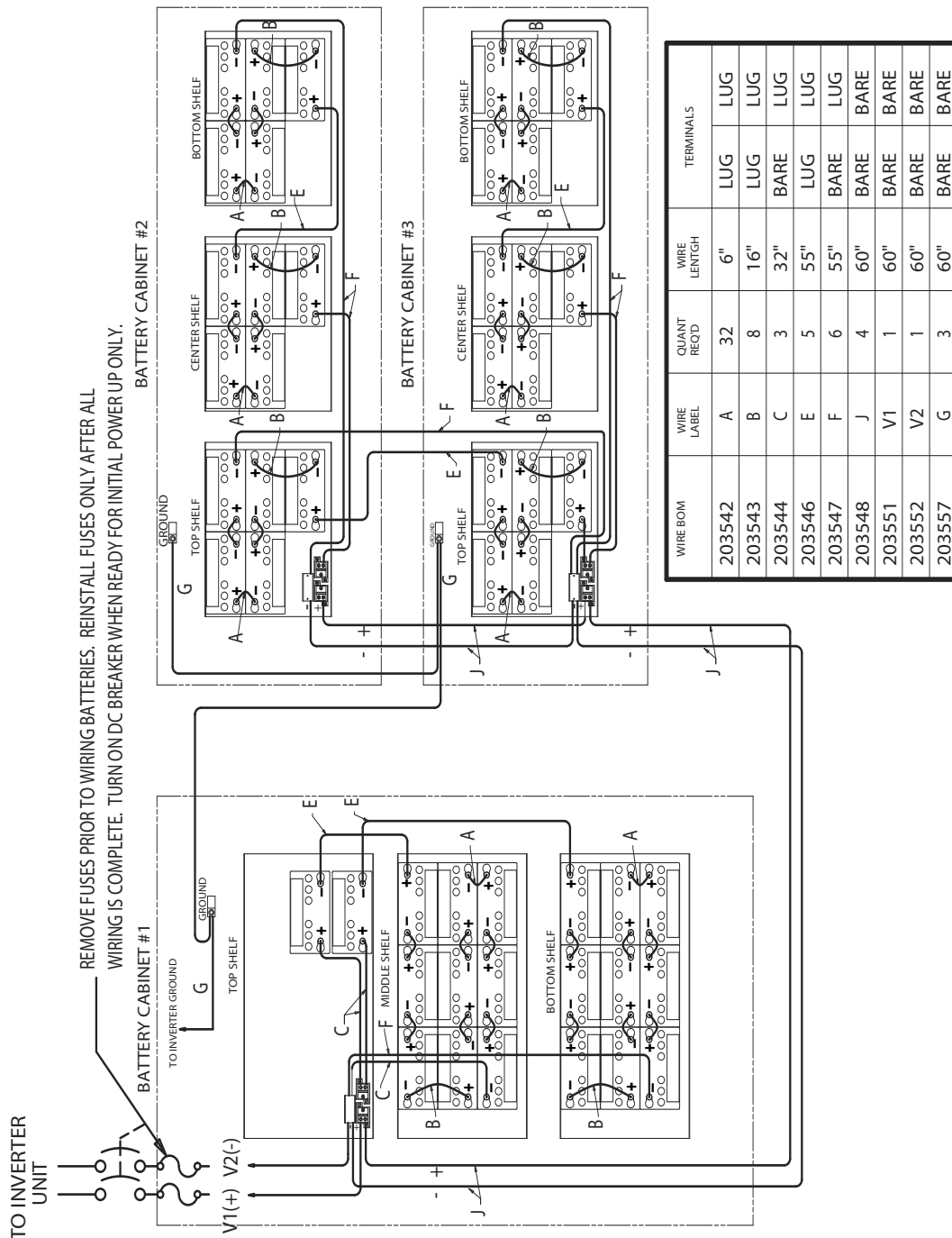
## BATTERY INSTALLATION AND WIRING

5 Strings of (10) 65 or 100 A/H Batteries in Multiple Sized Battery Cabinets (120V Buss)

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**





## INSTALLATION CONTINUED

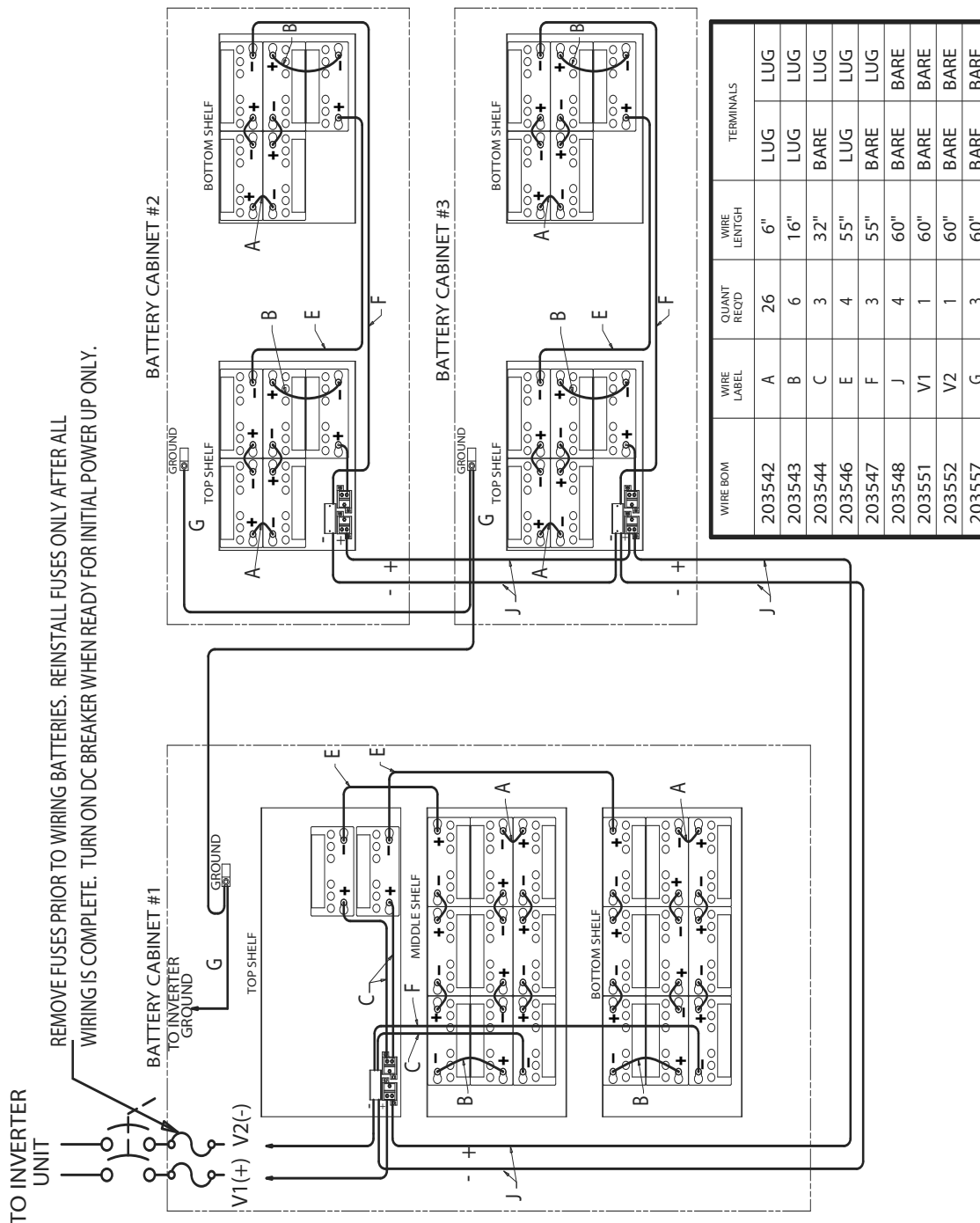
### BATTERY INSTALLATION AND WIRING

4 Strings of (10) 65 or 100 A/H Batteries in Multiple Sized Battery Cabinets (120V Buss)

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**



**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**





## BATTERY INSTALLATION AND WIRING

4 Strings of (10) 65 or 90 A/H Batteries in Multiple Sized Battery Cabinets (120V Buss)

**NOTE - NOT ALL BATTERY MANUFACTURERS WILL HAVE THE (+) AND (-) POSTS AS SHOWN BELOW. USE EXTREME CAUTION WHEN WIRING.**

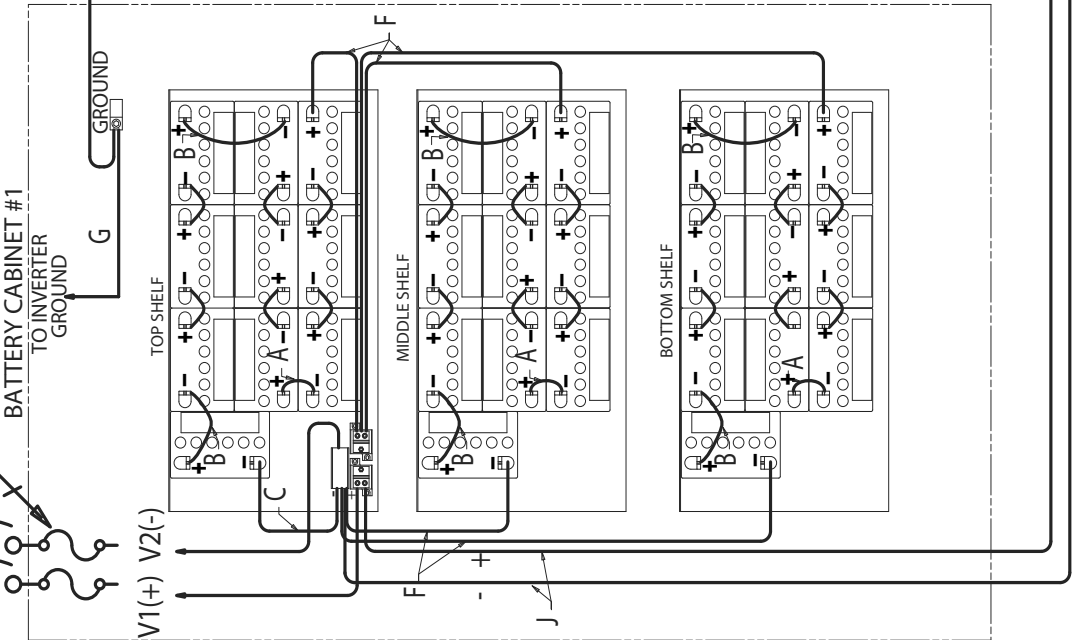
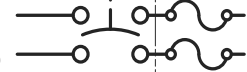


**WARNING - DO NOT COMPLETE DC CONNECTION UNTIL READY TO APPLY AC POWER.**

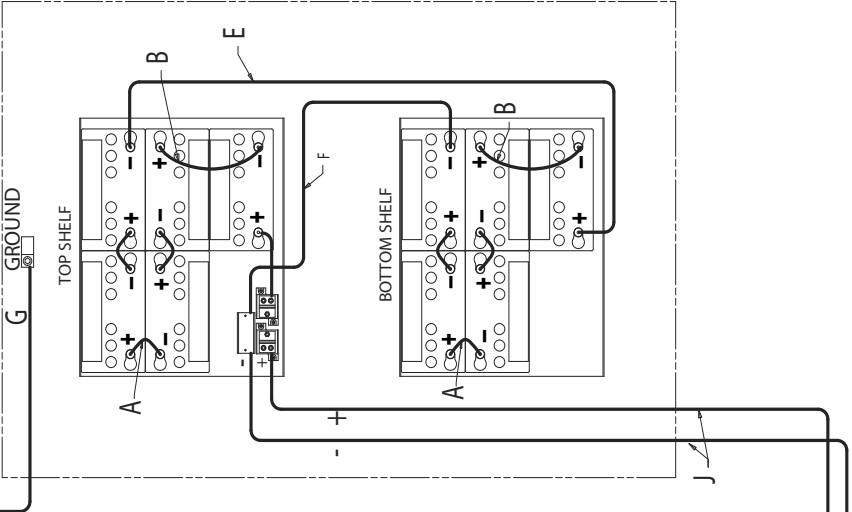
| WIRE BOM | WIRE NUMBER | QUANT REQD | WIRE LENGTH | TERMINALS |
|----------|-------------|------------|-------------|-----------|
| 203542   | A           | 27         | 6"          | LUG       |
| 203543   | B           | 8          | 12"         | LUG       |
| 203544   | C           | 1          | 32"         | LUG       |
| 203546   | E           | 1          | 55"         | LUG       |
| 203547   | F           | 6          | 55"         | LUG       |
| 203548   | J           | 2          | 60"         | BARE      |
| 203551   | V1          | 1          | 60"         | BARE      |
| 203552   | V2          | 1          | 60"         | BARE      |
| 203557   | G           | 2          | 60"         | BARE      |

REMOVE FUSES PRIOR TO WIRING BATTERIES.  
REINSTALL FUSES ONLY AFTER ALL WIRING IS  
COMPLETE. TURN ON DC BREAKER WHEN  
READY FOR INITIAL POWER UP ONLY.

TO INVERTER  
UNIT



BATTERY CABINET #2





## INSTALLATION CONTINUED

### INPUT AND OUTPUT CONDUIT ENTRY POINTS



#### \*\*\*WARNING\*\*\*



THE INVERTER RECEIVES POWER FROM MORE THAN ONE SOURCE. BE SURE ALL UTILITY CIRCUIT BREAKERS ARE IN THE OFF POSITION AND THE BATTERY CONNECTOR IS UNPLUGGED BEFORE SERVICING.

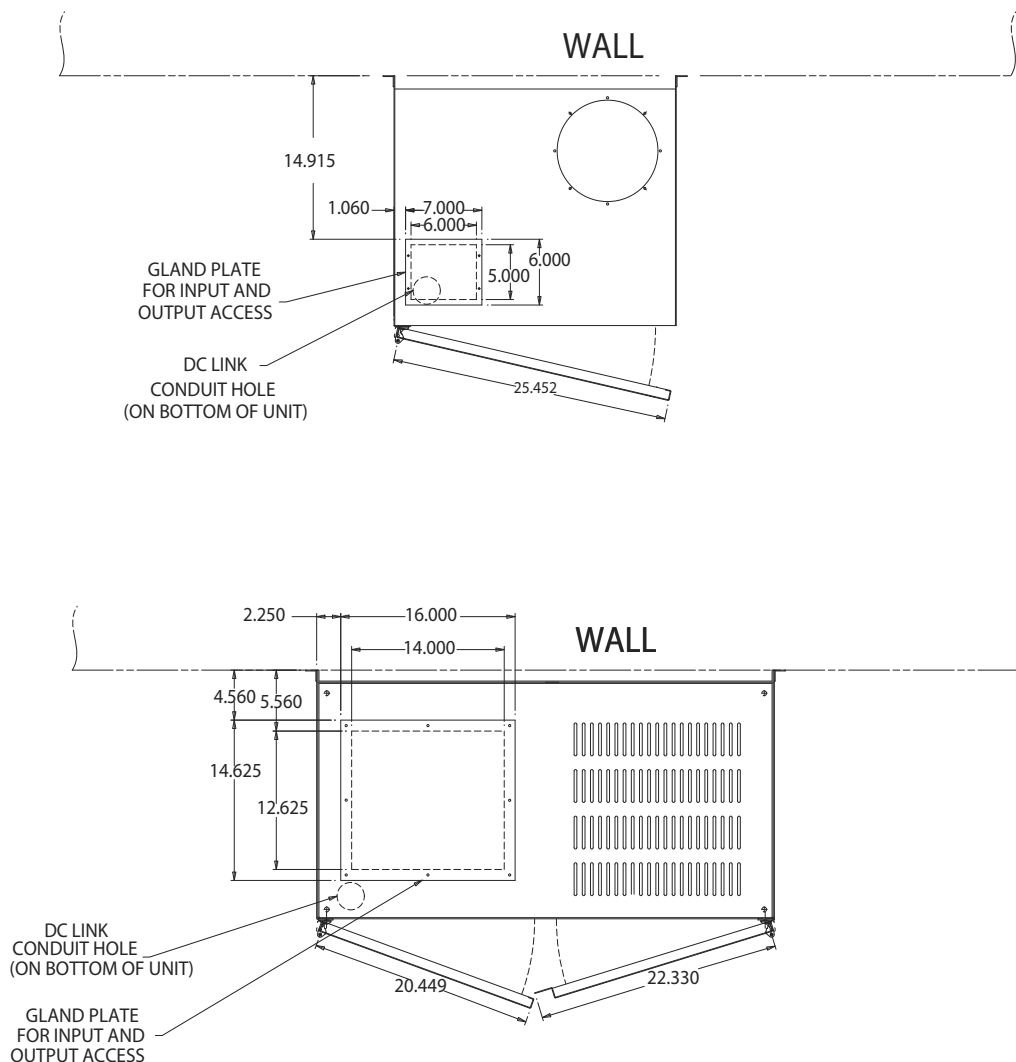


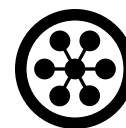
Do not remove the debris shield from the top of the unit until ready for start up.



### Inverter Wiring With Distribution

Input wiring is performed at the input EMI terminals. Output wiring is performed at the output terminal strip and terminated at the distribution breakers on the front panel. It is recommended that all wiring is performed according to NEC standards and local codes.





## INPUT AND OUTPUT WIRING



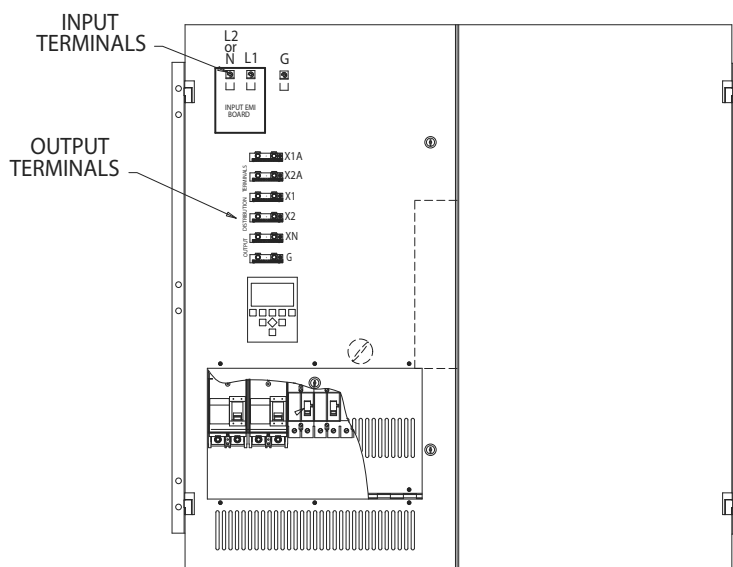
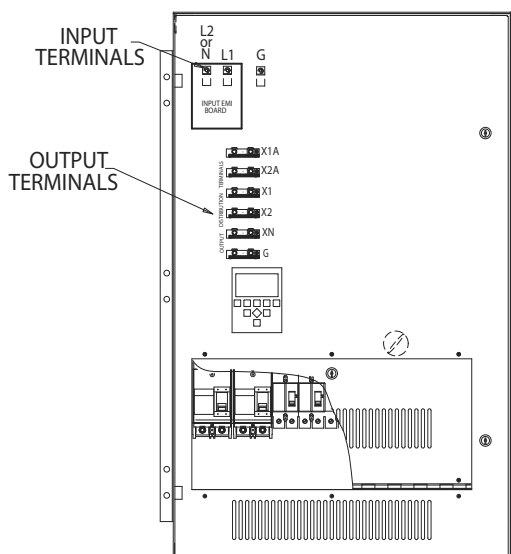
### \*\*\*WARNING\*\*\*



THE INVERTER RECEIVES POWER FROM MORE THAN ONE SOURCE. BE SURE ALL UTILITY CIRCUIT BREAKERS ARE IN THE OFF POSITION AND THE BATTERY CONNECTOR IS UNPLUGGED BEFORE SERVICING.

### Inverter Wiring With Distribution

Input wiring is performed at the input EMI terminals. Output wiring is performed at the output terminal strip and terminated at the distribution breakers on the front panel. It is recommended that all wiring is performed according to NEC standards and local codes. **For units without output distribution, a main output overcurrent protection/disconnect switch shall be provided by others.**





### OPTIONAL AUTOMATIC MESSAGE DIALER

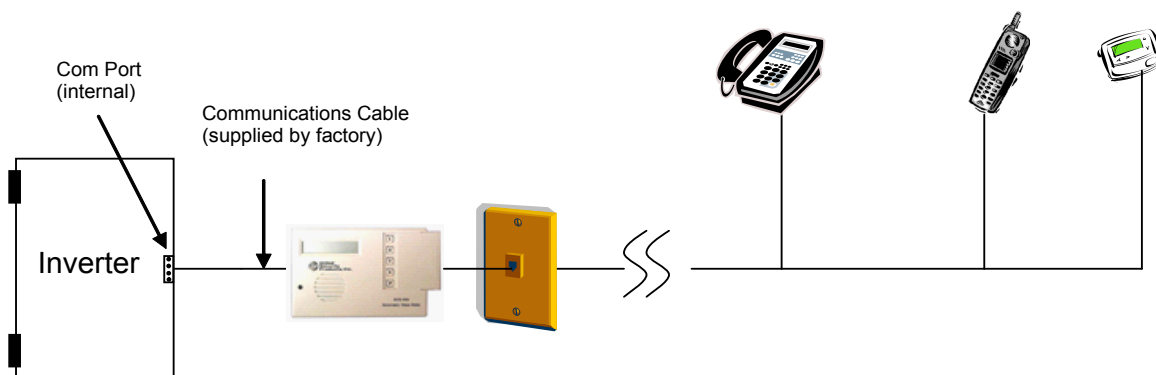
An Automatic Message Dialer is available on the Controlled Power Company line of Inverters. The Automatic Message Dialer is a device that notifies certain personnel if there is a problem with the inverter via an analog phone line. The Automatic Message Dialer is a small box that plugs into the communications port of the inverter. All that is required for the device is an analog phone line and it is ready to go!

Here's how it works: If in the event that there is an alarm condition, the Automatic Message Dialer will dial up to 4 numbers; these can be landline phones or cell phones. When a call is answered or sent to voice mail, the Automatic Message Dialer will play a customer-recorded, voice message.

Here are some features of the Automatic Message Dialer:

- Dials up to 4 numbers
- Custom voice message
- Programmable delay prevents nuisance dialing
- Internal or external battery backup for memory retention
- Power supply included

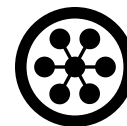
Here is how it is connected:



**NOTE:** The power supply for these options **MUST** be taken from the output of the Inverter. A 120V receptacle (5-20R) whose supply is taken from the output of the inverter must be installed near the location of the Automatic Message Dialer. A standard phone receptacle and phone cord is also required to complete the circuit.

Refer to the manual that accompanied these devices for features, function, use and installation Instructions.

# OPTIONAL REMOTE ANNUNCIATOR INSTALLATION



Please read this entire instruction set before installing!  
Turn off all power before installing or servicing!



## REMOTE ANNUNCIATOR

Controlled Power Company's Remote Annunciator is capable of displaying status conditions of an Uninterruptible Power Supply and alarming under critical conditions. The following installation instructions include operation, wiring, and mounting your Remote Annunciator.

## OPERATION

During normal operation of the UPS, the Remote Annunciator will illuminate the green UPS On LED. During an alarm condition (unit over temperature, utility fail, etc.) the red General Alarm LED will illuminate along with other applicable LED's indicating the nature of the alarm and the audible alarm will sound. The audible alarm can be silenced by pressing the Alarm Silence button on the front of the unit. If another alarm condition occurs (i.e. low battery), the alarm will resound. The audible alarm can be altogether defeated by changing jumper J1 on the circuit board. See the back side of the Remote Annunciator for J1 jumper setting.

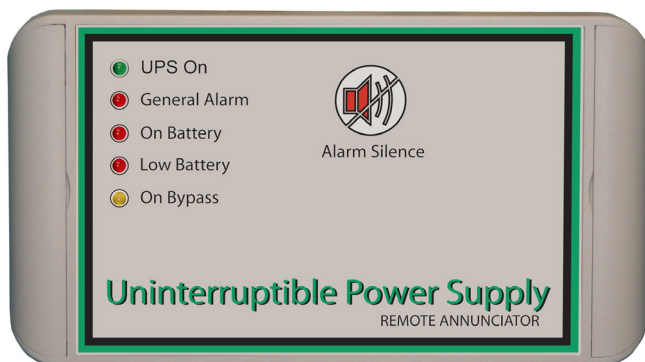


Figure 1: Remote Annunciator

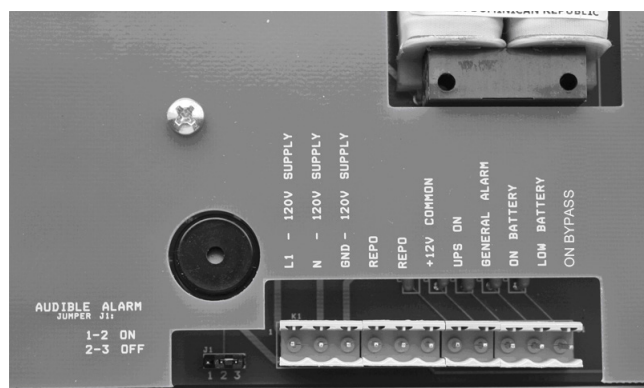


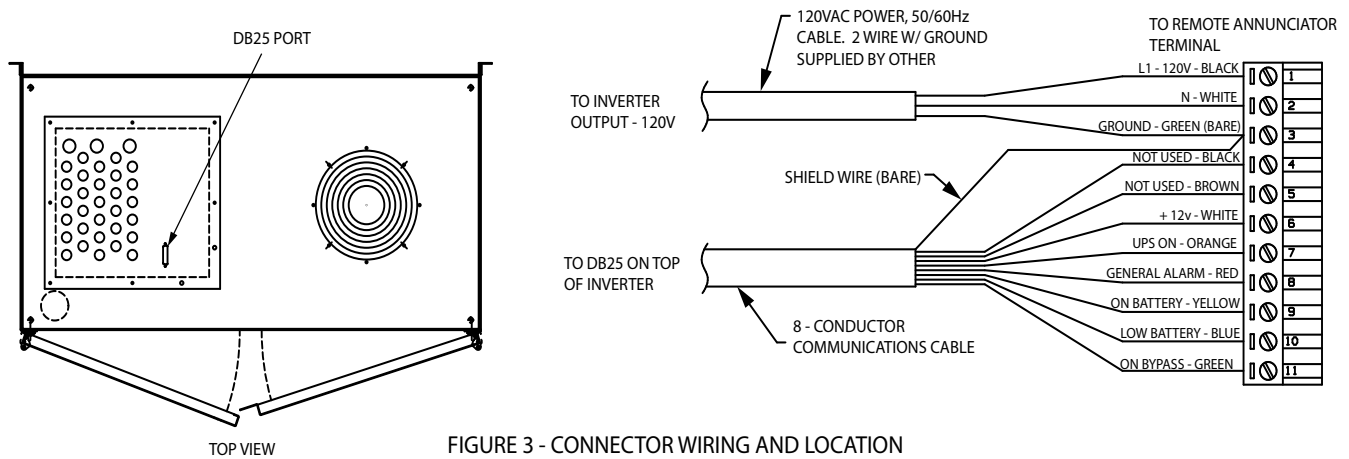
Figure 2: Rear of Remote Annunciator showing J1 and terminal header

## WIRING

The wiring of the Remote Annunciator consists of two feeds. One being the communication cable supplied with the unit, and the other is 120Vac 50/60Hz from the output of the UPS it is monitoring. The power supply can be taken directly from an output breaker on the unit, a receptacle or panel that is fed by the UPS or a nearby circuit fed by the UPS. From the UPS, run the communication cable to the location of the Remote Annunciator. The cable may be run through conduit, walls or cable tray/raceway, but care must be taken not to pinch, cut or kink the cable. After the cable is run, trim excess cable or coil in a safe location. Both feeds, after entering the box, must be wired to the supplied connector as shown in Fig 3. Use standard 1/2" box connector clamps to anchor the wire to the box (not supplied).



# OPTIONAL REMOTE ANNUNCIATOR INSTALLATION



## NOTES:

1. All wires to connector must be stranded, maximum 12 AWG.
2. If using solid conductor for AC power, splice in length (minimum 4") of stranded wire to connector.
3. Strip outer sheathing and foil back minimum 2".
4. Strip all wires 0.25".
5. 120V supply must come from UPS output. Power must be present in event of utility failure.
6. Connector on other end of communication cable to be factory wired.

After all cable routing and connector wiring is complete, plug Remote Annunciator connector into the terminal header.

## MOUNTING

The Remote Annunciator is designed to be wall mounted with wiring inputs through the rear or top/bottom (using conduit). Flipping out the side doors, remove the four screws fastening the cover to the box. The cover is attached to the box with two plastic retaining straps. Using the four holes in the back of the box and proper anchors (not supplied), mount the unit to drywall, masonry, paneling or any other type of wall. Holes are provided for rear cable entry. If top or bottom entry is desired, holes must be drilled in recommended location for (maximum 1/2") conduit (Fig. 4).

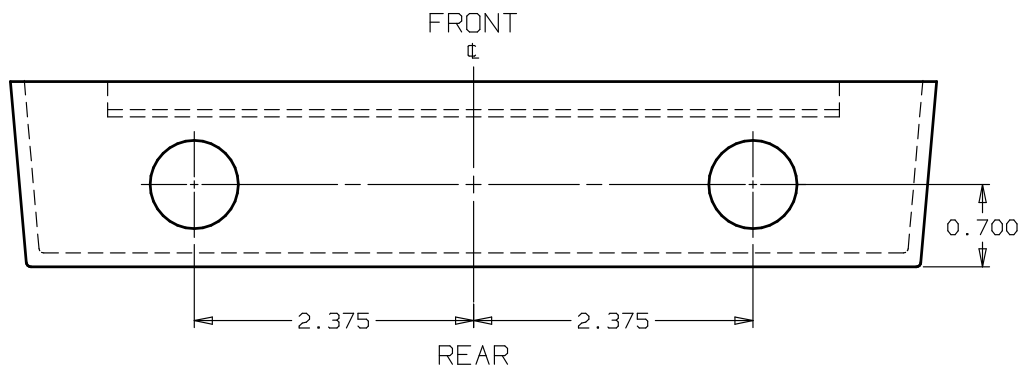
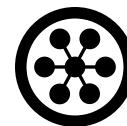


Figure 4: Drilling locations for top/bottom conduit entrance.



## NETMINDER REMOTE COMMUNICATIONS (CS141)

The NetMinder CS141 series of adapters integrate a Controlled Power UPS or lighting inverter into an Ethernet TCP/IP, MODBUS TCP, or MODBUS RS485 network with a specific IP address. The NetMinder CS141 adapters provide remote monitoring of UPS / Inverter status, alarm conditions and electrical measurements via a web browser, without the need for any external software. Remote notification of alarms and status are available via SNMP, e-mail, and network broadcast messaging. The CS141 series of adapters also perform an unattended graceful shutdown of critical servers when used in conjunction with the NetMinder RCCMD client. When used in a lighting inverter application, the NetMinder CS141B will report inverter battery test pass/fail results for NFPA life safety system requirements. The NetMinder CS141L advanced version provides a temperature and humidity sensing interface. NOTE the CS121 has been discontinued and replaced by the CS141. The CS121 is still supported.

### BACnet Communications

The NetMinder CS141 series of adapters are now able to communicate over a BACnet/IP or MS/TP network with the addition of customized hardware provided by Controlled Power Company. All objects including: parameters, alarms, status, and test results can be monitored and stored by building management systems, improving connectivity and simplifying maintenance.

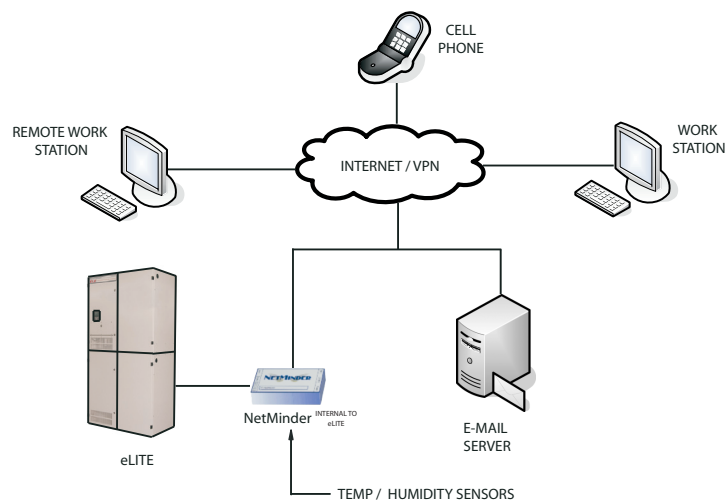
The NetMinder CS141 series of adapters are available in three different versions:

**NetMinder CS141B** – Basic Ethernet / SNMP / TCP/IP / MODBUS TCP communications used in UPS and lighting inverter applications. The CS141B also provides battery test pass/fail reporting via TCP/IP, e-mail and MODBUS TCP for lighting inverters to satisfy NFPA requirements for life safety.

**NetMinder CS141L** – Advanced version, includes all functionality of the basic version, plus the addition of temperature and humidity sensing capability, and 4 auxiliary contact closure inputs.

**NetMinder CS141L-485** – Adds MODBUS 485 communications to the advanced version of the NetMinder CS141L. However, temperature and humidity sensing are not available in this version.

**CS141 Applications** – One line diagrams are generic. Please download the Communication Products Overview for the specific status, alarm conditions and electrical measurements being monitored for each UPS or inverter model.



**Refer to the manual that accompanied this device for function, use and installation instructions.**



# COMMUNICATIONS DESCRIPTION

## K8 - DB9 COMMUNICATION PORT

DB9 (K8) PIN OUT - Rated 40VDC @ 0.3 Amps, 20VDC @ 1.0 Amps.

|       |               |       |               |
|-------|---------------|-------|---------------|
| Pin 1 | No connection | Pin 6 | No connection |
| Pin 2 | TXD           | Pin 7 | No connection |
| Pin 3 | RXD           | Pin 8 | No connection |
| Pin 4 | No connection | Pin 9 | No connection |
| Pin 5 | GROUND        |       |               |

## K6 - ALARM TERMINAL OUTPUTS

MOLEX TERMINALS - Dry contacts rated: 125VAC @ 0.5 Amps.

|            |                         |
|------------|-------------------------|
| Pins 5-6   | UPS ON                  |
| Pins 1-2   | GENERAL ALARM           |
| Pins 9-10  | LOW BATTERY WARNING     |
| Pins 11-12 | BYPASS ON               |
| Pins 7-8   | MANUAL RESTART REQUIRED |
| Pins 3-4   | UTILITY FAIL            |

## K7 - ALARM TERMINAL OUTPUTS

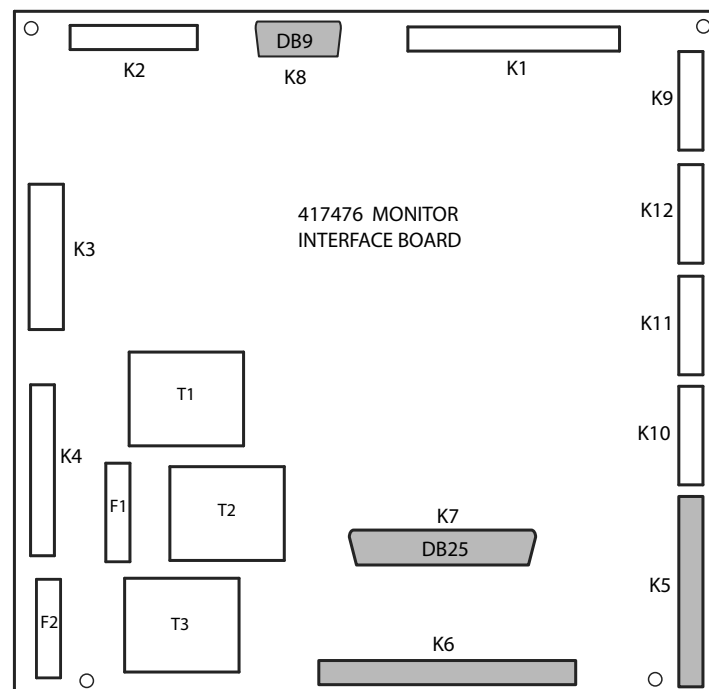
DB25 - Rated 40VDC @ 0.3 Amps, 20VDC @ 1.0 Amps.

|            |                         |
|------------|-------------------------|
| Pins 3-8   | UPS ON                  |
| Pins 5-9   | GENERAL ALARM           |
| Pins 2-6   | LOW BATTERY WARNING     |
| Pins 12-13 | BYPASS ON               |
| Pins 19-20 | MANUAL RESTART REQUIRED |
| Pins 1-4   | UTILITY FAIL            |

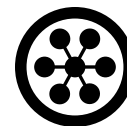
## K5 - ALARM TERMINALS

MOLEX TERMINALS - Dry contacts rated: 125VAC @ 0.5 Amps.

|          |                                          |            |                       |
|----------|------------------------------------------|------------|-----------------------|
| Pin 1    | INPUT NEUTRAL (2C)                       | Pins 7-8   | INVERTER TEST FAIL    |
| Pin 2    | NO CONNECTION                            | Pins 9-10  | INVERTER TEST PASS    |
| Pin 3    | INPUT NEUTRAL (2B)                       | Pins 11-12 | OUTPUT BREAKER OPEN   |
| Pins 4-5 | NORMALLY CLOSED CONTACT - OFF BUS ACTIVE | Pins 13-14 | REMOTE OFF BUS ACTIVE |
| Pins 5-6 | NORMALLY OPEN CONTACT - OFF BUS ACTIVE   | Pins 15-16 | MANUAL BATTERY TEST   |



See "Appendix A - Component Location Diagrams" for Interface board location



## INTELLISTAT™ MONITOR COMMUNICATIONS

Communicating with the ELS through the DB9 (K8) on the interface board will allow the user to obtain information remotely. Using the DB9 in this manner will only provide information from the Alarm Logs, Battery Test Events and Time Screens on the Intellistat™ Monitor. Additional information can be obtained remotely with the use of optional devices such as the MCM Device, Auto Dialer or Netminder options. See *“Appendix A - Options Interconnection Diagram”* and *“Interface Board Layout”*.

### MINIMUM SYSTEM REQUIREMENTS:

1. Computer/Laptop with Windows 3.1 or later.
2. “Hyperterminal” (Windows 3.1, Windows XP) or “PuTTY” for Windows Vista and Windows 7 or later. (download at <http://www.putty.org/>).
3. USB Port and a DB9 to USB Null Modem Conversion Cable - for use with all Windows operating systems and “Hyperterminal” or “PuTTY” emulation programs.

### PROCEDURE

1. Connect the DB9 to USB Null Modem Conversion cable from K8 on the Interface Board to the USB port on a computer. See *“Appendix A - “Interface Board Layout”*.
2. Make sure the UPS is ON and running.
3. Start Windows on the computer, access “All Programs” then “Accessories” then “Communications” then “Hyper Terminal” for Windows 3.1 or Windows XP. Or launch “PuTTY” for Windows Vista and Windows 7 or later.
4. In the Hyperterminal “Connection Description” window, enter any name then choose any icon - Click OK. For “PuTTY” users, Connection type = Serial, Serial Line = Com Port of computer being used, Speed = 1200. “PuTTY” users can name and save the session for later use. “PuTTY” users skip to step 7.
5. In the Hyperterminal “Connect To” window, choose “Connect Using” and select the comport you are using, Click OK.
6. In the Hyperterminal “COM Port Settings” window, set the following parameters: 1200 Baud, 8 data bits, 0 parity, 1 stop bit, flow control = xon/xoff, Echo=On, then click OK.
7. Once communication has been established with the Inverter, system Alarm Logs, Battery Test Events and Time data can be obtained by sending a series of characters to the Inverter. Below is a list of the character commands.

**Note: Not case sensitive.**

LL = Alarm Logs  
BB = Battery Test Events Log  
TT = Inverter Time and Date

Note: Entering BB or LL will list 5 events at a time. Re-entering BB or LL again will list the next 5 events.

### \*\*\*Caution\*\*\*



**Be sure that no power is applied to the Inverter  
while wiring to the Interface Board.**





## SET UP PROCEDURES



**DO NOT ATTEMPT TO OPERATE THE  
UNIT UNTIL ALL SET UP PROCEDURES HAVE  
BEEN COMPLETED.  
NOTE - THESE SETTINGS ARE FACTORY PRESET AND DO  
NOT REQUIRE MODIFICATION.**



**DIP SWITCH LOCATION** - The dip switches are located on the Main Control Board # 417622, which is located behind the front door, then behind the inner door above the bypass switch. It is the largest circuit board on that inner panel. See next page for Control Board layout and dip switch locations. Refer to “*Appendix A - Component Location Diagram*”.

**SW1-INPUT VOLTAGE SETTING** (Only one switch should be on.)

| SW1 ON BOARD #417622 (120/208/220/240V INPUTS ONLY) |     |     |     |     |
|-----------------------------------------------------|-----|-----|-----|-----|
| SWITCH POSITION                                     | 1   | 2   | 3   | 4   |
| 120                                                 | ON  | OFF | OFF | OFF |
| 208                                                 | OFF | ON  | OFF | OFF |
| 220                                                 | OFF | OFF | ON  | OFF |
| 240                                                 | OFF | OFF | OFF | ON  |

**SW2 - INVERTER SLEW RATE** - The slew rate is how fast the inverter will correct phasing synchronization to the incoming line. The standard setting should be used unless the incoming lines are very unstable or the inverter will be connected to a generator.

| SW2             |     |     |     |     |
|-----------------|-----|-----|-----|-----|
| SWITCH POSITION | 1   | 2   | 3   | 4   |
| STANDARD        | ON  | OFF | OFF | OFF |
| FAST            | OFF | ON  | OFF | OFF |
| GENERATOR       | OFF | OFF | ON  | OFF |

### SW4 - OPERATING OPTIONS

**Switch Position #1 - Factory Test Switch:** This switch is for factory testing only and must remain in the “Off” position.

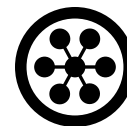
**Switch Position #2 - Battery Cutoff Voltage:** Battery manufacturers specify the desired cutoff voltage for maximum life performance.

ON = 1.75 VPC Cutoff

OFF = 1.67 VPC Cutoff

Controlled Power Company recommends 1.75 VPC. This assures longer battery life.

# SET UP PROCEDURES CONTINUED



## SW4 - OPERATING OPTIONS CONTINUED

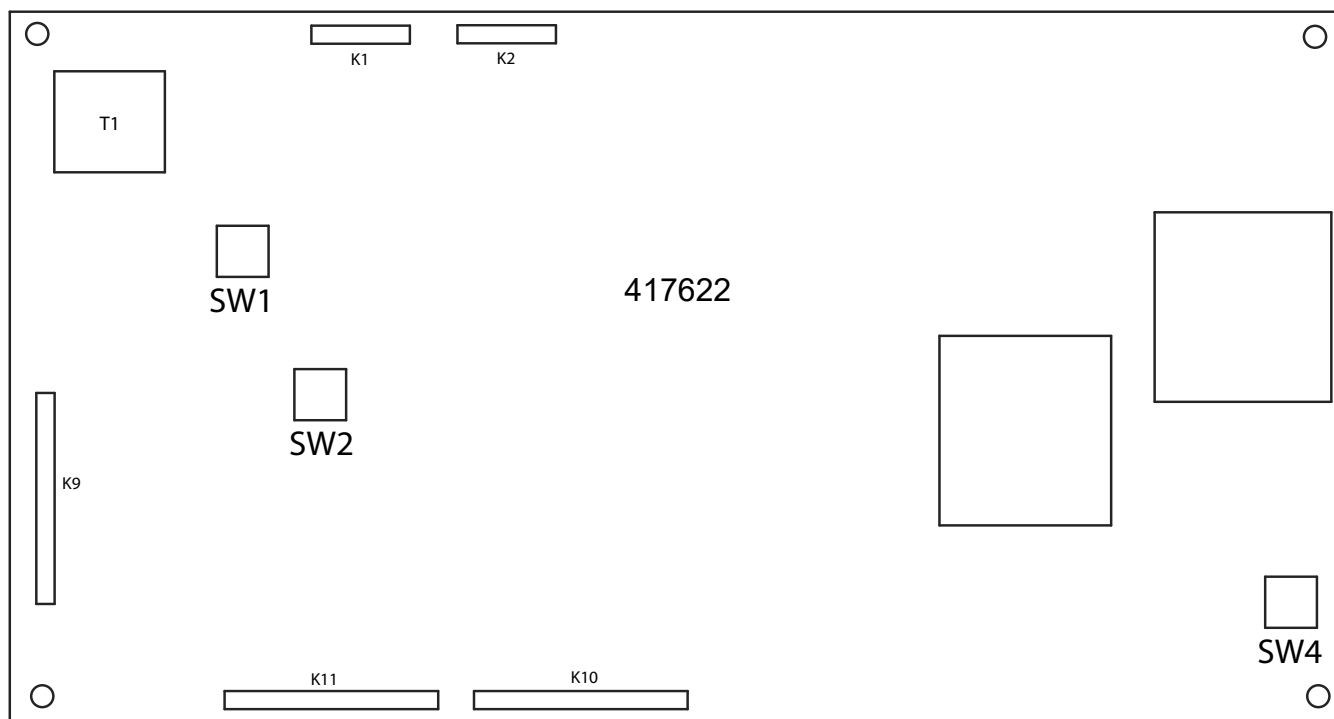
**Switch Position #3 - Manual Re-Start:** During extended power outages, the inverter automatically turns off to prevent total battery depletion. Upon return of utility power, you have the option for the inverter to turn on automatically or manually.

ON = Manual Re-Start

OFF = Auto Re-Start

**Switch position #4** - This switch remains on at all times.

DIP SWITCH LOCATION DIAGRAM





## START UP PROCEDURE



**DO NOT ATTEMPT TO OPERATE THE  
UNIT UNTIL ALL SET UP PROCEDURES HAVE  
BEEN COMPLETED**

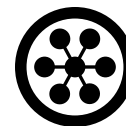


### NORMAL MODE START UP

1. Remove the debris shield on top of the unit and discard.
2. Turn off all AC input, DC circuit breaker and output circuit breakers.
3. Verify the bypass switch is in the “Normal” position.
4. Check the battery connections for proper voltage and polarity.
5. Verify for correct voltage at the input terminals (L1, L2, G). This should match the information on the specification tag on the unit.
6. Turn on the DC breaker.
7. Turn on the AC input breaker.
8. Check for correct output voltage at the output terminal (X1, X2, X1A, X2A, XN).

**Note 1:** Output voltage information is located on the specification tag.

9. Turn AC output load breakers on one at a time and verify that the amount of load does not exceed the system rating as indicated by the percentage load shown on the front display.



## INTELLISTAT™ MONITOR DESCRIPTION

**ADVANCED DIGITAL MONITORING** - The user-friendly Intellistat™ monitor provides quick, full access to all of the monitor features, and also allows all programming to be done directly from the keypad. An easy to read LCD indicates all the electrical parameters, as well as the functional status of the inverter. A virtual keypad allows the entry of date / time values, system setpoints and password information into the monitor, without the need for an external computer and cable.

**The Intellistat™** - Intelligent status monitoring an inverter's operational status is critical for maintaining the building's operational efficiency, as well as for monitoring the power feeding the systems. With this in mind, Controlled Power Company designed the model **"ELS"** with state of the art monitoring features to provide complete system diagnostics and testing with access to all electrical system parameters.

### FEATURES

- LCD display of all electrical parameters.
- NFPA compliant automatic battery testing and logging.
- User programmable automatic system testing.
- System alarm annunciation.
- Audible alarm with alarm silence.
- Alarm status display.
- Email / Cell phone status notification.
- Optional fax / email / voice / web page reporting of test results.
- Date and time display.
- Auto logging of test results / events.
- Multi layer password protection.
- Remote monitoring capabilities.
- Programmable local interfaces.
- Logs up to 25 events.
- Non volatile clock and memory.
- Programmable alarm set points.

### INVERTER STATUS AND ALARM INDICATORS

- |                               |                           |                                     |
|-------------------------------|---------------------------|-------------------------------------|
| - High / Low Input Voltage    | - System Normal           | - Auto Battery Test Failed / Passed |
| - High / Low Output Voltage   | - General Alarm           | - Off Bus Status                    |
| - High Output Volt-Amperes    | - System on Battery       | - Output Circuit Breaker Open       |
| - High / Low Output Frequency | - Low Battery Warning     | - Charger Fail / DC Open Circuit    |
| - High / Low Battery Voltage  | - Low Battery Shutdown    | - System in Static or Manual Bypass |
| - High Battery Charge Current | - Battery Test in Process | - REPO Activated                    |

### MEASURED PARAMETERS

- |                  |                       |                       |                              |
|------------------|-----------------------|-----------------------|------------------------------|
| - Input Voltage  | - Output Volt-Amperes | - Output Percent Load | - Battery Charger Current    |
| - Output Voltage | - Output Watts        | - Output Frequency    | - Battery Capacity Remaining |
| - Output Current | - Output Power Factor | - Battery Voltage     | - Battery Temperature        |

**AUTOMATIC SYSTEM TESTS** - The Intellistat™ Monitor automatically performs a user defined (date and time) 5 minute system test every 30 or 90 days; as well as a user defined (date and time) annual 30, 60 or 90 minute system test. For all of these tests, the Intellistat™ Monitor logs the test results with the date and time, as well as a "pass" or "fail" indication. Manual System tests are also available.



## INTELLISTAT™ MONITOR OPERATION



This section will give you a basic understanding of the Intellistat™ Monitor its menu items and functions. Do not change any parameters or enter any data prior to completing the System Setup section - see *"Intellistat™ Monitor Operation - Main Setup Screen - System Setup"*.



### MENU SELECTION BUTTONS

Use these buttons to select the menu items that correspond to the 5 menu items on the bottom of the LCD display.



LCD DISPLAY

MOVE CURSOR UP

MOVE CURSOR LEFT

MOVE CURSOR DOWN

THIS KEY CAN ALSO BE USED AS A SHORTCUT TO MOVE THE CURSOR DOWN TO THE LAST SELECTION IN THE MENU

MOVE CURSOR RIGHT

SELECT OR ENTER KEY

Only the Main Menu screen is a touch screen. The

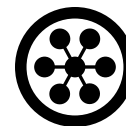


button seen on many other

screens is also a touch screen button. Select the

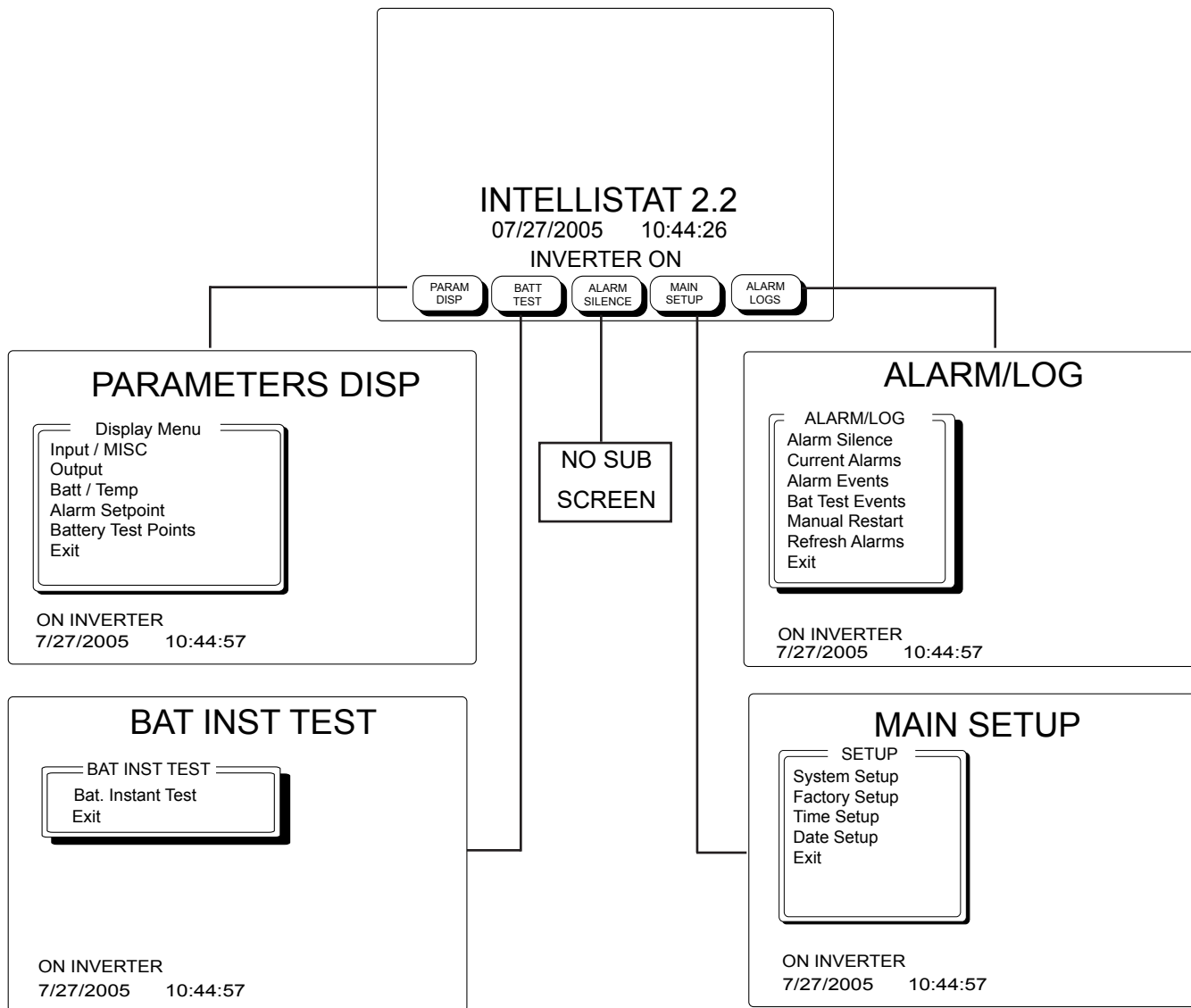


button to return to the previous menu. All other screens are cursor controlled.



## INTELLISTAT™ MONITOR OPERATION

### MAIN MENU



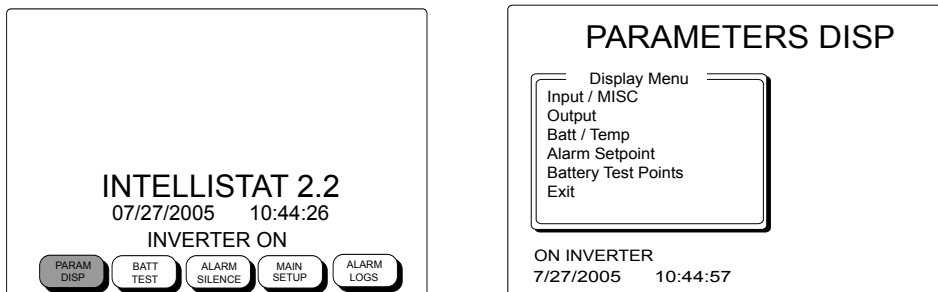
**GENERAL** - There are many keypad type screens in the following menus. Move the cursor with the directional keys to the desired number then hit the enter key in the center of the directional keys. The number selected will appear in the middle portion of the screen. Enter the next number using the same method. When the numbers desired are fully entered, select "RET" to execute the entry and move to the next screen. ESC = Go back to previous screen. CLR = Clear entire entry. DEL = Delete single digit entry.

|                                             |   |   |     |
|---------------------------------------------|---|---|-----|
| Battery Test Period<br>(1 = 30ds, 2 = 90ds) |   |   |     |
| *****                                       |   |   |     |
| 7                                           | 8 | 9 | ESC |
| 4                                           | 5 | 6 | CLR |
| 1                                           | 2 | 3 | DEL |
| 0                                           | . | - | RET |



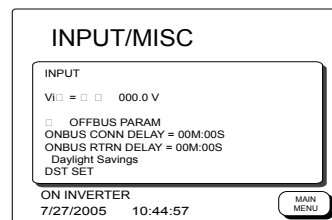
## INTELLISTAT™ MONITOR OPERATION

### PARAMETERS DISPLAY SCREEN

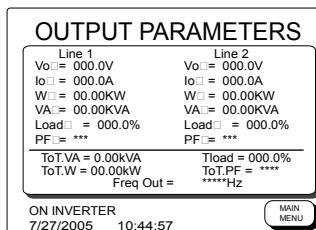


**PARAMETERS DISPLAY** - These items are for display only and are not modifiable from this menu. See “*System Setup*” and “*Operation - Main Setup - Main System Setup*”.

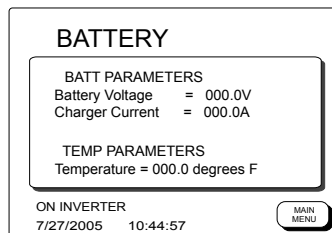
**INPUT / MISC** - Displays the Input Voltage (Vi), OFFBUS Connect Delay time and the OFFBUS Return Delay time. Also displays DST (Daylight Savings Time) information.



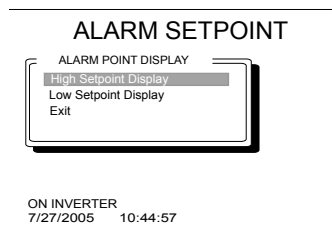
**OUTPUT** - Displays for both Line 1 and Line 2 the Output Voltage (Vo), Output Current (Io), Output Watts (W), Output VA (VA), L1 and L2 Load (Load), L1 and L2 Output Power Factor (PF). Also displays Total VA (ToT.VA), Total Watts (ToT.W), Total Load (Tload), Total Power Factor (ToT.PF), and the Output Frequency (Freq Out).



**BATT / TEMP** - Displays the battery parameters: Battery Voltage, Charger Current, and Temperature.



**ALARM SETPOINT** - This selection will drill down to another menu. This next menu will display selections for High Setpoint Display and Low Setpoint Display. Choosing “Exit” will return to the Parameters Display Menu.



Select the  button to return to the previous menu.



## INTELLISTAT™ MONITOR OPERATION

### PARAMETERS DISPLAY SCREEN CONTINUED

**HIGH SETPOINT DISPLAY** - Displays High Setpoints for Input Voltage (Vi), Output Voltage Line 1 (Vo1) and Line 2 (Vo2), Output Current Line 1 (Io1) and Line 2 (Io2), Output Watts Line 1 (Wo1) and Line 2 (Wo2), Output Volt-Amps Line 1 (VAo1) and Line 2 (VAo2), Output Frequency (Fout), Battery Voltage (Vbat), Battery Temperature (Vbat) and Charger Current (Icha). Select the Main Menu button at the bottom right of the display screen to return to the Alarm Setpoint menu.

**HI SETPOINT DISP**

|                |                |
|----------------|----------------|
| Vi = 000.0V    | Io1 = 000.0A   |
| Vo1 = 000.0V   | Io2 = 000.0A   |
| Vo2 = 000.0V   | Wo2 = 000.0KW  |
| Wo1 = 000.0KW  | VAo2 = 00.0KVA |
| VAo1 = 00.0KVA | Vbat = 000.0V  |
| Fout = 00.0Hz  | Tbat = 0.0F    |
| Icha = 000.0A  |                |

ON INVERTER  
7/27/2005 10:44:57

MAIN MENU

**LOW SETPOINT DISPLAY** - Displays Low Setpoints for Input Voltage (Vi), Output Voltage Line 1 (Vo1) and Line 2 (Vo2), Battery Voltage (Vbat), Output Frequency (Fout), Total KVA during Battery Test and the Low Line Offbus Act (%). Select the Main Menu button at the bottom right of the display screen to return to the Alarm Setpoint menu.

**ALARM SETPOINT**

ALARM POINT DISPLAY

High Setpoint Display

Low Setpoint Display

Exit

ON INVERTER  
7/27/2005 10:44:57

MAIN MENU

**EXIT** - Return to the Main Menu.

**LOW SETPOINT DISP**

|                       |           |
|-----------------------|-----------|
| Vi =                  | 000.0V    |
| Vo1 =                 | 0.0V      |
| Vo2 =                 | 0.0V      |
| Vbat =                | 0.0V      |
| Fout =                | 00.0Hz    |
| KVA Batt Test =       | 000.00KVA |
| Low Line Offbus Act = | 0.00      |

ON INVERTER  
7/27/2005 10:44:57

MAIN MENU

**BATTERY TEST POINTS** - Displays the following programmed Battery Test Parameters: Periodic Start Date (Per StartD), Periodic Start Time (Per StartT), Period in days (PbatT Cycle), Periodic Duration (PDduration), Annual Start Date (Ann StartD), Annual Start Time (Ann StartT), Annual Test Duration (AbatT Duration), and Manual Test Duration (Manual Dur). Select the Main Menu button at the bottom right of the display screen to return to the Parameters Display Menu.

**BATT TEST PARAM**

|                |             |
|----------------|-------------|
| Per StartD =   | 00 00 0000  |
| Per StartT =   | 00 00 0000  |
| PbatT Cycle =  | 30 Days OFF |
| PDduration =   | 000 Minutes |
| Ann StartD =   | 09 22 2006  |
| Ann StartT =   | 05 00 00    |
| Ann Duration = | 000 Min OFF |
| Manual Dur =   | 00 00 30    |

ON INVERTER  
7/27/2005 10:44:57

MAIN MENU

**EXIT** - Return to the Main Menu.

Select the



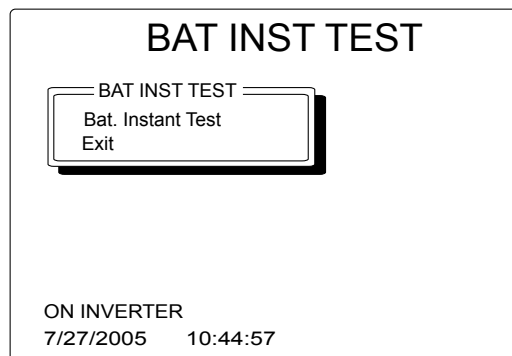
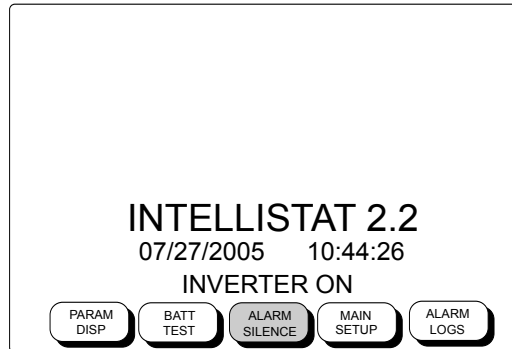
button to return to the previous menu.



## INTELLISTAT™ MONITOR OPERATION

### BATT TEST SCREEN

**BATT TEST SCREEN** - This selection will drill down to the Bat Inst Test Menu.

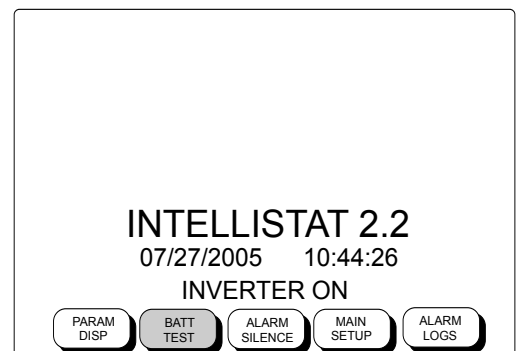


**BAT. INSTANT TEST** - Selecting the Bat. Instant Test will force the inverter into battery mode for the programmed duration. See *"Intellistat™ Monitor Operation - Main Setup - System Setup - Battery Test Menu"*.

**EXIT** - Return to the Main Menu.

### ALARM SILENCE SCREEN

**ALARM SILENCE** - This selection will silence all audible alarms. Alarm logs are stored in the ALARM LOGS Menu. See *"Intellistat™ Monitor Operation - Alarm Logs"*.

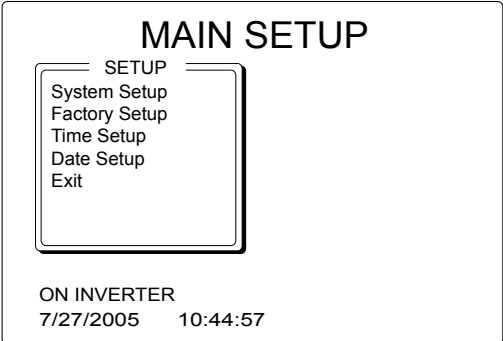




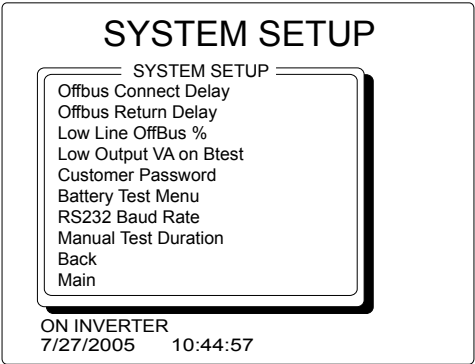
## INTELLISTAT™ MONITOR OPERATION

### MAIN SETUP SCREEN - MAIN SYSTEM SETUP

**MAIN SETUP** - Password Protected - Factory Default Customer Password is 1111. This password can be changed as required see *"Intellistat™ Monitor Operation - Main Setup - System Setup - Customer Password"*.



**MAIN SETUP** - This menu contains the following sub menus and sub menu items. The following items are all user programmable:





### INTELLISTAT™ MONITOR OPERATION

#### MAIN SETUP SCREEN - MAIN SYSTEM SETUP CONTINUED

**LOW OUTPUT VA ON BTEST** - Enter the desired Low Output VA on battery test setting. Suggested Setting = -10% of nominal load (sum of lighting load). This setting is disabled at shipment. See *“Operation - Monitor Operation - Alarm Logs - Refresh Alarms”* to clear this battery test event from the Alarm Events screen. Unit = KVA.

**CUSTOMER PASSWORD** - Enter a new customer password as desired. This will overwrite the existing factory preset password (1111).

**BATTERY TEST MENU** - This menu has the following user programmable parameters:

**AUTO TEST START DATE** - Determines the automatic test start date. Format = MM-DD-YYYY-Off/On (12-01-2006-0/1), Note: the dashes in the format are a required keypad entry. Factory Preset = Date with “off” selected (Disabled). Must set **BOTH** *“Auto Test Start Date”* and *“Auto Test Start Time”* for data to be saved.

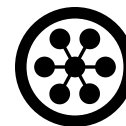
**AUTO TEST START TIME** - Determines the automatic test start time. Format = HH-MM (Military time format), Note: the dashes in the format are a required keypad entry. No factory preset. Must set **BOTH** *“Auto Test Start Date”* and *“Auto Test Start Time”* for data to be saved.

**AUTO TEST PERIOD** - Determines the automatic test frequency. 0 = Disabled, 1 = every 30 days, 2 = every 90 days. Factory default = 1 (every 30 Days).

**AUTO TEST DURATION** - Determines the duration of the automatic battery test. Format = 5. Unit = Minutes, Factory default = 5 Minutes.

**ANNUAL TEST START DATE** - Determines the annual automatic test start date. The automatic test will begin on the programmed date. The test will **not** repeat on that date the following year. Format = MM-DD-YYYY-Off/On (12-01-2006-0/1) Factory Preset = Date with “off” selected (Disabled). Note: the dashes in the format are a required keypad entry.

**ANNUAL TEST START TIME** - Determines the annual automatic test start time. The automatic test will begin on the programmed date and the time set. The test will **not** repeat on that date the following year. Format = HH-MM (Military time format), Note: the dashes in the format are a required keypad entry. No factory preset.



## INTELLISTAT™ MONITOR OPERATION

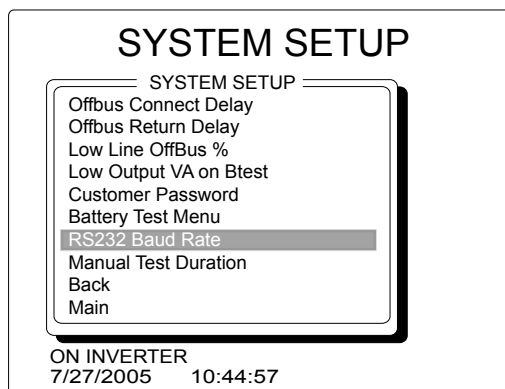
### MAIN SETUP SCREEN - MAIN SYSTEM SETUP CONTINUED

#### BATTERY TEST MENU CONTINUED

**ANNUAL DURATION** - Determines the annual automatic test duration. Format = 90. Units = Minutes, Factory default = depends on battery option purchased, 0 = Disabled.

**BACK** - Return to the Main Setup Menu.

**MAIN** - Return to the Main Menu Screen.



**RS232 BAUD RATE** - Set the desired RS232 Baud Rate. 1 = 4.8K, 2 = 9.5K, 3 = 19.2K. Factory Default = 3 (19.2K).

**MANUAL TEST DURATION** - Determines the duration of the manual battery test. Format = (HH-MM-SS). Factory default = 5 Minutes (00-05-00). Note: the dashes in the format are a required keypad entry.

**BACK** - Return to the Main Setup Menu.

**MAIN** - Return to the Main Menu Screen.



## INTELLISTAT™ MONITOR OPERATION

### MAIN SETUP SCREEN - MAIN SETUP CONTINUED

**FACTORY SETUP** - For factory use only.

The screenshot shows the 'MAIN SETUP' screen. At the top, it says 'MAIN SETUP'. Below that is a box titled 'SETUP' containing a list: 'System Setup', 'Factory Setup' (highlighted with a grey bar), 'Time Setup', 'Date Setup', and 'Exit'. At the bottom of the screen, it displays 'ON INVERTER' and the date/time '7/27/2005 10:44:57'.

**TIME SETUP** - Enter the current time and DST (Daylight Savings Time). Format = HH-MM-SS-D (14-35-05-1) (Military time format) D - Enter a 1 to enable automatic daylight Savings Time adjustment or a 0 to Disable automatic Daylight Savings Time adjustment. Note: the dashes in the format are a required keypad entry.

The screenshot shows the 'MAIN SETUP' screen. At the top, it says 'MAIN SETUP'. Below that is a box titled 'SETUP' containing a list: 'System Setup', 'Factory Setup', 'Time Setup' (highlighted with a grey bar), 'Date Setup', and 'Exit'. At the bottom of the screen, it displays 'ON INVERTER' and the date/time '7/27/2005 10:44:57'.

**DATE SETUP** - Enter the current date. Format = MM-DD-YYYY (12-01-2006), Note: the dashes in the format are a required keypad entry.

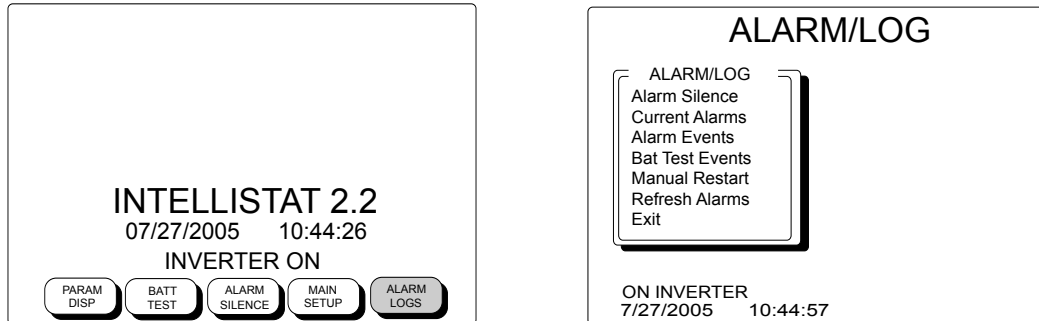
The screenshot shows the 'MAIN SETUP' screen. At the top, it says 'MAIN SETUP'. Below that is a box titled 'SETUP' containing a list: 'System Setup', 'Factory Setup', 'Time Setup', 'Date Setup' (highlighted with a grey bar), and 'Exit'. At the bottom of the screen, it displays 'ON INVERTER' and the date/time '7/27/2005 10:44:57'.

**EXIT** - Return to the Main Menu.



## INTELLISTAT™ MONITOR OPERATION

### ALARM LOG SCREEN



**ALARM/LOG** - This selection will drill down to the Alarm/Log Menu.

**ALARM SILENCE** - This selection will silence any current audible alarms.

**CURRENT ALARMS** - This selection will drill down to the Alarm Information screen.

**ALARM EVENTS** - This selection will drill down to the Alarm Events screen.

**BAT TEST EVENTS** - This selection will drill down to the Battery Test Events screen.

**MANUAL RESTART** - Used to manually restart the system after an Emergency Power Off (E.P.O.) or low battery shutdown signal.

**REFRESH ALARMS** - Resets the audible alarms, MUST be used to clear “Low VA on Bat Test” indication.

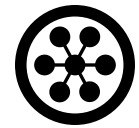
**EXIT** - Return to the Main Menu screen.



### INTELLISTAT™ MONITOR OPERATION

#### ALARM MESSAGES AND DEFINITIONS

1. **High Output KWatts Tot** – Total output watts are above the total rated watts.
2. **High Output KVA Tot** – Total output volt-amps are above the total rated volt-amps.
3. **High Vin** – Vin is 10% above Vin nominal.
4. **Low Vin** – Vin is 20% below Vin nominal.
5. **LO VA Out On Batt** – During a battery test, if output VA falls below the low VA threshold, this alarm is triggered.
6. **High Vout1** – Vout1 is above high Vout1 threshold.
7. **Low Vout1** – Vout1 is below the low Vout1 threshold.
8. **High Vout2** – Vout2 is above the high Vout2 threshold.
9. **Low Vout2** – Vout2 is below the low Vout2 threshold.
10. **High Iout1** – Iout1 is above the high Iout1 threshold.
11. **High Iout2** – Iout2 is above the high Iout2 threshold.
12. **High KWout L1** – KW one Line 1 is above the high KWout threshold.
13. **High KWout L2** - KW one Line 2 is above the high KWout threshold.
14. **High KVAout L1** - KVA one Line 1 is above the high KVAout threshold.
15. **High KVAout L2** - KVA one Line 2 is above the high KVAout threshold.
16. **High Freq Out** – Output frequency is above 63 Hz.
17. **Low Freq Out** – Output frequency is below 57 Hz.
18. **High Icharge** – Charger current is above high charge current threshold.
19. **High Vbat** – Battery voltage is above high battery voltage threshold.



## INTELLISTAT™ MONITOR OPERATION

### ALARM MESSAGES AND DEFINITIONS

- 20. Low Vbat** – Battery voltage is below low battery voltage threshold.
- 21. Battery High Temp** – Battery temperature is above the high battery temperature threshold.
- 22. Low Battery Shutdown** – Unit shutdown due to the batteries being run down too low.
- 23. Manual Restart** – a Manual Restart was/is required.
- 24. System on Manual Bypass** – The system has been placed on manual bypass.
- 25. External Offbus Active** – The offbus was/is activated externally.
- 26. System on Battery** – The system is currently running on battery power.
- 27. User REPO** – There was a User Remote Emergency Power Off.
- 28. Output Circuit Breaker Open** – One or more output circuit breakers are open.
- 29. DC Charger Fail/DC Open** – Charger fuse open.
- 30. Low Battery Warning!** – Battery Voltage is below Low Battery Voltage threshold.
- 31. XFM Overtemp Warning** – The power transformer temperature is currently above 180 degrees C.
- 32. UnderV/Overtemp Shutdown!** – The unit shutdown due to either an Output under voltage condition or an over temperature on either the heatsink or the transformer shutdown. The over temperature threshold is 200 degrees for the transformer and 180 degrees for the heatsink. The Under Voltage threshold is roughly 60 volts.
- 33. Low Line Offbus Activate** – The off bus was/is activated due to a low line condition.



## BYPASS SWITCH OPERATION

The purpose of the bypass switch is to connect the loads to utility power in case of inverter failure. The bypass is a manual turn mechanical switch.



\*\*\*\*\* CAUTION \*\*\*\*\*

**DO NOT SWITCH IF THE INVERTER IS ON BATTERY.**



\*\*\*\*\* CAUTION \*\*\*\*\*

**NOT A MAINTENANCE BYPASS.  
INTERNAL HIGH VOLTAGES PRESENT WHEN IN BYPASS.**



**Switching the Inverter to bypass mode.**

1. Turn the bypass switch clockwise to the “Bypass” position.

**Switching back to normal mode.**

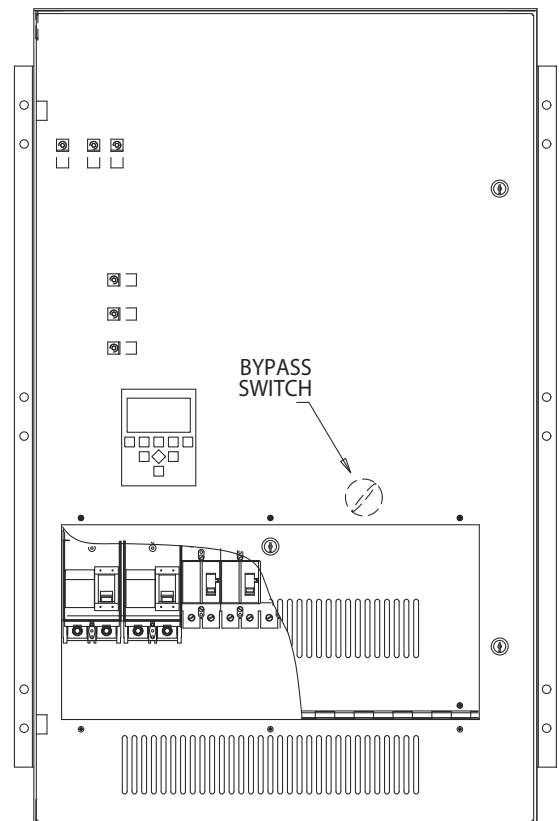
1. Turn the bypass switch counter clockwise to the “Normal” position.

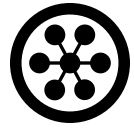


**After switching to bypass mode, it is recommended that the DC Circuit Breaker be turned “OFF” (open). This will prevent battery discharge and possible battery damage if left in bypass mode for extended periods of time.**

**Be sure to turn the DC Circuit Breaker back “ON” (closed) before returning to normal mode operation.**

**Typical bypass location for all inverter sizes.**





## \*\*\*WARNING\*\*\*



**THE INVERTER RECEIVES POWER FROM MORE THAN ONE SOURCE. BE SURE ALL UTILITY CIRCUIT BREAKERS ARE IN THE OFF POSITION AND THE BATTERY CONNECTOR IS UNPLUGGED BEFORE SERVICING.**

## GENERAL MAINTENANCE

The best preventive maintenance is to operate the Model ELS Inverter in a clean environment with proper ventilation and no restriction on air intakes and cooling fan outputs.

Battery connections should be tightened annually by qualified electrical personnel. Batteries should be replaced every 5 years.

The inverter should be checked monthly on battery operation. The Intellistat<sup>™</sup> monitor can be programmed to perform this function automatically. See “*Operation - Intellistat<sup>™</sup> Monitor Operation*”. Take precautions to have the load in a mode that could tolerate a shut down. To simulate a utility power loss, simply select the Instant Battery test menu on the Intellistat<sup>™</sup> Monitor, this will force the inverter into battery mode for the programmed duration. Observe the display monitor. Select the Alarm Logs/Bat Test Events menu on the monitor to see the results of the test.

## COMPLETE MAINTENANCE CHECK

### PREPARATION

A shutdown period must be scheduled to perform maintenance unless the system is equipped with a “Maintenance Bypass” switch. A load should be available to test the inverter with a loss of power simulation.

### EQUIPMENT

Digital multimeter, wire brush or other cleaning device (for battery connections), insulated tools (for battery connections), and safety glasses.

### SYSTEM OPERATION

1. With power on, check the display functions for proper operation.
2. Turn AC and DC breakers off.

### INSPECTION

1. Open the front door on the inverter cabinet. Make sur input power has been turned off.
2. Disconnect the battery connector. See “*Appendix A - Component Location Diagram*” for location.
3. Turn off any loads on the inverters output.



## PREVENTIVE MAINTENANCE CONTINUED

### VISUAL INSPECTION

1. Check for loose connections, burnt, frayed or broken wires. Look closely in the following areas:  
  
Input, output connections, circuit breaker, transformer connections, capacitor connections, fan connections, by-pass switch and electronic connections, inverter components and power semi-conductors connections. See *"Appendix A - Component Location Diagram"*.
2. Correct any loose connections etc.... Replace any physically burned or broken components. Use extreme care when replacing components to assure correct installation.

**NOTE:** Check off all items on the Performance Checklist

### BATTERY TEST



**Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.**

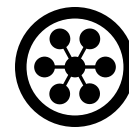


1. Visually inspect all battery connections. If there is any sign of corrosion, disconnect that battery and clean with a wire brush. Tighten all other battery connections. Make sure the batteries are not swollen or cracked. If they are, contact the factory.
2. Reconnect DC battery connector.
3. Check **all** circuit board connections are securely plugged in.
4. Turn AC and DC breakers on. Let the unit run for a minute.
5. Verify the battery voltage on the Intellistat™ Monitor by selecting Param Disp - Battery. Note the battery voltage, charger current and backup percentage. You can verify the actual battery voltage by measuring the DC voltage across the DC Circuit Breaker.
6. Once the unit is up and running, turn off the DC Breaker which will take the batteries out of the circuit, and the unit will be running on the internal charger. If the unit does not continue to run with the DC breaker off, then there is a problem with the charger. Contact the factory. Check float voltage by placing a DC voltmeter across the positive (K1 - pin 1 labeled V1) and negative wires (K1 - Pin 3 labeled V3) on the 404563 (Switch Mode Power Supply). See *"Appendix A - Component Location Diagram"* for board location. If not, allow batteries to charge and re-check float voltage. If float voltage is incorrect, adjust potentiometer P3 on control board #417622 (see *"Float Voltage Matrix"* below). See *"Appendix A - Component Location Diagram"* for board location.

FLOAT VOLTAGE MATRIX

| DC VOLTAGE<br>(CHARGER OFF) | NUMBER OF<br>BATTERIES | BATTERY FLOAT<br>VOLTAGE<br>(CHARGER ON) |
|-----------------------------|------------------------|------------------------------------------|
| 48 V                        | 4                      | 54.5                                     |
| 96 V                        | 8                      | 109                                      |
| 120 V                       | 10                     | 136                                      |

# PREVENTIVE MAINTENANCE CONTINUED



## GENERATOR TEST

1. If generator is backing the inverter, check to be sure the inverter operates properly with the generator.
  - A. Check generator operation with no load. Unit should switch to inverter when generator turns on. After a minute or so, the inverter should switch back to normal mode and run off the generator. Record inverter output voltage on Performance Checklist.
  - B. Check generator with loads. Follow same steps stated above and record readings on Performance Checklist.

**NOTE:** Check all items on the Performance Checklist.

## BATTERY TESTING

Both the automatic and the manual battery tests are factory preset at 5 minutes. Refer to “*Operation*” for instructions on re-programming the battery test parameters.

**PREPARATION** - Proper precautions must be taken when performing battery testing. The load(s) should be available to test on inverter, in a loss of power simulation. Be sure also to take precautions to have the load in a mode that could tolerate a shut down. If the battery test fails the system may shutdown and all of the loads connected to it will lose power.

It is recommended that batteries are periodically inspected for corroded and loose connections. Battery connections should be tightened annually by qualified electrical personnel. Batteries should be checked as indicated by monthly battery testing.

### AUTOMATIC BATTERY TEST

**GENERAL** - The inverter is preset at the factory for automatic monthly testing. Each test is 5 minutes in duration and takes place on the programmed calendar date. During this time, the battery discharge rate is evaluated to determine the health of the battery string. Since the inverter is operating from battery power during the 5 minute test, a general alarm condition will be indicated in the Alarm Log.

If the health of the battery string is suspect, a general alarm will exist on the Intellistat™ monitor and the general alarm will continue to exist after the battery test is complete. By scrolling to the “Current Alarms” screen on the Intellistat™ Monitor a “Low Battery Voltage” indication will be displayed. There will also be an “Inverter Test Fail” listed under the “Bat Test Events” screen. A contact closure signal is also provided as a result of the general alarm status. The general alarm signal may be used for external / remote communications. See “*Communications*” for details.



# PREVENTIVE MAINTENANCE CONTINUED

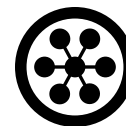
## BATTERY TESTING CONTINUED

### MANUAL BATTERY TEST

**GENERAL** - The inverter is preset at the factory for 5 minute manual testing. During this time, the battery discharge rate is evaluated to determine the health of the battery string. Since the inverter is operating from battery power during the 5 minute test, a general alarm condition will be indicated in the Alarm Log.

1. On the Intellistat™ Monitor, select “Batt Test” from the Main Menu. Select “Bat Inst Test”. This will force the inverter into battery mode for the programmed duration. Since the inverter is operating from battery power during the manual battery test, a general alarm condition will be indicated in the Current Alarms and Bat Test Events logs.
2. The unit will stay in battery mode for five minutes (factory preset), or the duration programmed by the user then return to normal mode.
3. If the health of the battery string is suspect, a general alarm will exist on the Intellistat™ monitor and the general alarm will continue to exist after the battery test is complete. By scrolling to the “Current Alarms” screen on the Intellistat™ Monitor a “Low Battery Voltage” indication will be displayed. There will also be an “Inverter Test Fail” listed under the “Battery Test Events” screen. A contact closure signal is also provided as a result of the general alarm status. The general alarm signal may be used for external / remote communications. See “Communications” for details.

# PERFORMANCE CHECKLIST



## ELS INVERTER PERFORMANCE CHECKLIST

1. Comments or problems with Inverter \_\_\_\_\_
2. Display Functions \_\_\_\_\_ Cabinet Cooling Fans \_\_\_\_\_  
Transformer Cooling Fans \_\_\_\_\_ Inverter Cooling Fans \_\_\_\_\_
3. Electrically wired properly i.e..Bypass switch, breakers, ground \_\_\_\_\_
3. Verify input and output voltage. Compare with spec. tag \_\_\_\_\_
5. Test any emergency shutoff devices REPO \_\_\_\_\_
6. Check tightness of electrical connections.-Bypass Switch \_\_\_\_\_ Input Connections \_\_\_\_\_  
Output Connections \_\_\_\_\_ Heat Sink Assembly \_\_\_\_\_ Fan Motor \_\_\_\_\_  
Circuit Board Connections \_\_\_\_\_ Resonant Capacitors \_\_\_\_\_ Battery Connections \_\_\_\_\_  
Main Battery Connector \_\_\_\_\_
7. Inverter environment clean and dust free. Yes \_\_\_\_\_ No \_\_\_\_\_  
If no, explain condition \_\_\_\_\_
8. Battery charger voltage level. \_\_\_\_\_ VDC. Battery charger current shunt level \_\_\_\_\_ Milli VDC
9. NO LOAD ON LINE AVAILABLE LOAD ON LINE  

Input Voltage \_\_\_\_\_ VAC  
Output Voltage L1 to L2 \_\_\_\_\_ VAC  
L1 to N \_\_\_\_\_ VAC L2 to N \_\_\_\_\_ VAC  
L3 to N \_\_\_\_\_ VAC L1 to L3 \_\_\_\_\_ VAC

Input Voltage \_\_\_\_\_ VAC  
Output Voltage L1 to L2 \_\_\_\_\_ VAC  
L1 to L3 \_\_\_\_\_ VAC  
Input Current \_\_\_\_\_ Amps  
Output Current \_\_\_\_\_ Amps
10. INVERTER NO LOAD TEST INVERTER FULL LOAD TEST  

Output Voltage L1 to L2 \_\_\_\_\_ VAC  
L1 to N \_\_\_\_\_ VAC L2 to N \_\_\_\_\_ VAC  
L1 to L3 \_\_\_\_\_ VAC L3 to N \_\_\_\_\_ VAC  
Output Frequency \_\_\_\_\_ HZ

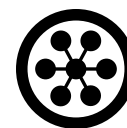
Output Voltage L1 to L2 \_\_\_\_\_ VAC  
L1 to N \_\_\_\_\_ VAC L2 to N \_\_\_\_\_ VAC  
L3 to N \_\_\_\_\_ VAC L1 to L3 \_\_\_\_\_ VAC  
Output Current \_\_\_\_\_ Amps  
Output Frequency \_\_\_\_\_ Hz
11. BATTERY VOLTAGE (Record actual voltage of each battery while on battery power with loads connected).  
Battery Type \_\_\_\_\_ Amp Hour Rating \_\_\_\_\_  

| No Load | With Load | No Load | With Load | No Load | With Load |
|---------|-----------|---------|-----------|---------|-----------|
| _____   | _____     | _____   | _____     | _____   | _____     |
| _____   | _____     | _____   | _____     | _____   | _____     |
| _____   | _____     | _____   | _____     | _____   | _____     |
| _____   | _____     | _____   | _____     | _____   | _____     |
| _____   | _____     | _____   | _____     | _____   | _____     |
| _____   | _____     | _____   | _____     | _____   | _____     |
| _____   | _____     | _____   | _____     | _____   | _____     |
| _____   | _____     | _____   | _____     | _____   | _____     |
| _____   | _____     | _____   | _____     | _____   | _____     |
| _____   | _____     | _____   | _____     | _____   | _____     |
12. GENERATOR CHECK A. No load on GEN-Output= \_\_\_\_\_ VAC. B. Invert on GEN-Output= \_\_\_\_\_ VAC. Does inverter return to normal when on generator\_ Yes \_\_\_\_\_ No. \_\_\_\_\_  
Generator Frequency \_\_\_\_\_ Hz.
13. Run time annual certification \_\_\_\_\_ 90 Min. @ Full Load \_\_\_\_\_ Time @ Actual Load \_\_\_\_\_



## GENERAL TROUBLESHOOTING

| PROBLEM                                   | PROBABLE CAUSE                           | SOLUTION                                                              |
|-------------------------------------------|------------------------------------------|-----------------------------------------------------------------------|
| NO OUTPUT WHEN UTILITY POWER FAILS        | DEFECTIVE CONTROL CIRCUITS.              | CONTACT FACTORY.                                                      |
|                                           | DEFECTIVE BATTERY.                       | CHECK WIRING AND TEST BATTERIES.                                      |
|                                           | UNIT IN BYPASS MODE.                     | CHECK "BY PASS" SWITCH.                                               |
|                                           | DC BREAKER TRIPPED.                      | RESET DC BREAKER.                                                     |
|                                           | BATTERIES WEAK.                          | ALLOW BATTERIES TO CHARGE 24 HOURS AND TEST INVERTER.                 |
| INVERTER SHUTS OFF OR OVERTEMPS           | AIR INTAKE BLOCKED.                      | CLEAN INTAKES.                                                        |
|                                           | EXHAUST FANS BLOCKED.                    | CHECK FOR PROPER CLEARANCE, CLEAN EXHAUST.                            |
|                                           | DEFECTIVE FANS                           | REPLACE DEFECTIVE FANS.                                               |
|                                           | ROOM TEMPERATURE TOO HOT.                | CHECK OPERATING SPECIFICATIONS.                                       |
|                                           | UNIT OVERLOADED.                         | VERIFY OUTPUT RATINGS.                                                |
| NO OUTPUT AT START UP                     | OUTPUT BREAKER OPEN OR OUTPUT FUSE OPEN. | CHECK BREAKER OPERATION AND TEST OR REPLACE FUSE.                     |
|                                           | WRONG INPUT VOLTAGE.                     | VERIFY INPUT VOLTAGE AND SELECTOR SWITCH SW2.                         |
|                                           | DEFECTIVE FANS.                          | VERIFY SOURCE FEEDING THE INVERTER.                                   |
|                                           | DEFECTIVE BATTERY.                       | TEST BATTERIES.                                                       |
|                                           | SHORTED OUTPUT.                          | DISCONNECT OUTPUTS AND RESTART UNIT.                                  |
|                                           | DEFECTIVE INVERTER COMPONENTS.           | CONTACT FACTORY.                                                      |
|                                           | DEFECTIVE CONTROL CIRCUITS.              | CONTACT FACTORY.                                                      |
|                                           | AC OR DC BREAKER OFF.                    | TURN ON BOTH AC AND DC BREAKERS.                                      |
|                                           | BATTERY CABLE NOT CONNECTED.             | CONNECT BATTERY CONNECTOR                                             |
| INVERTER WILL NOT RETURN TO UTILITY POWER | INPUT VOLTAGE OR FREQUENCY OUT OF SPEC.  | VERIFY INPUT SPECS., SELECT ALTERNATE SLEW RAT.                       |
|                                           | DEFECTIVE CONTROL CIRCUITS.              | CONTACT FACTORY.                                                      |
|                                           | INADEQUATE SOURCE.                       | VERIFY SOURCE FEEDING INVERTER IS ADEQUATE.                           |
|                                           | AC BREAKER TRIPPED.                      | RESET AC BREAKER.                                                     |
| SHORT BATTERY BACK-UP TIME                | BATTERY DISCONNECTED.                    | CHECK BATTERY CONNECTIONS.                                            |
|                                           | BATTERY NOT CHARGING.                    | CHECK BATTERY FLOAT VOLTAGE.                                          |
|                                           | OPEN CHARGER FUSE.                       | CHECK FUSE F1 ON CHARGER BOARD.                                       |
|                                           | DEFECTIVE BATTERY.                       | TEST BATTERIES.                                                       |
|                                           | BATTERY NOT CHARGED.                     | ALLOW BATTERIES TO CHARGE FOR 24 HOURS.                               |
|                                           | UNIT OVERLOADED.                         | CHECK % LOAD DISPLAY AND REDUCE LOAD.                                 |
| INVERTER ALARMS OCCASIONALLY              | NORMAL.                                  | INVERTER IS PROTECTING EQUIPMENT FROM MOMENTARY SAGS AND/OR SURGES.   |
|                                           | INTERMITTENT ALARM.                      | MONITOR TYPE AND FREQUENCY OF ALARM, TAKE ACTION ON PARTICULAR ALARM. |
| UNIT OPERATES BUT DROPS LOADS             | COMMUNICATIONS ERROR.                    | CHECK INTERFACE CABLES FOR CONTINUITY / TEST COMMUNICATIONS SIGNALS.  |
|                                           | OUTPUT BREAKER TRIPPED OR FUSE OPEN.     | RESET OUTPUT BREAKER AND TEST OUTPUT FUSE.                            |
|                                           | UNIT OVERLOADED.                         | CHECK % LOAD DISPLAY AND REDUCE LOAD.                                 |



**This Warranty applies only to the original purchaser who must properly register the product within thirty (30) days of receipt.**

**<https://controlledpwr.com/customer-support/warranty-registration/>**

Controlled Power Company warrants that our products and their components will remain free from defects in material and workmanship for the duration of the respective warranty period\* from the date of shipment and agrees to replace, F. O. B. its factory, any parts which fault through defect in material or workmanship during such period. Non payment for the product to either the reseller, rep, distributor or the factory direct will result in revocation of warranty, technical support and service contracts. **Warranty begins from date of shipment unless a factory Start-Up Plus is purchased, then the warranty begins from date of Start Up or 90 days from ship date; whichever comes first.**

If a Start-Up Plus is purchased with the unit(s) or within 30 days from original ship date, the 1st year warranty is upgraded to include onsite labor and expenses during normal business hours (Monday - Friday, 8AM - 4PM). Start-Up Plus includes all travel and living expenses. Start-Up Plus description: Testing all emergency circuitry - Calibration - Inspection - Exercising all circuit breakers - Cooling fan check - Input and output parameter check - Air intake / exhaust check - Complete battery inspection and testing (where applicable) - Re-torque all high current terminals - Battery certification report (where applicable) - Input/Output verification - Written report. User training to be done at time of start up (no return visits). Product installation is required to be complete before start up can be scheduled.

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#### Products:

- UPS Systems (ELS) / 1 Year parts only\*, Batteries are prorated when enrolled in a customer support plan.

\* From original shipment date / Excludes on site labor and expenses unless otherwise noted.

- 
1. This Warranty shall be effective only if and so long as the system is installed and operated in the manner specified in the manual which accompanied the product, and is operated within the ratings on the nameplate of the system.
  2. This Warranty shall be effective provided the purchaser pays the cost of transporting the faulty component(s) to and from Controlled Power Company's factory at the purchaser's own expense, unless the item covered under service contract with Controlled Power Company. There is no cost for installation of the replacement component(s) when done at the factory. Otherwise installation of the replacement component(s) are the responsibility of the purchaser, unless the item is covered under service contract with Controlled Power Company. If after inspection the faulty component has been caused by misuse or abnormal conditions in the judgment of Controlled Power Company, the purchaser will be charged for repairs based on parts and labor required. This Warranty does not cover fuses, light bulbs, and other normally expendable items. Controlled Power Company service personnel are not included in this warranty unless covered by a Controlled Power Company service contract.
  3. This Warranty shall be void if any alteration is made to the system, or any of its components are altered by anyone other than an authorized Controlled Power Company service person, without the written permission of Controlled Power Company.
  4. This Warranty is in lieu of all other warranties, expressed or implied. Controlled Power Company neither assumes, nor authorizes any person to assume for it, any liability other than that specifically set forth in this Warranty. Except for its obligations, Controlled Power Company assumes no liability or responsibility for personal injury, loss of life, consequential or other damages resulting from defects in, or failure of, the system or any of its components.

**<https://controlledpwr.com/customer-support/warranty-registration/>**



# CUSTOMER SUPPORT

## Contact Controlled Power Company.

### CONTROLLED POWER COMPANY NATIONWIDE CUSTOMER SUPPORT

Controlled Power Company offers total Customer Support that assures your critical equipment is maintained properly for trouble free operations.

#### WHAT A CUSTOMER SUPPORT PLAN OFFERS:

**Hotline:** 24 hour toll free 1-800-521-4792.

**Response Time:** Immediate 24 hour phone support. If problem is not solved Controlled Power will make every effort to have your system running within 48 hours.

**Batteries:** Battery changes, installation, freight, travel and disposal are covered under a 48 month pro-rate schedule when enrolled in a service plan, beginning from the original date of shipment or battery installation date. Batteries are not covered if they were not supplied by Controlled Power Company.

**Preventative Maintenance:** Scheduled preventative maintenance includes the following:

- Inspection
- Exercising all circuit breakers
- Input and output parameter check
- Complete battery inspection and testing
- Re-tighten all high current terminals and connectors
- Testing all emergency circuitry
- Calibration
- Clean internal and external
- Written report

**Start-up (optional):** Includes installation inspection (wired properly, location, environment), Unit inspection (internal and external), Unit power up, Operation verification including options. One visit, includes all travel expenses.

| PLAN     | ON SITE COVERAGE | PARTS COVERED | FIELD REPAIR LABOR COVERED | FACTORY REPAIR LABOR COVERED | FREIGHT COVERED | TRAVEL EXPENSES COVERED |
|----------|------------------|---------------|----------------------------|------------------------------|-----------------|-------------------------|
| SILVER   | NONE             | YES           | NO                         | YES                          | NO              | NO                      |
| GOLD     | M-F 8AM-4PM      | YES           | YES                        | YES                          | YES             | YES                     |
| PLATINUM | 24-7             | YES           | YES                        | YES                          | YES             | YES                     |

#### TRAINING AND PARTS

For Customers who maintain their own equipment, Controlled Power offers hands on training at our training facility and part kits. For more information, contact Controlled Power Customer Support Department at 1-800-521-4792.

Individual components are available upon request, please contact the factory for specific part numbers and prices. See "Appendix A - Component Location Diagrams" for component location and description. When contacting the Parts Department, please have the unit's full model number and serial or system number. Call 1-800-521-4792.



# **APPENDIX A**

**RELATIVE DRAWINGS**

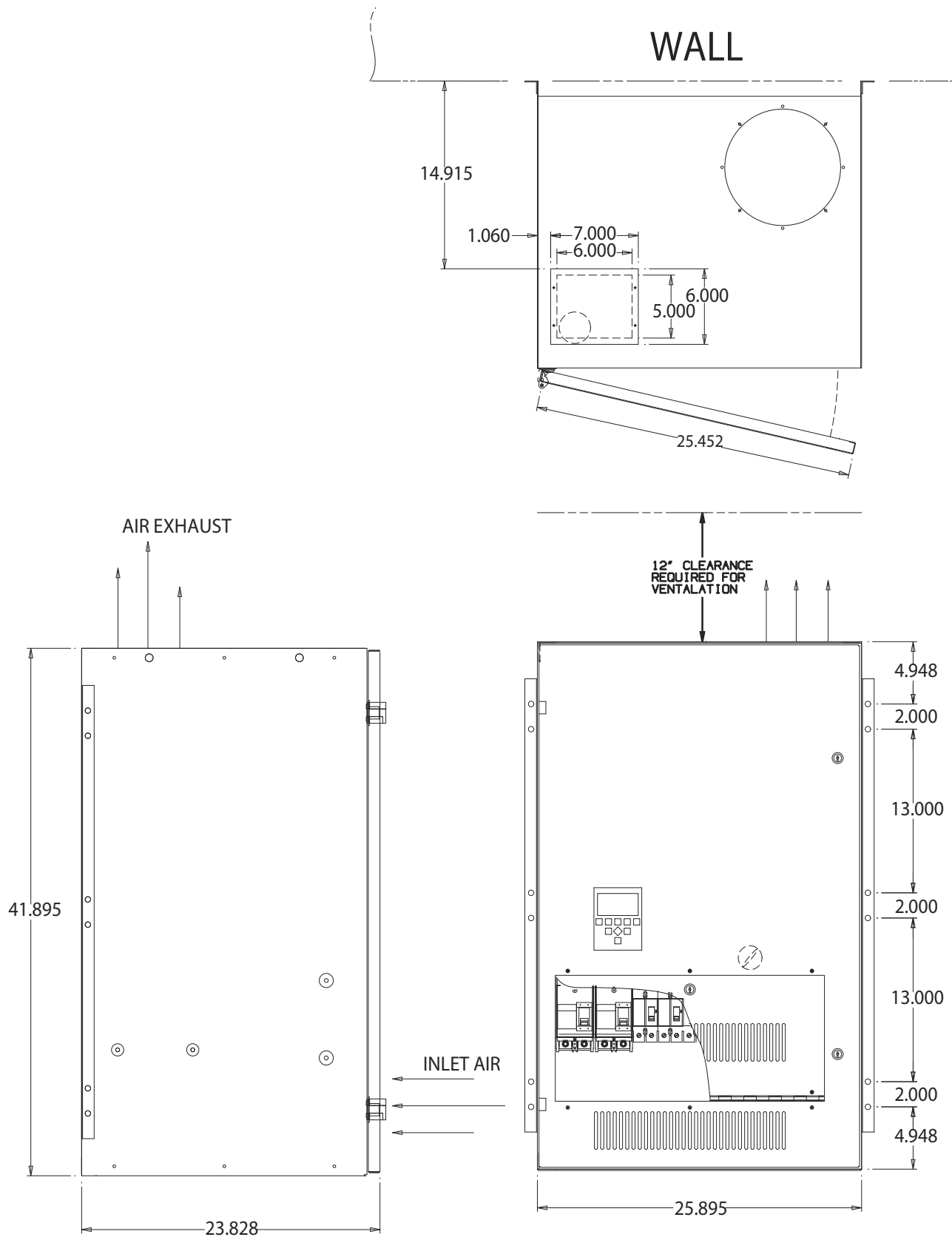
**&**

**SCHEMATICS**



# CABINET OUTLINE

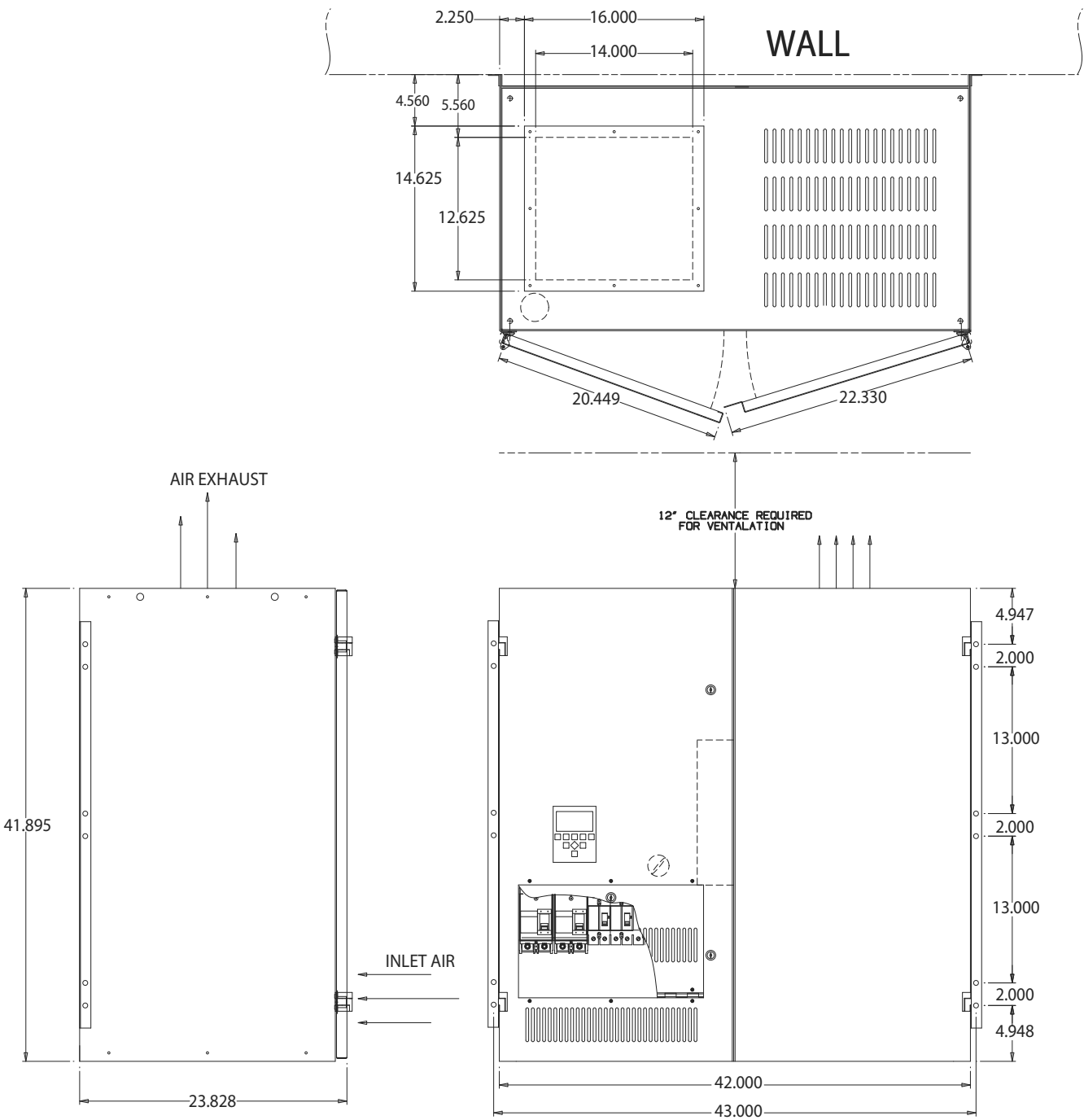
## SMALL INVERTER CABINET OUTLINE 2KW - 5.3KW



# CABINET OUTLINE



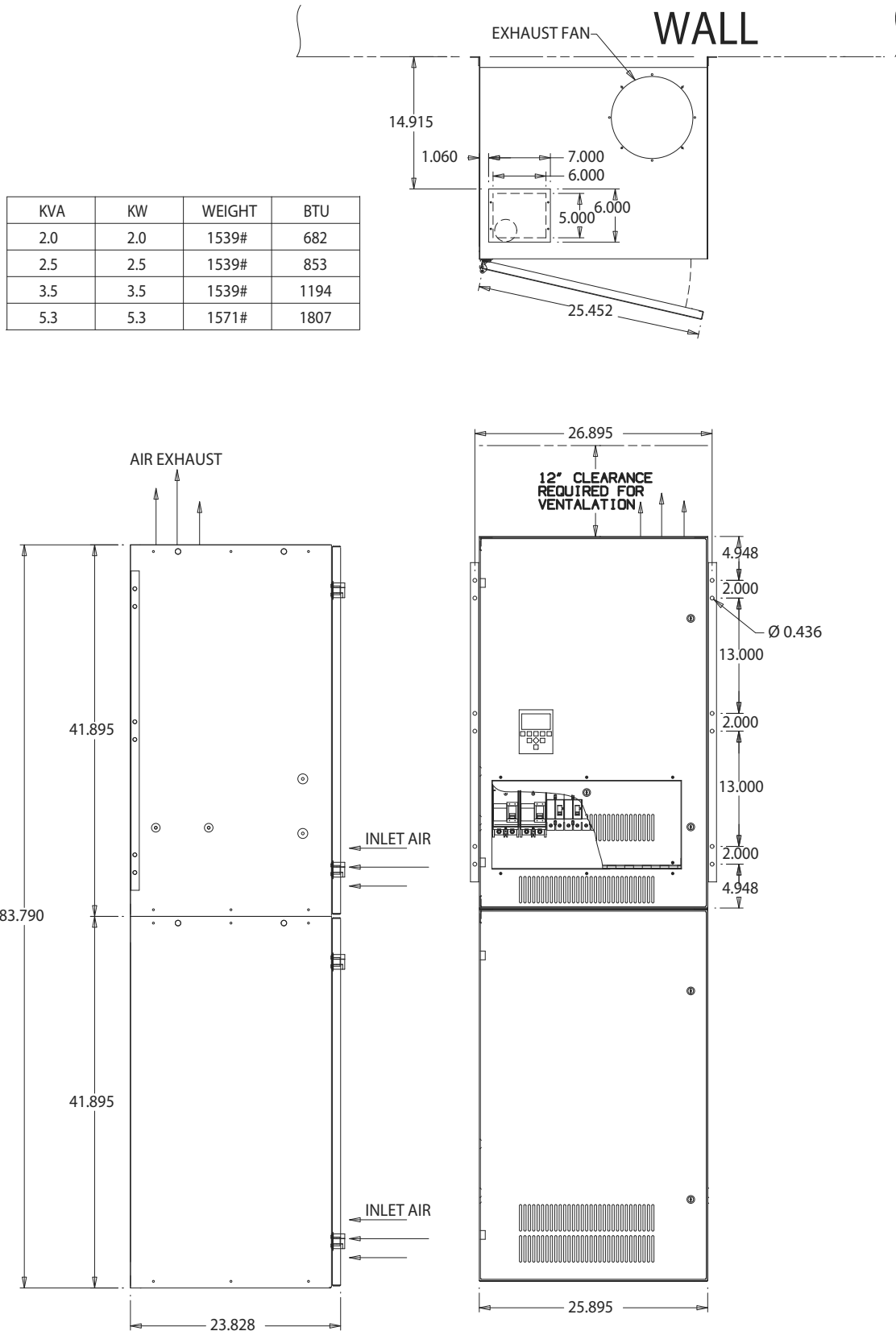
## LARGE INVERTER CABINET OUTLINE 7.5KW - 18KW





# CABINET OUTLINE

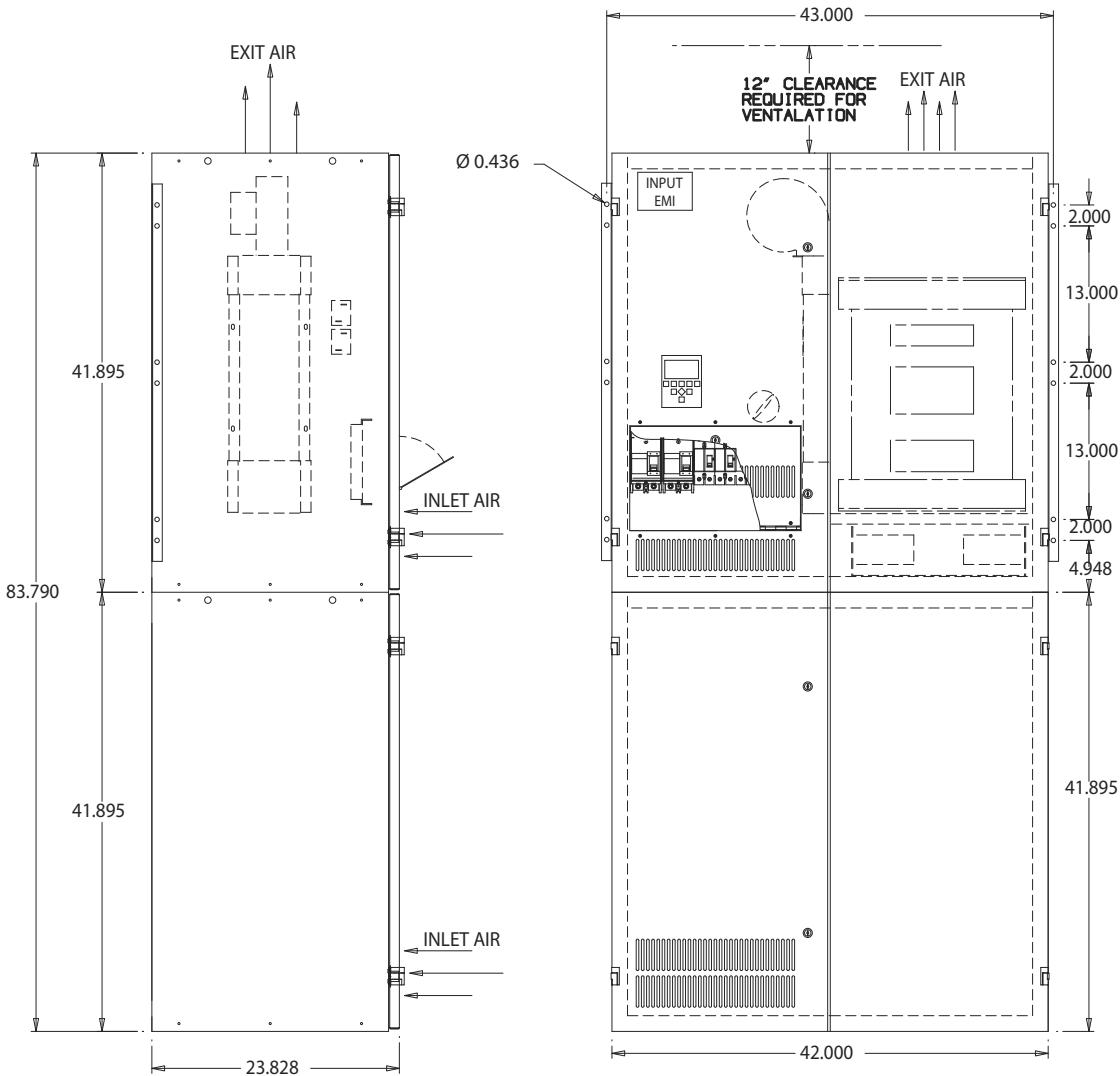
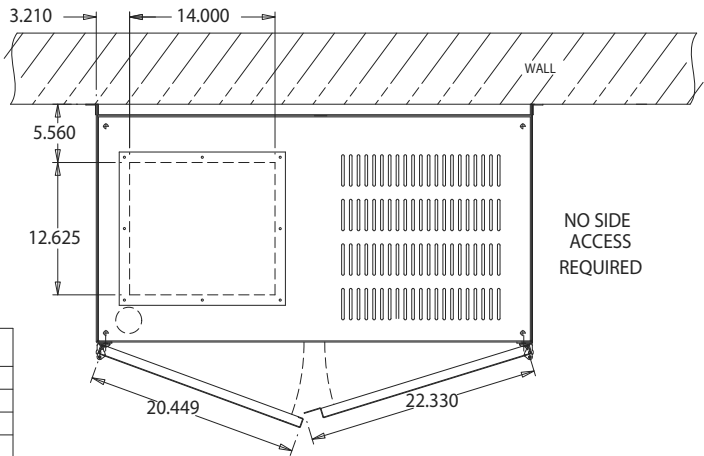
## SMALL INVERTER WITH SMALL BATTERY CABINET OUTLINE





## LARGE INVERTER WITH LARGE BATTERYCABINET OUTLINE

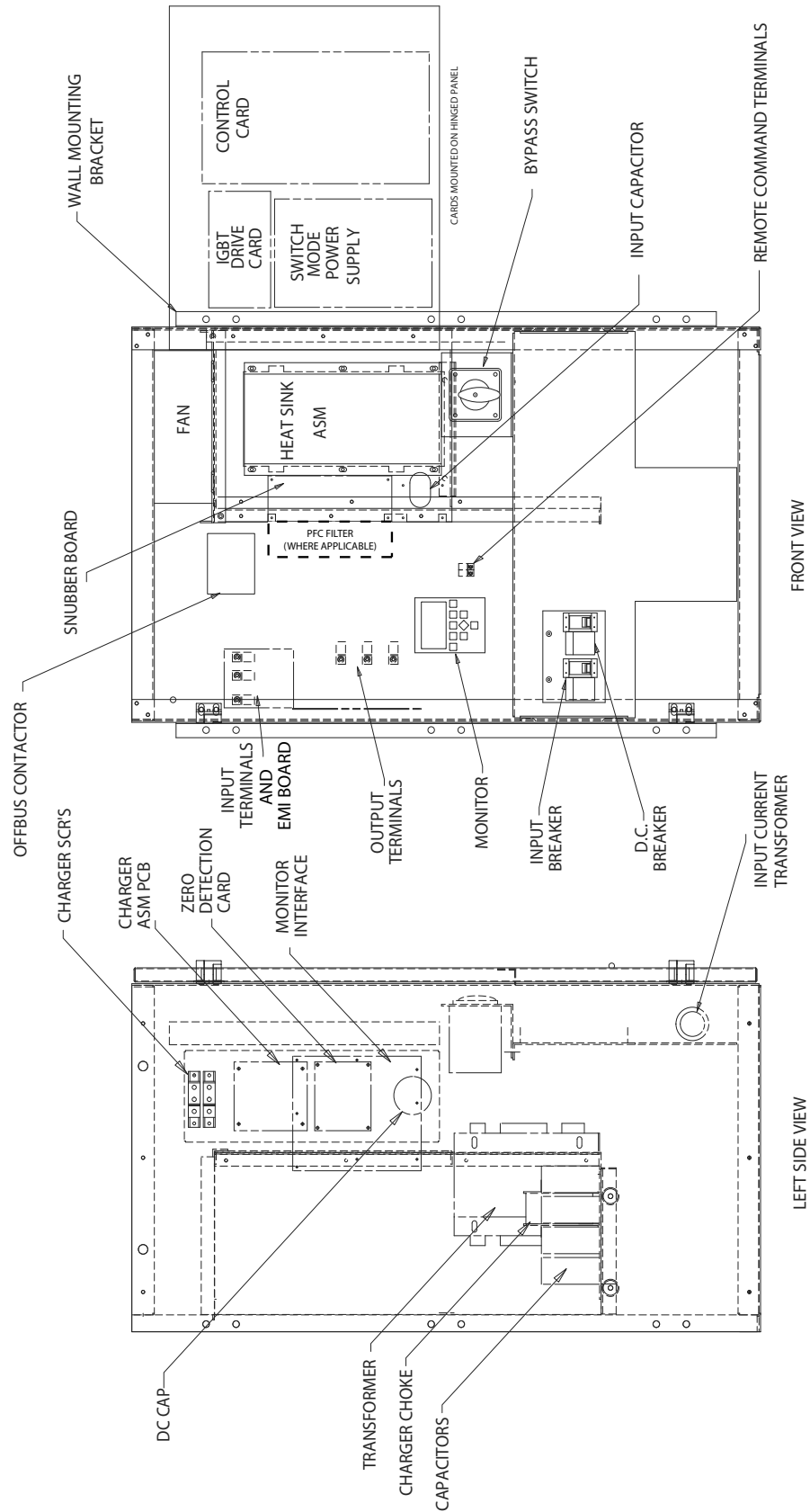
| KVA  | KW   | INVERTER WEIGHT | 30 MIN BATTERY WEIGHT | 60 MIN BATTERY WEIGHT | 120 MIN BATTERY WEIGHT | BTU  |
|------|------|-----------------|-----------------------|-----------------------|------------------------|------|
| 7.5  | 7.5  | 690#            | 822#                  | 1488#                 | 2063#                  | 2558 |
| 8.5  | 8.5  | 690#            | 992#                  | 1488#                 | 2063#                  | 2889 |
| 10   | 10   | 792#            | 1156#                 | 1771#                 | N/A                    | 3410 |
| 12.5 | 12.5 | 792#            | 1078#                 | 1974#                 | N/A                    | 4263 |
| 14.5 | 14.5 | 792#            | 1550#                 | 2156#                 | N/A                    | 4945 |
| 16   | 16   | 930#            | 1550#                 | N/A                   | N/A                    | 5456 |
| 18   | 18   | 930#            | 1974#                 | N/A                   | N/A                    | 6138 |





# COMPONENT LOCATION DIAGRAM

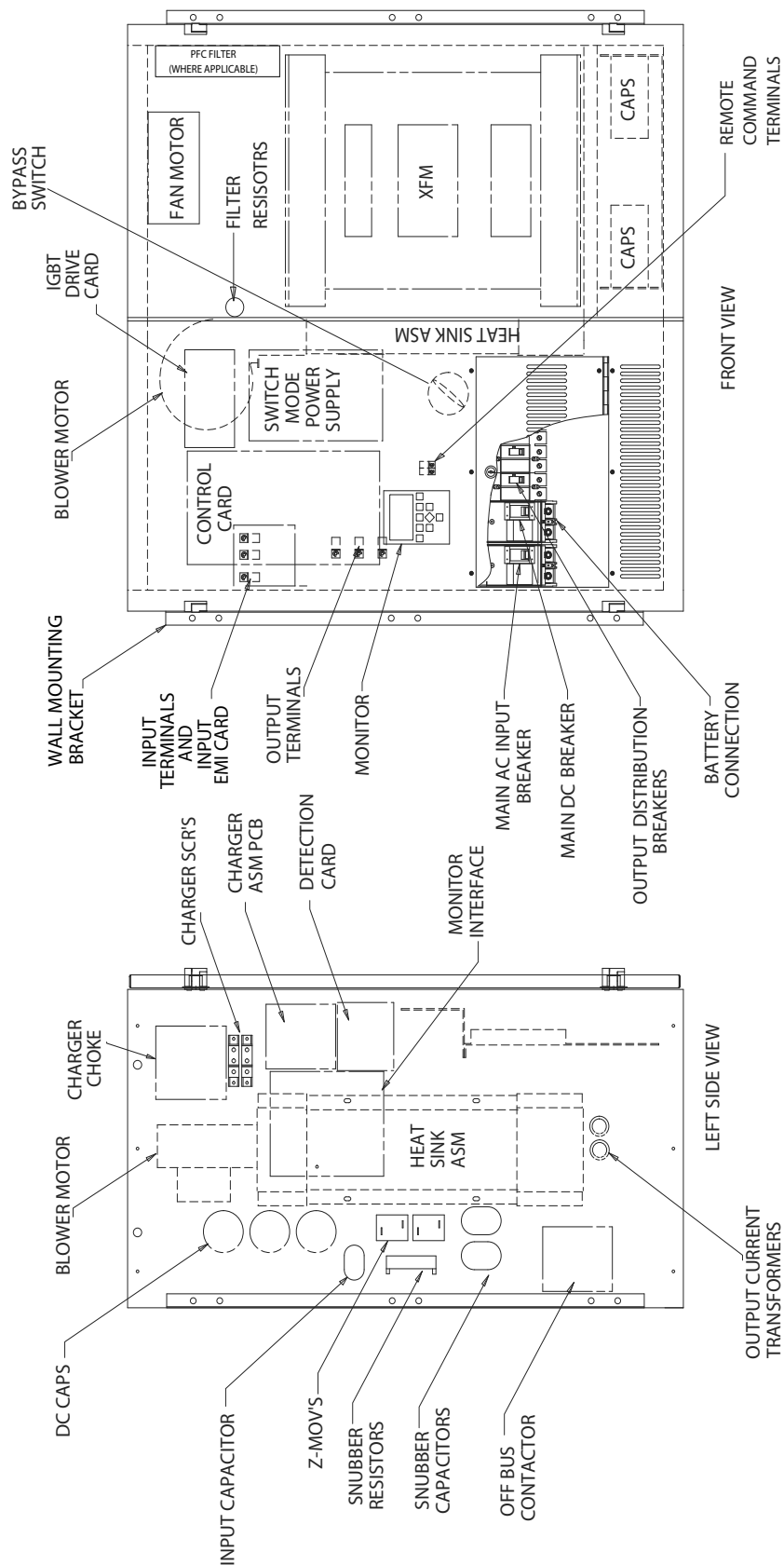
## COMPONENT LOCATION DIAGRAM 2KW - 5.3KW



# COMPONENT LOCATION DIAGRAM

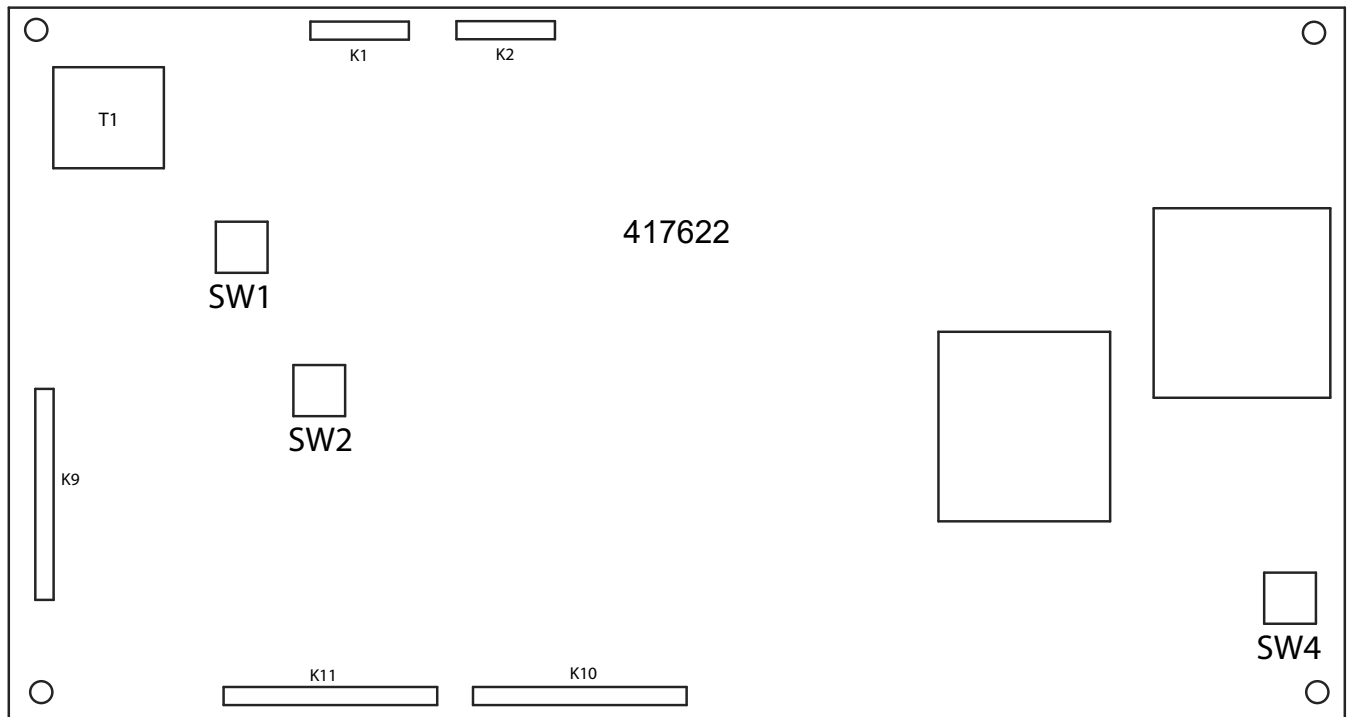


## COMPONENT LOCATION DIAGRAM 7.5KW - 18KW

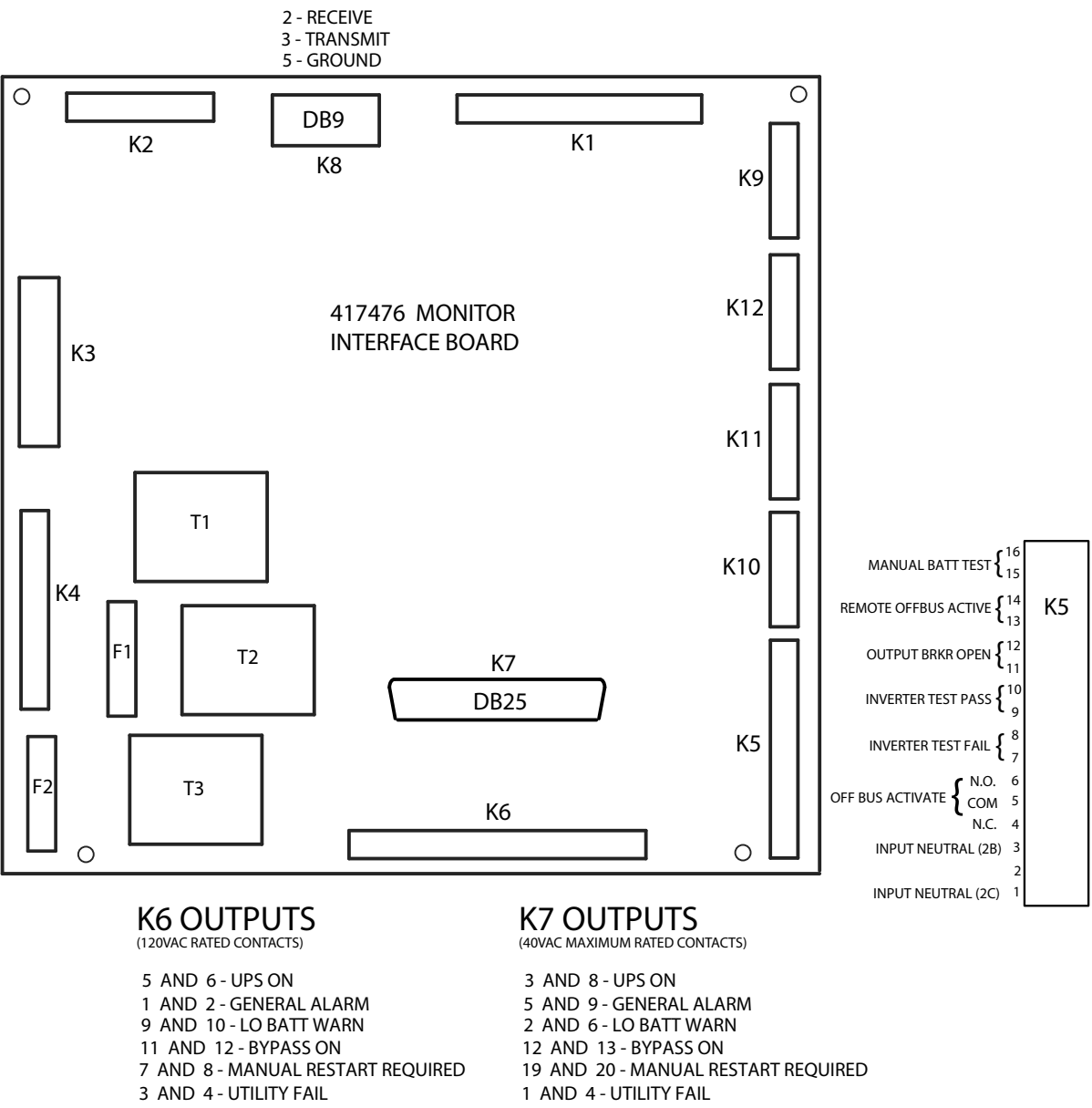




# CONTROL BOARD LAYOUT

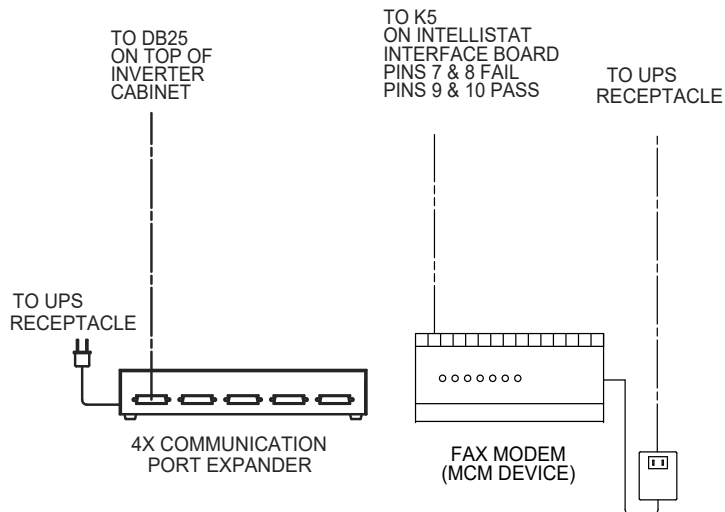
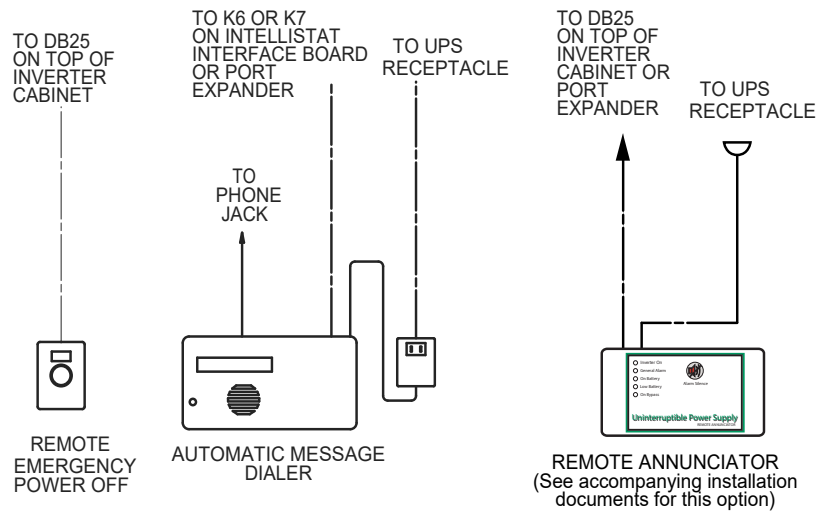


# INTERFACE BOARD LAYOUT





## OPTIONS INTERCONNECTION DIAGRAM



NOTE: THE POWER SUPPLY FOR DEVICES, EXCLUDING THE REMOTE EMERGENCY POWER OFF, MUST BE TAKEN FROM THE OUTPUT OF THE INVERTER. A 120V RECEPTACLE (5-20R) WHOSE SUPPLY IS TAKEN FROM THE OUTPUT OF THE INVERTER MUST BE INSTALLED NEAR THE LOCATION OF THE DEVICE.

