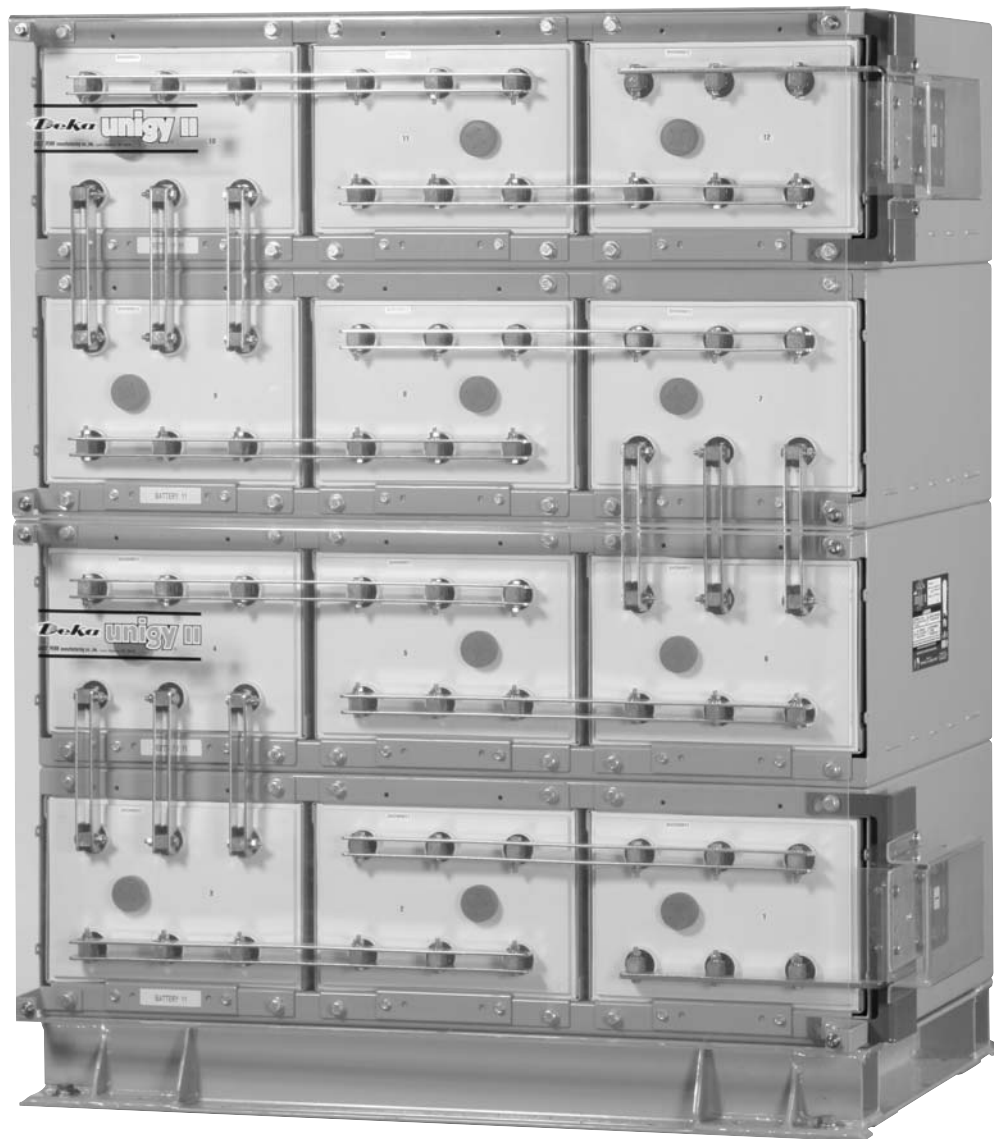


# **Deka**<sup>®</sup> **unigy II** **II**

## **NEBS CERTIFIED UNIGY II SYSTEM NC4-2000 125 AH** *Installation and Operation Manual*



**California  
Proposition 65  
Warning:**

Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the state of California to cause cancer and birth defects or other reproductive harm. **Wash hands after handling.**

# TABLE OF CONTENTS

## Safety Precautions

Protective Equipment .....3  
 Procedures .....3

## Receiving & Storage

Receiving Inspection.....3  
 Unpacking .....3  
 Storage .....3

## Installation

General .....3  
 Grounding .....4  
 Electric Code for Maintenance Access.....4  
 Floor Anchoring & Module Arrangements .....4  
 Module Installations .....4

## Electrical Connection

Connector Assembly .....4  
 Terminal Assembly .....4  
 Final Assembly Check Procedure.....4-5  
 Parallel Strings .....5  
 Module Front Shield Assembly .....5  
 Top Protective Shield Assembly .....5  
 Terminal Plate Shield Assembly .....5

## System Operations

Charger Voltage .....5  
 Operating Temperatures .....5  
 Cell Voltage .....5  
 Equalizing .....5

## Record Keeping

Voltages, Temperatures  
 & Ohmic Readings .....5

## Maintenance

Annual Inspection .....6  
 Rectifier Ripple Voltage.....6  
 Battery Cleaning .....6  
 Capacity Testing .....6

## Sleeve/Cell Removal Procedure.....6

## Unigy II NC4-2000

Acid Volumes & Weights.....6  
 Torque Values .....6







## FIGURES .....7-13

## APPENDIX A

Material Safety Data Sheet .....14-15

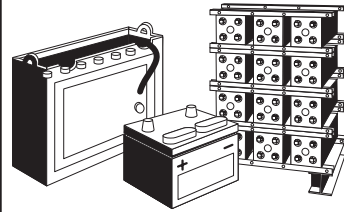
## APPENDIX B

Battery Maintenance Report .....16

<b>⚠ DANGER</b>				
 <b>HIGH VOLTAGE...</b> RISK OF SHOCK. DO NOT TOUCH UNINSULATED TERMINALS OR CONNECTORS.	 <b>SHIELD EYES.</b> <b>EXPLOSIVE GASES</b> CAN CAUSE BLIND- NNESS OR INJURY.	 <b>NO</b> • SPARKS • FLAMES • SMOKING	 <b>SULFURIC ACID</b> CAN CAUSE BLINDNESS OR SEVERE BURNS.	 <b>FLUSH EYES</b> <b>IMMEDIATELY</b> <b>WITH WATER.</b>  <b>GET</b> <b>MEDICAL</b> <b>HELP</b> <b>FAST.</b>
DO NOT REMOVE VENT VALVE. WARRANTY VOID IF VENT VALVE IS REMOVED.		VENTILATE WELL WHEN IN AN ENCLOSED SPACE AND WHEN CHARGING.		
SEE INSTALLATION, MAINTENANCE AND OPERATION INSTRUCTIONS FOR IMPORTANT SAFETY PRECAUTIONS.				

<b>California                  Proposition 65                  Warning:</b>	Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the state of California to cause cancer and birth defects or other reproductive harm. <b>Wash hands after handling.</b>
---	---

**BATTERIES  
 AND RELATED PARTS  
 CONTAIN LEAD**



**WASH HANDS  
 AFTER HANDLING!**

**CALIFORNIA PROPOSITION 65 WARNING:**  
 Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

California Proposition 65 Workplace Warning Sign 7/04  
*Must be posted in workplace near batteries.*

## SAFETY PRECAUTIONS

Although all valve-regulated batteries have the electrolyte immobilized within the cell, the electrical hazard associated with batteries still exists. **Work performed on these batteries should be done with the tools and the protective equipment listed below.** Valve-regulated battery installations should be supervised by personnel familiar with batteries and battery safety precautions.

### Protective Equipment

To assure safe battery handling, installation and maintenance, the following protection equipment should be used:

1. Safety glasses or face shield
2. Acid-resistant gloves
3. Protective aprons and safety shoes
4. Proper lifting devices
5. Properly insulated tools

### Procedures

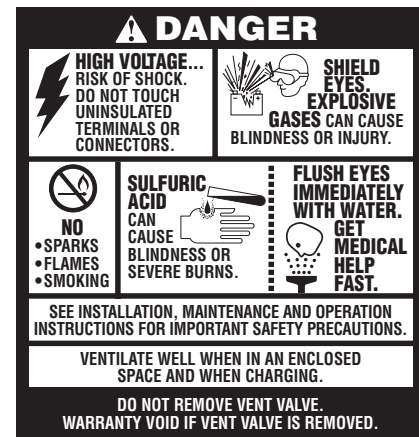
The following safety procedures should be followed during installation: **(Always wear safety glasses or face shield when working on or near batteries. Refer to Fig. 1-1, pg. 3)**

1. These batteries are sealed and contain no free electrolyte. Under normal operating conditions, they do not present any acid danger. However, if the battery jar or cover is damaged, acid could be present. **Sulfuric acid is harmful to the skin and eyes. Flush affected area with water immediately and consult a physician if splashed in the eyes.**
2. **Prohibit smoking and open flames, and avoid arcing in the immediate vicinity of the battery.**
3. Do not wear metallic objects, such as jewelry, while working on batteries.
4. Keep the top of the battery dry and clear of tools and other foreign objects.
5. Provide adequate ventilation **(per IEEE standard 1187 and/or local codes)** and follow recommended charging voltages.
6. Extinguishing media: Class ABC extinguisher.  
**Note: CO<sub>2</sub> may be used but not directly on the cells due to thermal shock and potential cracking of cases.**
7. **Never** remove or tamper with the pressure relief valves. Warranty void if vent valve is removed.
8. Inspect all flooring and lifting equipment for functional adequacy.
9. Adequately secure battery modules, racks, or cabinets to the floor.
10. Connect support structures to ground system in accordance with applicable codes.

## RECEIVING & STORAGE

### Receiving Inspection

Upon receipt, and at the time of actual unloading, each package should be visually inspected for any possible damage or electrolyte leakage. If either is evident, a more detailed inspection of the entire shipment should be conducted and noted on the bill of lading. Record receipt date, inspection data and notify carrier of any damage.



### California Proposition 65 Warning:

Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the state of California to cause cancer and birth defects or other reproductive harm. **Wash hands after handling.**

Fig. 1-1

### Unpacking

1. Always wear eye protection.
2. Check for visible defects such as cracked containers, loose terminal posts, or other unrepairable problems. Batteries with these defects must be replaced.
3. Check the contents of the package against the packaging list. Report any missing parts or shipping damage to your East Penn agent or East Penn Mfg. Co. immediately. (See Fig. 2-1, pg. 8)
4. Never lift batteries by the terminal posts.
5. When lifting batteries, the proper equipment is needed such as a forklift or a portable crane. Always check the lifting capacities of the equipment being used and never lift more than one module at a time by the module mounting holes.

### Storage

1. Cells should be stored indoors in a clean, level, dry, cool location. Recommended storage temperature is 0°F to 90°F (-18°C to 32°C).
2. Stored lead-acid batteries self discharge and must be given a boost charge six months from the date of manufacture to prevent permanent performance degradation. Record dates and conditions for all charges during storage.
3. Do not store beyond 12 months.
4. Store in horizontal position only.

## INSTALLATION

### General

Caution should be taken when installing batteries to insure no damage occurs. The battery cabinet, tray, rack, etc. shall be inspected for sharp edges that could cause damage to the battery casing. Batteries shall not be dropped, slid, or placed on rough or uneven surfaces such as tray lips or grated flooring. Mishandling of batteries could result in equipment damage or human injury. East Penn will not be liable for damage or injury as a result of mishandling or misuse of the product.

## INSTALLATION (con't)

### Grounding

When grounding the battery system, proper techniques should be applied per electrical standards, such as NEC and/or local codes.

Two .201 diameter x .750 center holes are provided in back of each module to accept a #6 x .750 center compression grounding lug. The holes must be tapped for a 1/4-20UNC thread and paint must be removed for a proper grounding pad location.

### Electric Code for Maintenance Access

Refer to ANSI/NFPA-70 National Electric Code for access and working space requirements around the battery. A minimum of 36" aisle space is recommended in front of the battery for service and inspection.\*

*\*Note: Battery system and/or individual module grounding, if required, is the installer's responsibility.*

### Floor Anchoring & Module Arrangements

See East Penn Mfg. Co.'s schematic diagram illustration. One is supplied with each shipment. If it cannot be located, contact East Penn Mfg. Co. for a copy. Refer to your delivery number, located on the packing slip. This will aid in obtaining the proper drawing.

### Module Installations

Assemble modules per the following details.

**CAUTION: Never lift more than one module at a time with the lifting slings. (See Fig. 3-1, pg. 9.)**

1. Remove the floor-mounting base support from the top of the battery, and bolt base to the floor. **(See local building codes for anchor bolt requirements, anchor bolts not included.)**  
It is important that the base is leveled, prior to stacking modules.
2. With sleeves / cells removed from the module, remove module to module bolts. Use the two slings provided to lift modules.
3. Remove the next module in the same manner as the first. Place in position.
4. As the modules are stacked, bolt together and torque each tier including module to base connection. [Torque 1/2" bolts to 100 ft. lbs. (135.5 Nm)]
5. Replace sleeves / cells using 2 x 4 lumber or equivalent and torque bolts. [Torque 3/8" bolts to 25 ft. lbs. (33.8 Nm).] (See Fig. 8-2, pg. 7)
6. Front shield bracket placement. (See Fig. 4-10, pg. 13)
7. Each battery is shipped with its own schematic. Make sure the polarity on the cells match the drawings.

## ELECTRICAL CONNECTION

### Connector Assembly

1. The contact surfaces of each individual post on every cell have been cleaned and coated with a thin film of no-ox-ID "A" grease at the factory. Assure the contact surfaces are free of dust or dirt prior to assembly.
2. The NC4-2000 battery is supplied with connector package "2CU" requiring two connectors per post. Install the connectors loosely to allow for final alignment, then torque to 125 ± 5 inch pounds

### Connector Assembly (con't)

(14.1 ± .5 Nm.) **The installation and direction of the post bolts is important!** (Refer to Fig. 4-1, pg. 4, Fig. 4-2, pg. 10, Fig. 4-3, pg. 10 and Fig. 4-4, pg. 11)

3. Batteries used in high rate discharge applications require multiple connectors per connection. (Refer to optional connector packages in Fig. 4-5, pg. 4)



Fig. 4-1

Connector Packages	
Standard Package (125 AH)	
2CU: (2) 3/8" connectors / post	
≤ 700 amps / 1120 wpc (33 plate)	
Optional Packages	
4CU: (4) 3/8" connectors / post	
≤ 2000 amps / 3200 wpc (33 plate)	
6CU: (6) 3/8" connectors / post	
≤ 3000 amps / 4800 wpc (33 plate)	
Corresponding Bolt Package	
2CU: 1/4-20 x 1 1/2" long — JMP1407	
4CU: 1/4-20 x 1 3/4" long — JMP1435	
6CU: 1/4-20 x 2" long — JMP1409	

Fig. 4-5

### Terminal Assembly

1. Attach the terminal mounting bracket to the module frame. (See Fig. 4-6, pg. 11 for Side Terminal and Fig. 4-7, pg. 12 for Top Terminal)
2. Attach the terminal plates or the terminal connectors to the battery posts and then torque to 125 ± 5 inch-pounds (14.1 ± .5 Nm).
3. For cable connection assembly, (See Fig. 4-8, pg. 12 and Fig 4-9, pg. 13)

### Final Assembly Check Procedure

1. For future identification of all cells, number individual cells in sequence, beginning with number one (1) at the positive end of the battery. The last cell of the battery is located at the negative output terminal.
2. Read and record the voltages of the individual cells to assure that they are connected properly. The total battery voltage should be approximately equal to the number of cells connected in series multiplied by the measured voltage of one cell. If the measurement is less, recheck the connections for proper polarity. Verify that all cell and battery connections have been properly torqued..

### **Final Assembly Check Procedure (con't)**

3. Measure and record the intercell connection resistance using a micro-ohms meter. This helps determine the adequacy of initial connection installation and can be used as a reference for future maintenance requirements. Refer to the recording forms in Appendix B of this manual. Review the records of each connection and detail resistance measurements. Clean, remake, and remeasure any connection that has a resistance measurement greater than **10%** of the average of all the same type connections (i.e. intercell, intermodule, etc.).
4. Battery performance is based on the output at the battery terminals. Therefore, the shortest electrical connection between the battery system and the operating equipment results in maximum total system performance.

#### **Select cable size based on current carrying capability and voltage drop.**

Cable size should not provide a greater voltage drop between the battery system and operating equipment than specified. Excessive voltage drop in cables will reduce the desired reserve time and power from the battery system.

#### **Parallel Strings**

When paralleling valve-regulated batteries, the capacity, arrangement, and external circuit length should be identical for each battery. Wide variation in the battery circuit resistance can result in unbalanced charging (i.e., excessive charging currents in some batteries and undercharging in others). As a result, cell failures in one battery string and subsequent loss of performance capabilities of that string will result in higher loads in the other parallel string(s), which may exceed the ratings of the battery connections. This can damage the battery system and dramatically shorten battery life.

#### **Module Front Shield Assembly**

1. Place shield on to bracket studs and attach hardware. (See Fig. 4-10, pg. 13)

#### **Top Protective Shield Assembly**

For side terminal assembly, attach the top protective cover to the highest front shield.

For top terminal assembly, cut the protective cover to fit between the terminals and then attach to the front shield. Use panel rivet to attach top protective shield to front shield. (See Fig. 4-10, pg. 13)

#### **Terminal Plate Shield Assembly**

For side terminal shield assembly, (See Fig. 4-6, pg 11)

For top terminal shield assembly, (See Fig. 4-7, pg. 12)

## **SYSTEM OPERATIONS**

### **Charger Voltage**

These batteries are designed for continuous float applications. When setting the float voltage on the charger, the system should be set to float at the nominal cell float voltage times the number of cells per string. The charger must be able to maintain the system voltage within  $\pm 0.5\%$  of the desired level at all times. The desired float voltage varies with temperature according to the table in the next column.

### **Operating Temperatures**

Battery Temperature		Float Voltage per Cell	
°F	°C	AVR125	AVR125LG
50°	10°	2.25	2.21
59°	15°	2.25	2.21
68°	20°	2.25	2.21
77°	25°	2.25	2.21
86°	30°	2.25	2.21
95°	35°	2.23	2.19

### **Cell Voltage**

Although the charger must maintain the system voltage within  $\pm 0.5\%$ , individual cell voltages may vary by  $\pm 0.05$  volts of the average cell float voltage.

### **Equalizing**

Upon installation of the battery, an optional boost charge of: **2.30 VPC  $\pm$  .01 volts (AVR125) and 2.26  $\pm$  .01 volts (AVR125LG)** for a maximum of 24 hours can be applied. **(Note: Verify that the higher battery voltage will not adversely affect the other connected equipment.) If this is done, be sure to reset the charging equipment to the proper float voltage.** The average battery operating temperature should not exceed 95°F (35°C) and never exceed 105°F (40.5°C) for more than an eight-hour period.

Operating at temperatures greater than 77°F (25°C) will reduce the operating life of the battery. If operating temperatures are expected to be in excess of 95°F (35°C), contact East Penn for recommendations.

## **RECORD KEEPING**

### **Voltages, Temperatures & Ohmic Readings**

Record keeping is an important part of stationary battery maintenance and warranty coverage. This information will help in establishing a life history of the battery and inform the user if and when corrective action needs to be taken. (Refer to Appendix B, Battery Maintenance Report)

While it is acceptable to operate at temperatures less than 77°F (25°C), it will require longer charging time to become fully recharged. Also, the capacity will be less at operating temperatures below 77°F (25°C).

After installation and when the batteries have been on float charge for one week, the following data should be recorded:

1. Battery terminal voltage
2. Charger voltage
3. Individual cell float voltages
4. Individual cell ohmic readings. On a 4-post cell place meter leads on the left positive - left negative posts or right positive - right negative posts. For 6-post cells, measure from center positive - center negative posts. Do not measure diagonally from positive to negative posts. (See Fig. 5-1, pg. 6)
5. Ambient temperatures
6. Terminal connections should be checked to verify that the installer did torque all connections properly (125  $\pm$  5 in.-lbs.). Micro-ohm readings should be taken across every connection. (Refer to Fig. 5-2, pg. 6) Refer to meter manufacturer's instructions for proper placement of probes. If any reading differs by more than **20%** from its initial installation value, re-torque the connection to 125  $\pm$  5 inch-pounds. If the reading still remains high, clean contact surfaces according to Step 2 under Connector Assembly.



Fig. 5-1

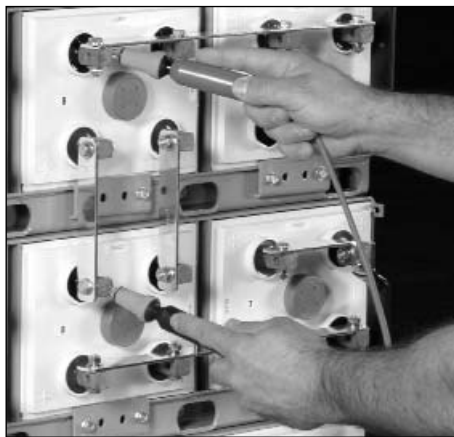


Fig. 5-2

## MAINTENANCE

Always wear eye protection when working on or near batteries. Keep sparks and open flames away from batteries at all times. See Safety Precautions on pg. 3.

### Annual Inspection <sup>(1)</sup>

1. Conduct a visual inspection of each cell.
2. Record the battery string voltage.
3. Record the charger voltage.
4. Record the individual cell voltages. The accuracy of the DMM (Digital Multimeter) must be .05% (on dc scale) or better. The DMM must be calibrated to NIST traceable standards. Because float readings are affected by discharge and recharges, these readings must be taken when batteries have been on continuous, uninterrupted float for at least one month. Cells should be within  $\pm 0.05$  volts of the average cell float voltage.
5. Record the ambient temperatures.
6. Record individual cell ohmic readings.
7. Record all interunit and terminal connection resistances. Micro-ohm readings should be taken during this inspection. If any reading differs by more than 20% from initial readings taken, retorque the connection. Recheck the micro-ohm reading. If the reading remains high, clean the contact surface according to installation portion of this manual.

<sup>(1)</sup> Other Maintenance Inspection intervals follow IEEE 1188

### Rectifier Ripple Voltage

Acceptable charging ripple (peak to peak) shall be less than 0.5% of the manufacturer's recommended string float voltage or have a duration shorter than 8 milliseconds.

### Battery Cleaning

Batteries, cabinets, racks, and modules should be cleaned with clear water or a mixture of baking soda and water.

**Never use solvents to clean the battery.**

### Capacity Testing

Capacity tests should not be run unless the battery's operation is questionable. Do not discharge the batteries beyond the specified final voltage. When discharging at higher rates, extra connectors may need to be added to prevent excessive voltage drop. When performing capacity testing and recording data use **IEEE 1188** instructions. Should it be determined that any individual battery(ies) or cell(s) need to be replaced, contact your nearest East Penn agent or East Penn Service Center.

## SLEEVE / CELL REMOVAL PROCEDURE

1. Before removing sleeve / cell, review Safety Precautions on pg. 3 of this manual. Contact East Penn Mfg. Company, Inc. with specific questions or concerns.
2. Refer to Fig. 4-2, pg. 10, Fig. 8-1, pg. 7 and Fig. 8-2, pg. 7 for specific instructions.

## NC4-2000 125 AH Unigy II System Acid Volumes & Weights

Cell Size	Acid Wt gm	Acid Vol cc	Acid Vol gal	Acid Wt lbs	Pure Acid lbs
125-33	33,531	25,793	6.81	73.92	29.55

\* Data subject to change.

## NC4-2000 125 AH Unigy II System Torque Values

Module to Module - 100 ft/lbs (136 Nm)  
 Sleeve to Module - 25 ft/lbs (34 Nm)  
 Cell Retainer to Sleeve - 125 in/lbs (14 Nm)  
 Connectors - 125 in/lbs (14 Nm)

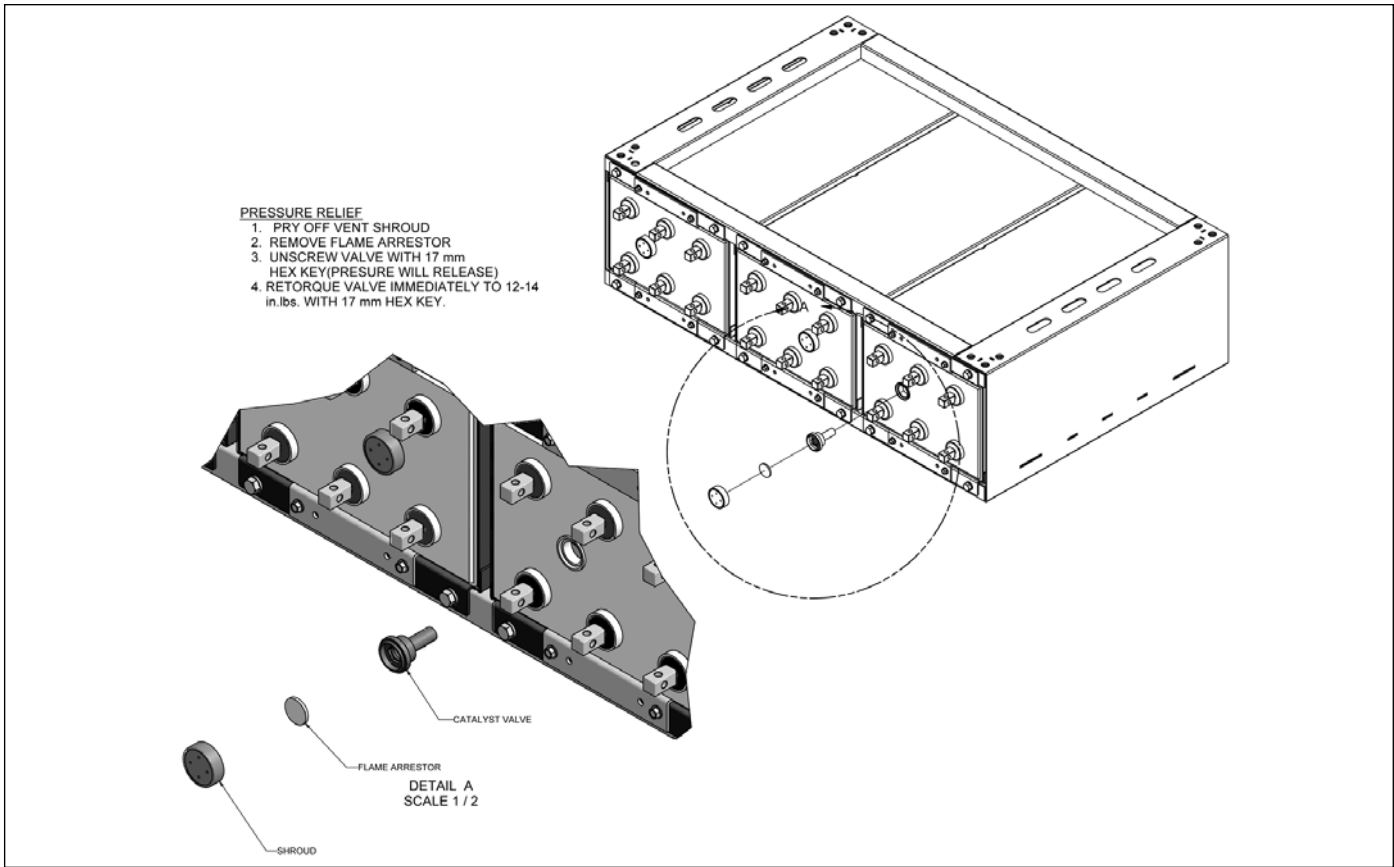


Fig. 8-1

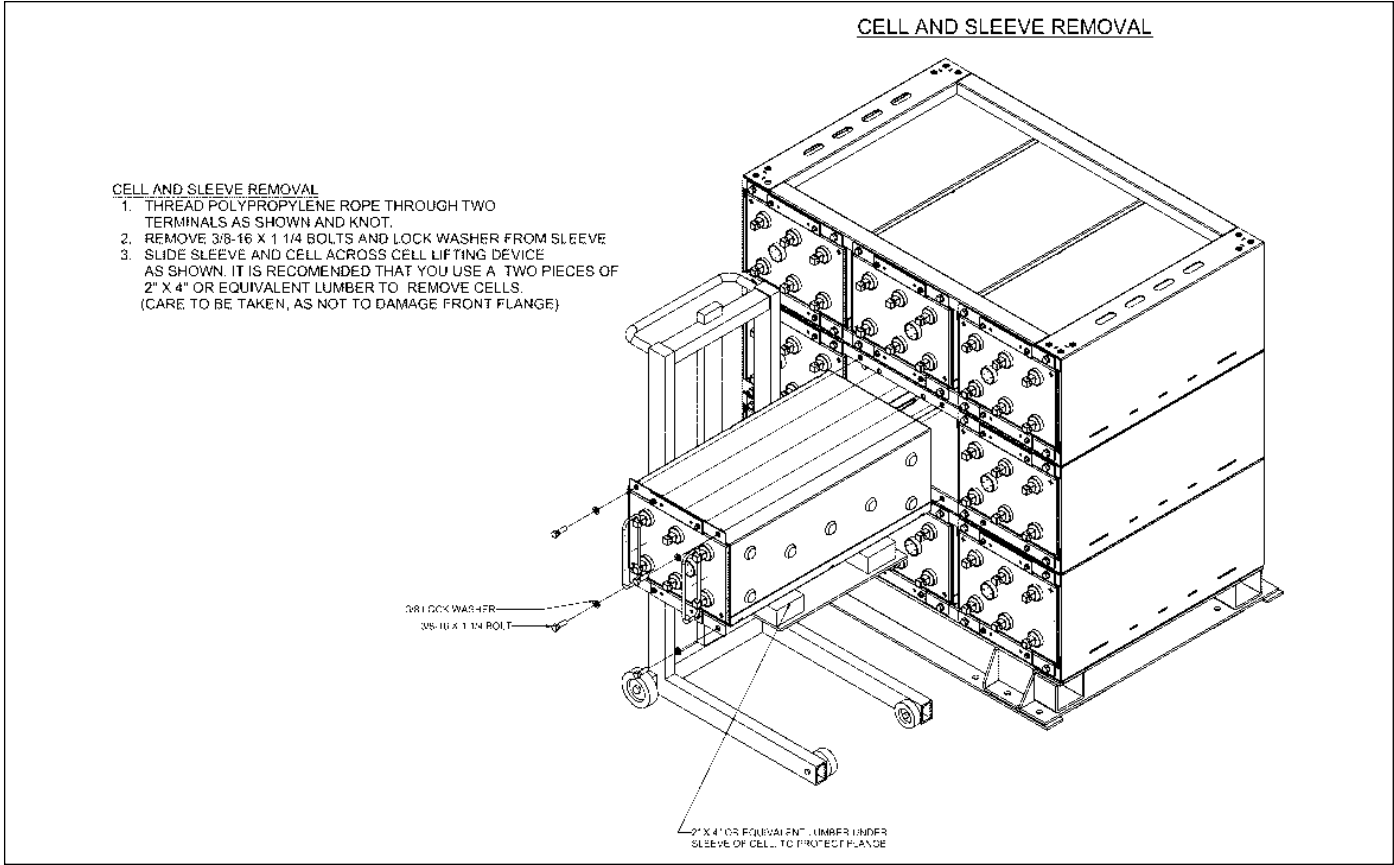


Fig. 8-2

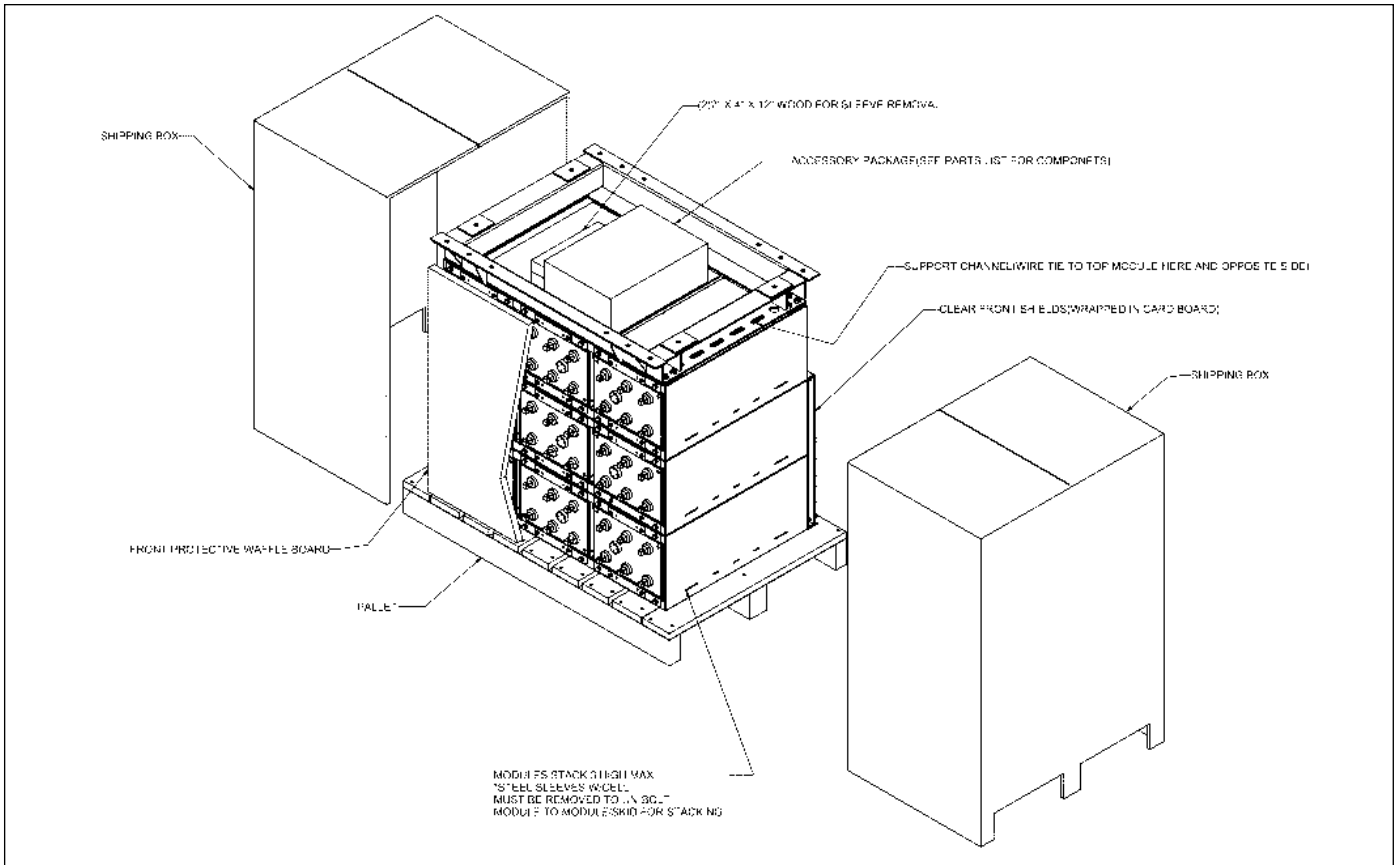


Fig. 2-1

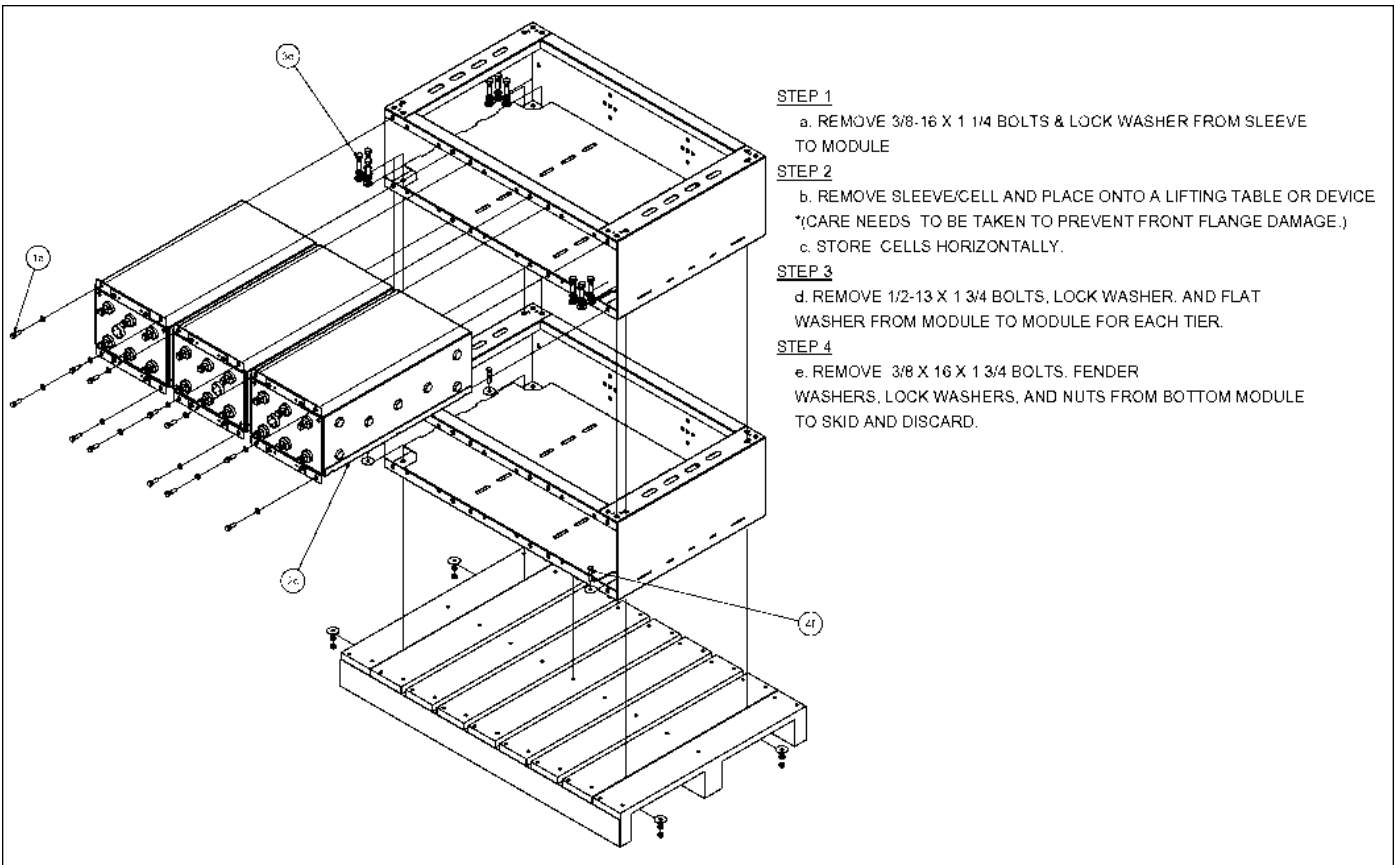


Fig. 2-2



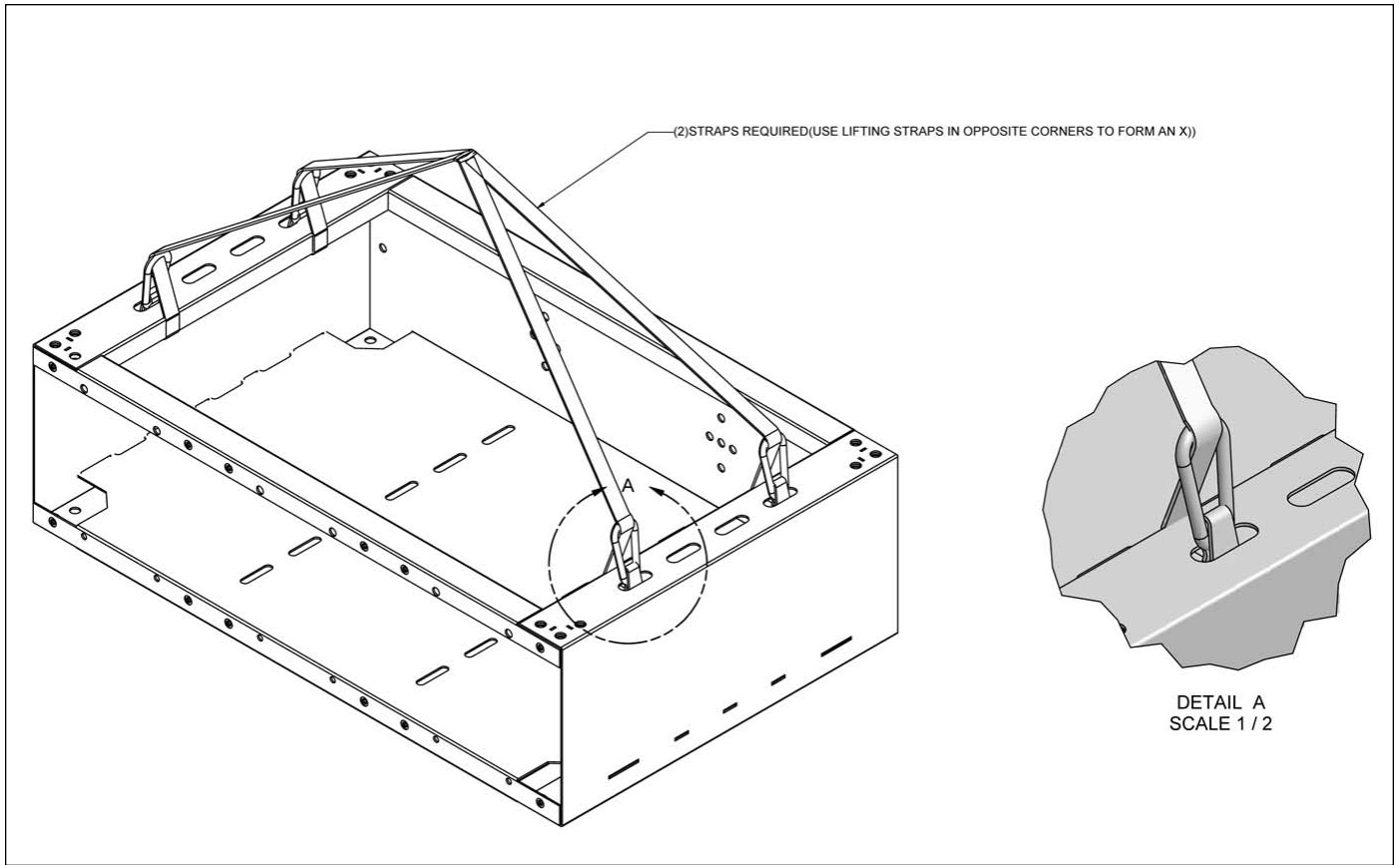


Fig. 2-3

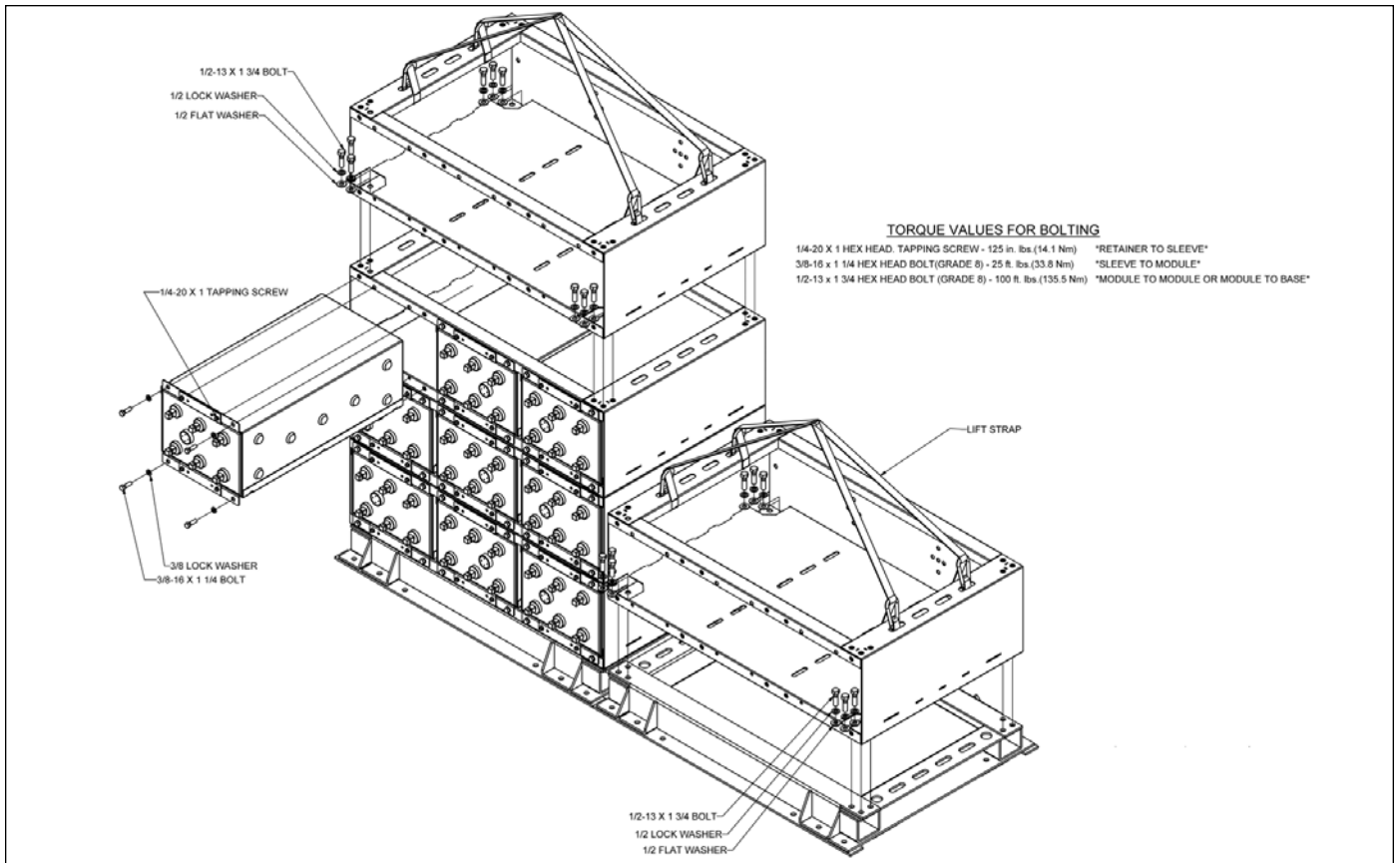


Fig. 3-1

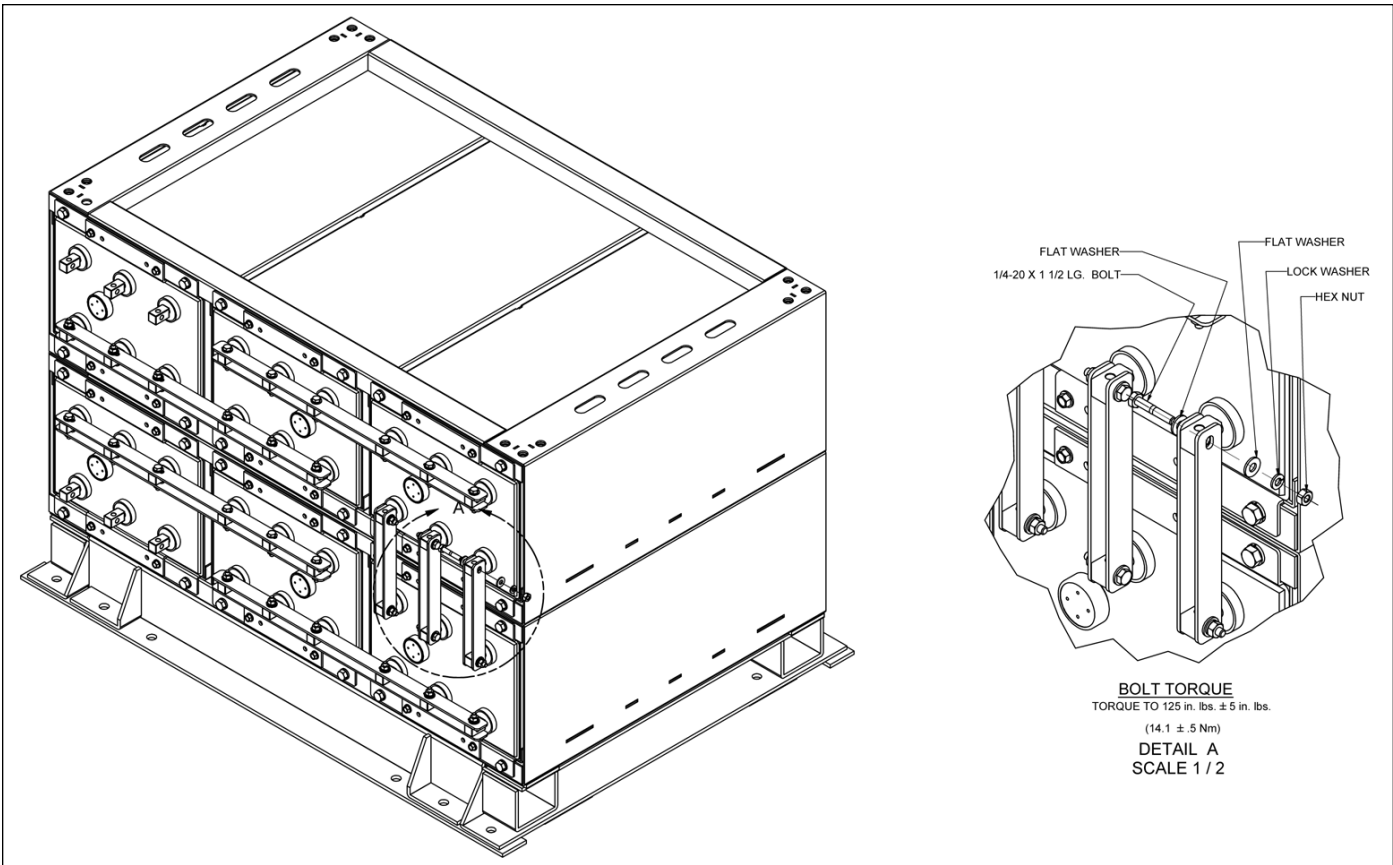


Fig. 4-2

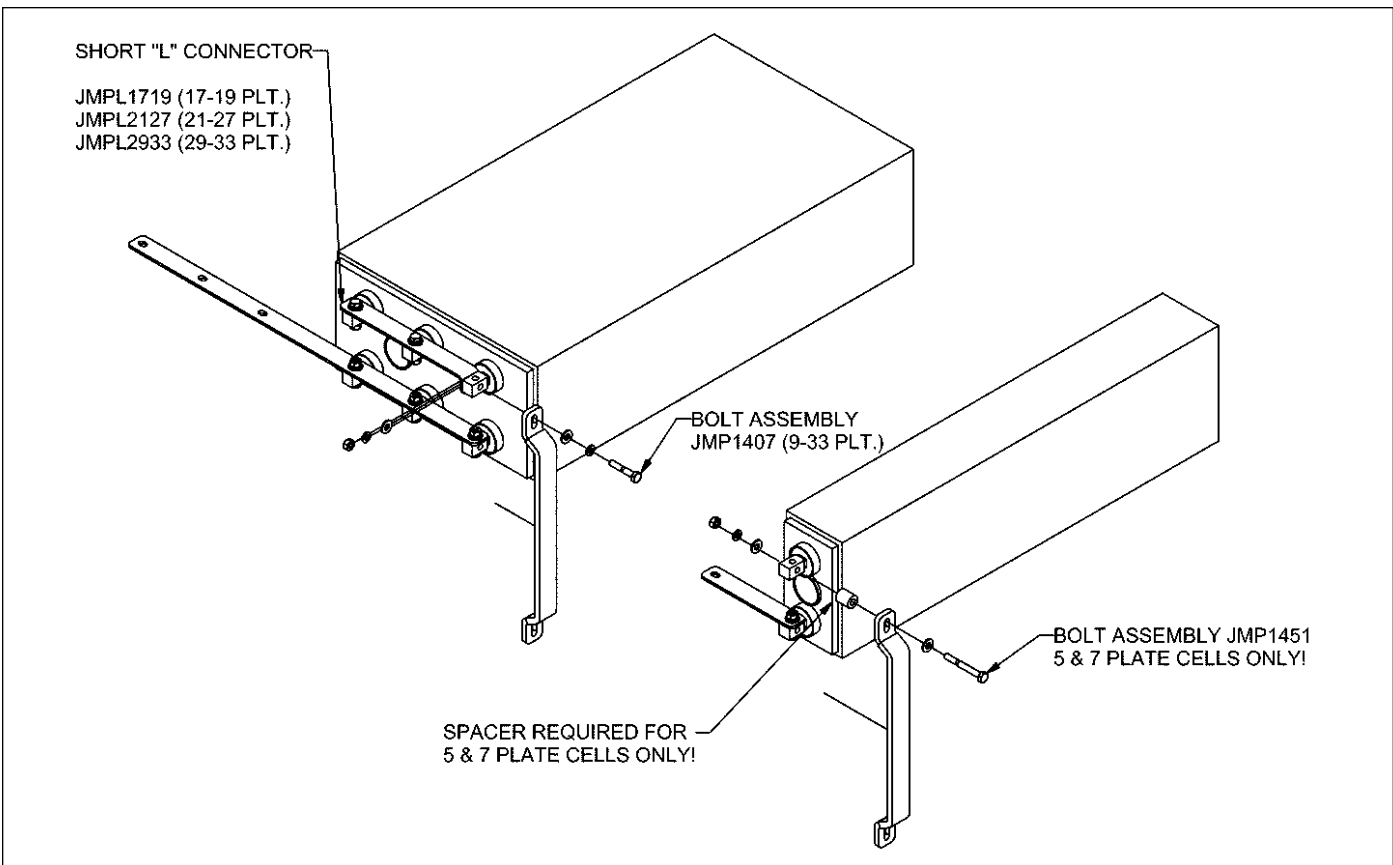
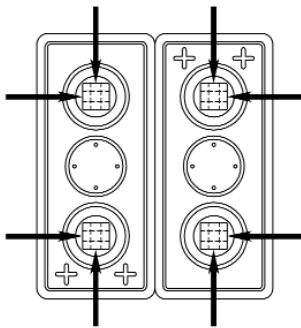
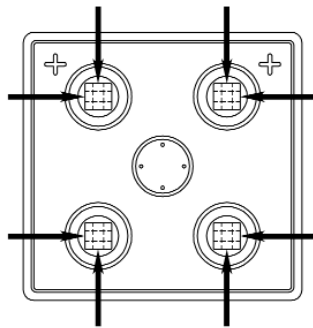


Fig. 4-3

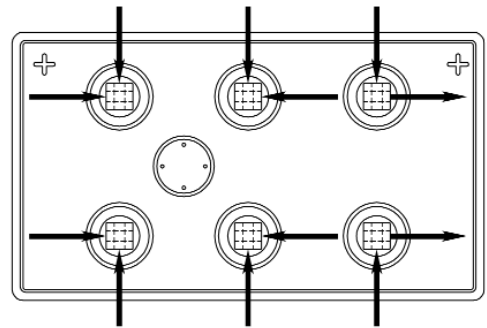
### RECOMMENDED BOLT DIRECTION



5-15 PLATE



17-27 PLATE



29-33 PLATE

NOTES: INSULATED TORQUE WRENCH SHOULD BE PLACED ON BOLT HEAD TO ENSURE MAXIMUM CLEARANCE.

Fig. 4-4

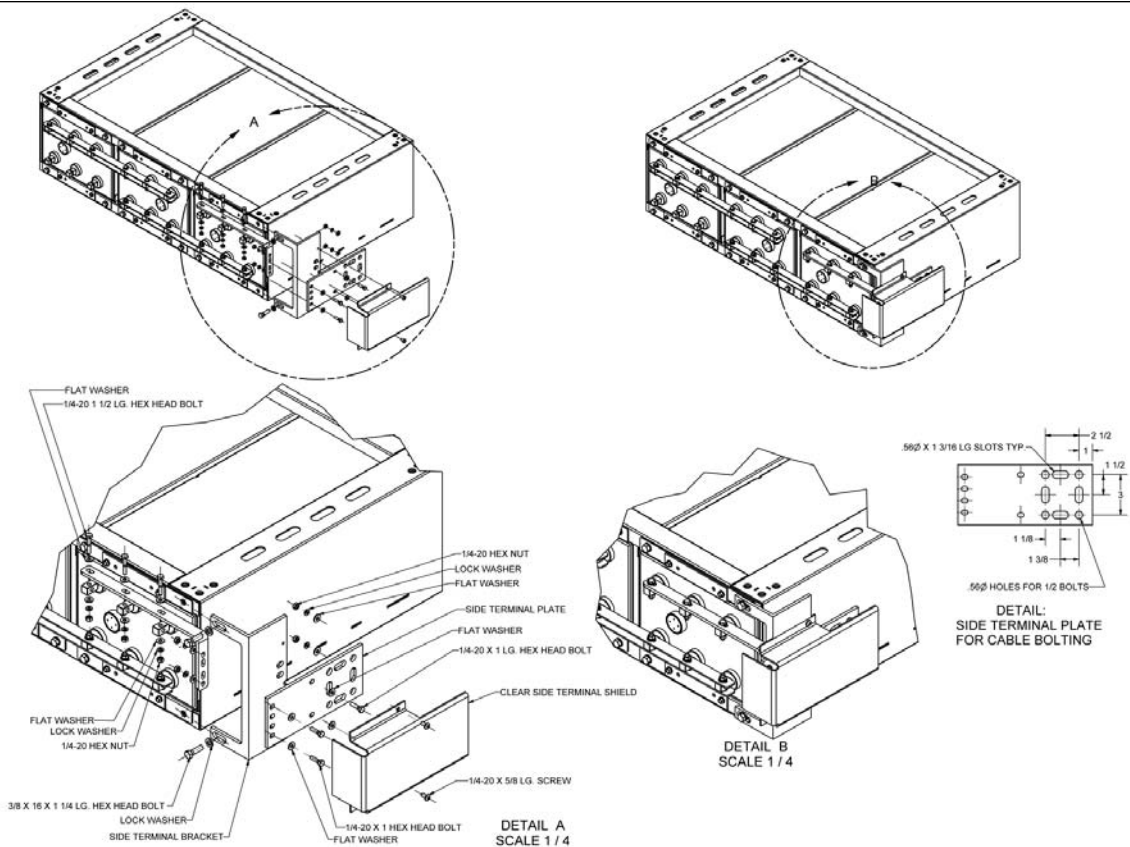


Fig. 4-6

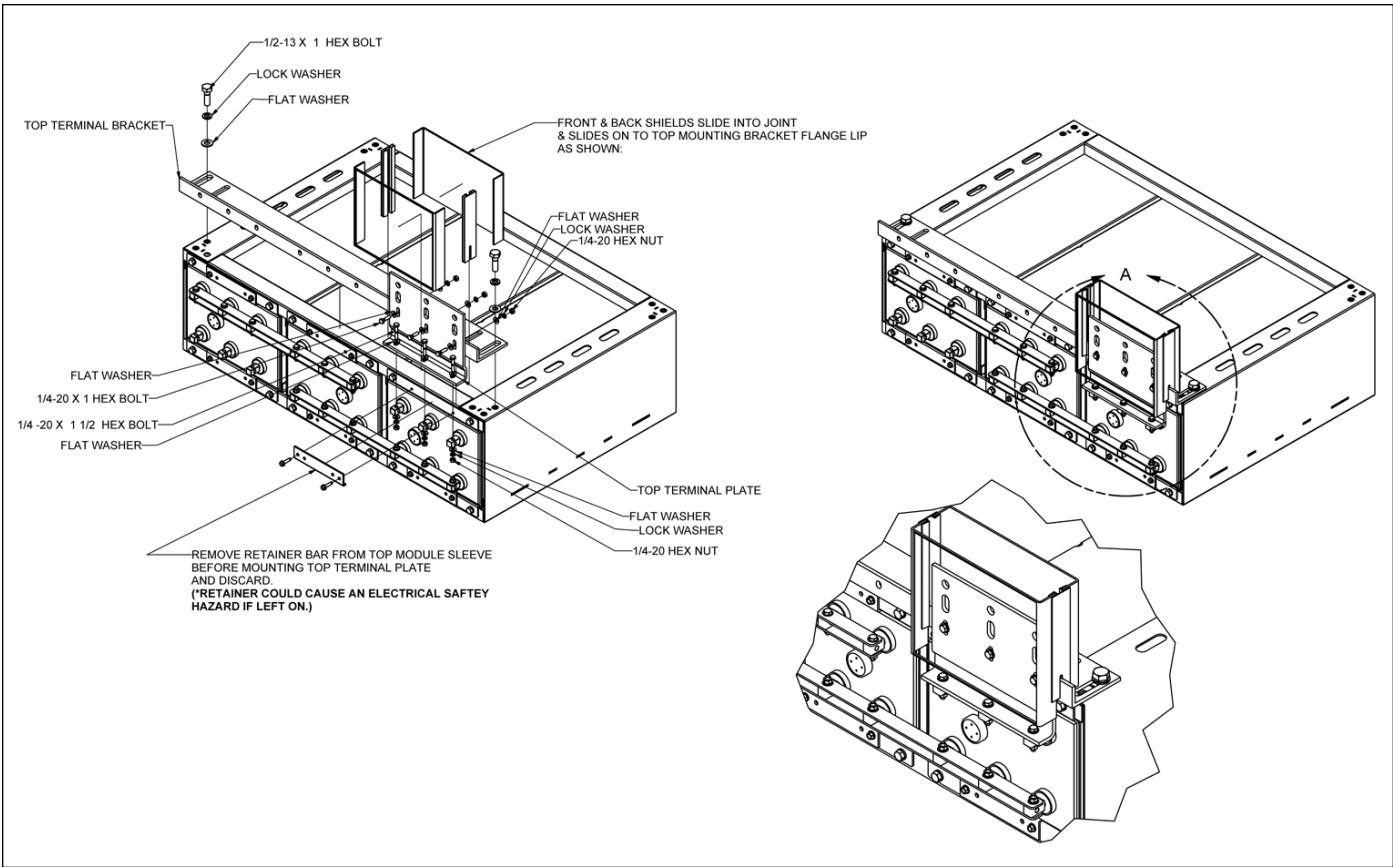


Fig. 4-7

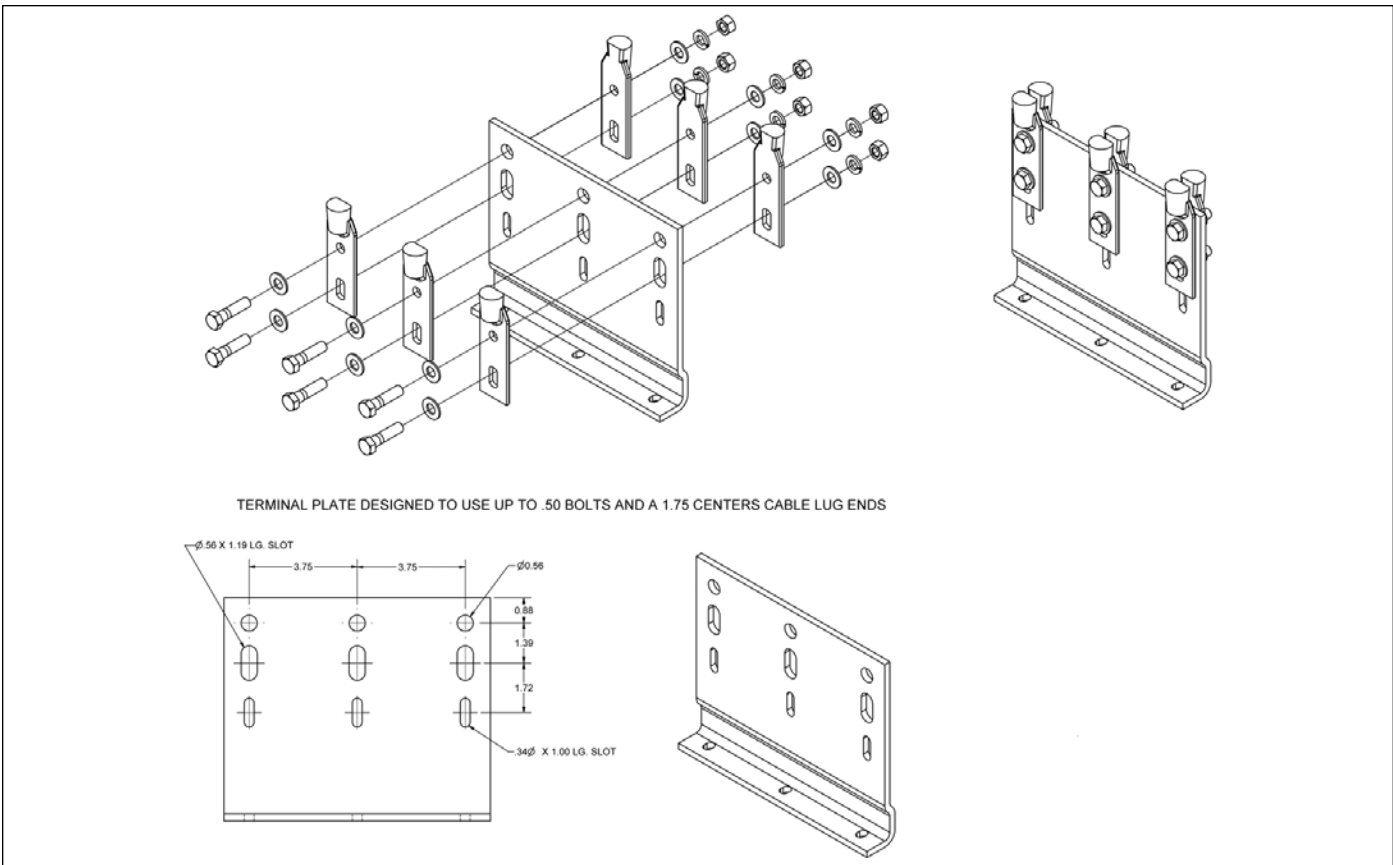


Fig. 4-8

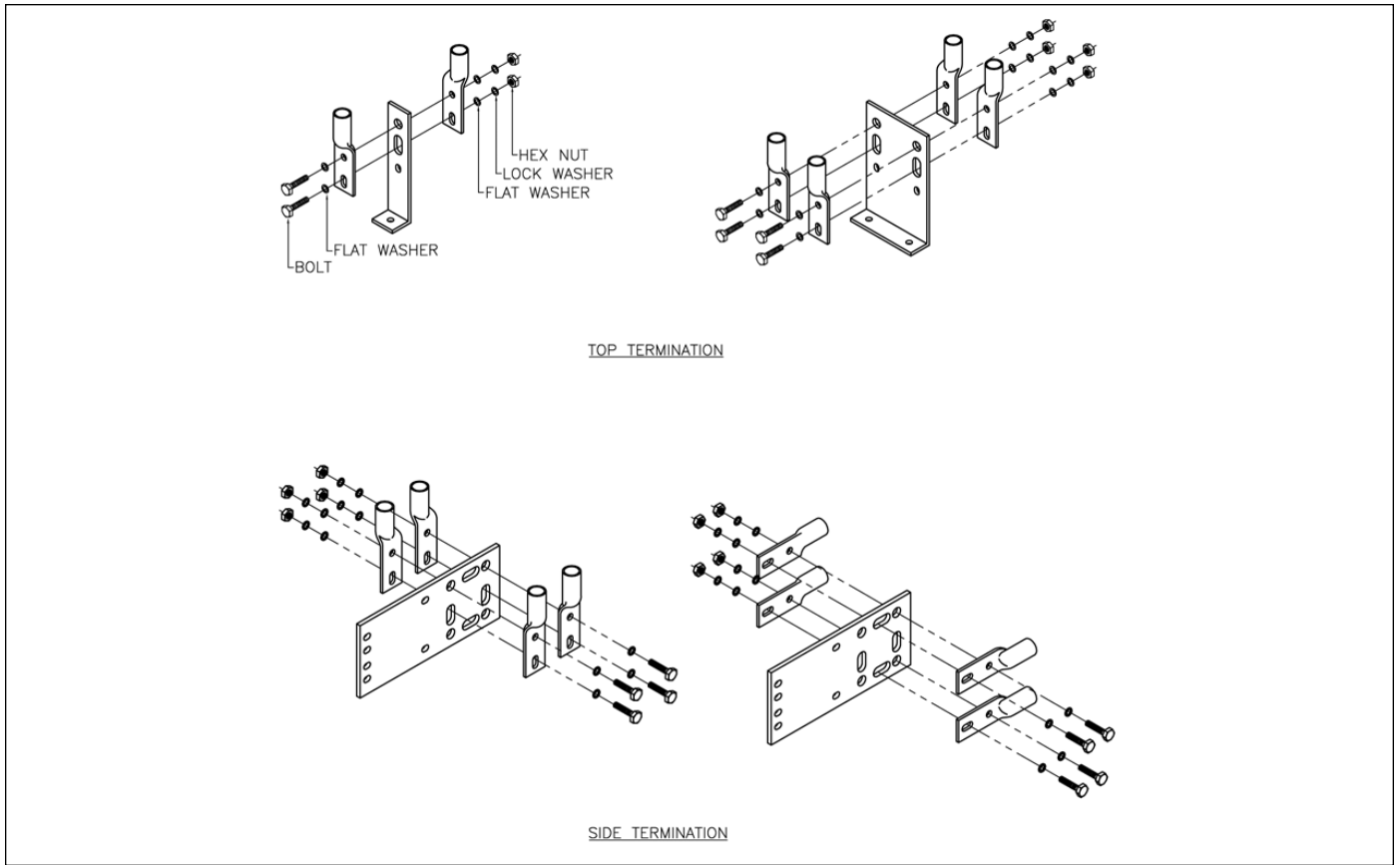


Fig. 4-9

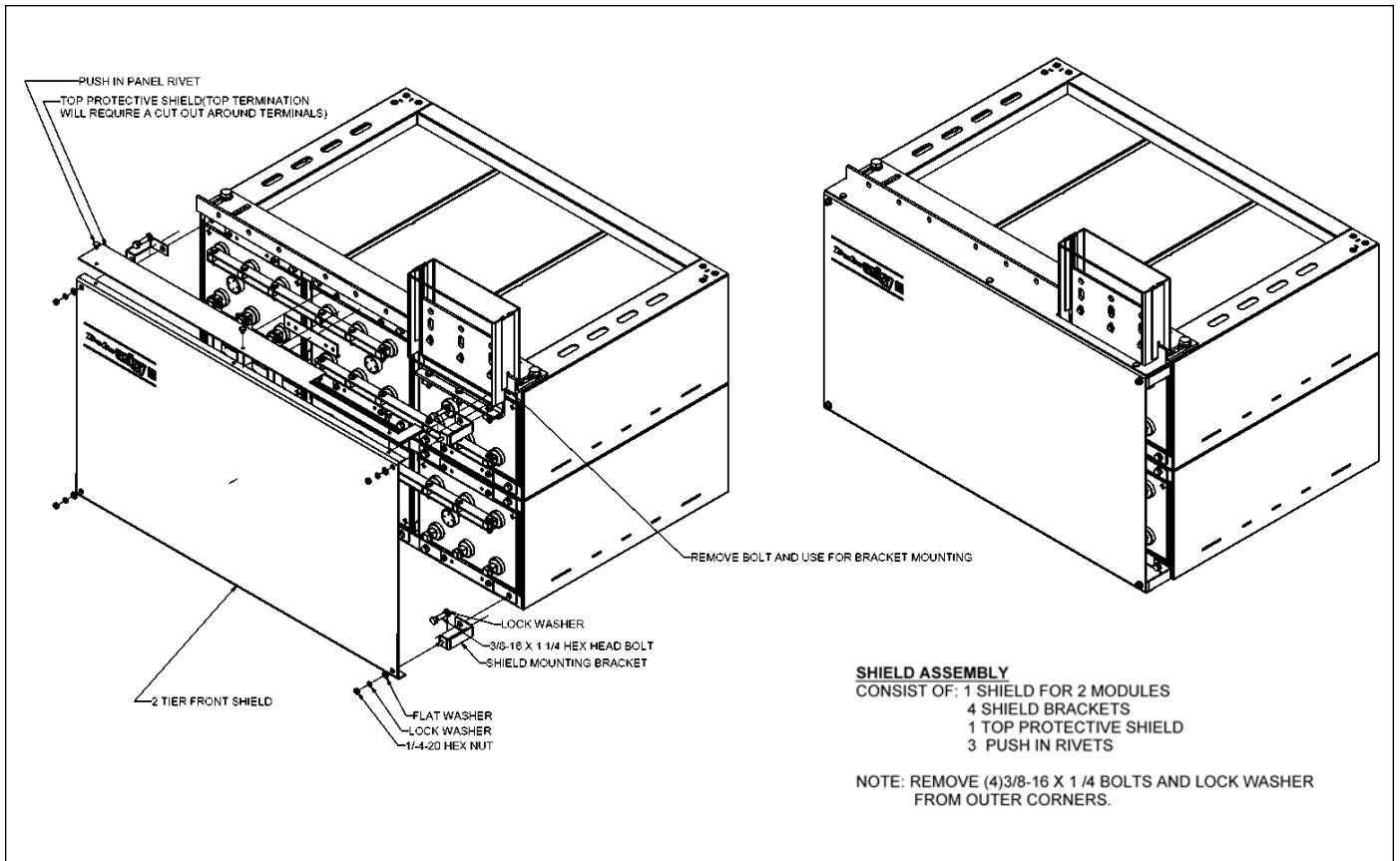


Fig. 4-10

**– Material Safety Data Sheet –  
LEAD ACID BATTERY WET, FILLED WITH ACID**

**SECTION I**

**Manufacturer's Name:** East Penn Manufacturing Co., Inc. Deka Road, Lyon Station, PA 19536  
**Telephone Number for Information:** (610) 682-6361 **Date:** March 16, 2005  
**Emergency Telephone Number:** CHEMTREC: 1-800-424-9300, **Trade Name:** Electric Storage battery, SLI or Industrial battery  
 In Washington D.C. or outside continental U.S., call 1-202-483-7616 **Classification:** Battery wet, filled with acid, electric storage  
 UN2794

**SECTION II  
HAZARDOUS INGREDIENTS/IDENTITY INFORMATION**

Hazardous Components Specific Chemical Identity [Common Name(s)]	OSHA PEL	ACGIH TLV	Range Percent by Weight	Average
Lead, CAS #7439921	0.05 mg/m <sup>3</sup>	0.05 mg/m <sup>3</sup>	43-70	65
Sulfuric Acid, CAS #7664939	1.00 mg/m <sup>3</sup>	1.00 mg/m <sup>3</sup>	20-44	25
Antimony, CAS #7440360	0.50 mg/m <sup>3</sup>	0.50 mg/m <sup>3</sup>	0-4	<1
Arsenic, CAS #7440382	0.01 mg/m <sup>3</sup>	0.01 mg/m <sup>3</sup>	<.01	—
Polypropylene, CAS #9003070	—	—	5-10	8
Calcium, CAS #7440702	1.0 mg/m <sup>3</sup>	1.0 mg/m <sup>3</sup>	<1	<1

**SECTION III  
PHYSICAL/CHEMICAL CHARACTERISTICS**

**Electrolyte (Sulfuric Acid):**  
**Appearance and Odor:** Clear, Odorless, Colorless  
**Boiling Point:** approximately 235°F  
**Evaporation Rate (Butyl Acetate=1):** less than 1.0  
**Melting Point:** N/A  
**Solubility in Water:** Completely  
**Specific Gravity (H<sub>2</sub>O=1):** 1.220 – 1.325  
**Vapor Density (AIR=1):** N/A  
**Vapor Pressure (mm Hg):** 13

**SECTION IV  
FIRE AND EXPLOSION HAZARD DATA**

**Flash Point (Method Used):** Non-Flammable  
**Extinguishing Media:** Class ABC extinguisher, CO<sub>2</sub>  
**Special Fire Fighting Procedures:** Cool exterior of battery if exposed to fire to prevent rupture. The acid mist and vapors in a fire situation are corrosive. Wear special respiratory protection (SCBA) and clothing.  
**Unusual Fire and Explosion Hazards:** \*Hydrogen gas, which may explode if ignited, is produced by this battery, especially when charging. Use adequate ventilation; avoid open flames, sparks, or other sources of ignition.  
**Flammable Limits:** \*Hydrogen Gas  
**LEL:** 4% **UEL:** 74%

**SECTION V  
REACTIVITY DATA**

**Stability:** Stable **Condition to Avoid:** Prolonged overcharging, sources of ignition  
**Incompatibility (Materials to Avoid):** Sulfuric Acid: Contact with combustibles and organic materials may cause fire and explosion. Also reacts violently with strong reducing agents, metals, strong oxidizers and water. Contact with metals may produce toxic sulfur dioxide fumes and may release flammable hydrogen gas.  
**Hazardous Decomposition of By-Products:** Sulfuric Acid: Excessive overcharging or fire may create Sulfur trioxide, carbon monoxide, sulfuric acid mist, sulfur dioxide, and hydrogen.  
Lead Compounds: Contact with strong acid or base or presence of nascent hydrogen may generate highly toxic arsine gas.

**SECTION VI  
HEALTH HAZARD DATA**

**Route(s) of Entry:** Not Applicable under normal use. (Inhalation, skin contact, and ingestion)  
**Health Hazards (Acute and Chronic):** Do not open battery, avoid contact with internal components. Internal components are Oxide lead and electrolyte. Short term exposure: Sulfuric acid may cause irritation of eyes, nose, and throat. Prolonged contact may cause severe burns. Long term exposure: Repeated contact causes irritation and skin burns. Repeated exposure to mist may cause erosion of teeth, chronic eye irritation and/or chronic inflammation of the nose, throat, and bronchial tubes.  
**TARGET ORGAN:** (Electrolyte) respiratory system, eyes, skin, and teeth  
**Carcinogenicity:**  
Sulfuric Acid: The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mist containing sulfuric acid" as a Category 1 carcinogen, a substance that is carcinogenic to humans. This classification does not apply to liquid forms of sulfuric acid contained within a battery. Inorganic acid mist (sulfuric acid mist) is not generated under normal use of this product. Misuse of the product such as

*continued*

**SECTION VI  
HEALTH HAZARD DATA (continued)**

overcharging, may result in the generation of sulfuric acid mist.

**Lead Compounds:** Lead is listed as a 2B carcinogen, likely in animals at extreme doses. Proof of carcinogenicity in humans is lacking at present.

**Arsenic:** Listed by National Toxicology Program (NTP), IARC, OSHA and NIOSH as a carcinogen only after prolonged exposure at high levels.

**Signs and Symptoms of Exposure:** Acid contact may cause irritation of eyes, nose and throat. Breathing of mist may produce respiratory difficulty. Contact with eyes and skin causes irritation and skin burns. Sulfuric acid is a CORROSIVE chemical.

**Medical Conditions Generally Aggravated by Exposure:** Sulfuric Acid Mist exposure may aggravate medical conditions such as, pulmonary edema, bronchitis, emphysema, dental erosion, and tracheobronchitis. Pregnant women and children must be protected from lead exposure.

**Emergency and First Aid Procedures:** (Sulfuric Acid)

- 1) Flush contacted area with large amounts of water for at least 15 minutes. Remove contaminated clothing and obtain medical attention if necessary. Eye wash and/or emergency shower should be readily available.
- 2) If swallowed, give large volumes of water. **DO NOT** induce vomiting, obtain medical treatment.

**SECTION VII  
PRECAUTIONS FOR SAFE HANDLING AND USE**

**Steps to be Taken in Case Material is Released or Spilled:** *SULFURIC ACID:* Dilute spill cautiously with five to six volumes of water and gradually neutralize with sodium bicarbonate, soda ash or lime. When exposure level is not known, wear NIOSH approved positive pressure self-contained breathing apparatus. Reference North American Emergency Response Guidebook, #154.

**Waste Disposal Method:** Lead-acid batteries are completely recyclable. For information on returning batteries to East Penn for recycling, contact your East Penn Representative. Dispose of any collected material in accordance with local, state or applicable federal regulations.

**Precautions to be Taken in Handling and Storing:** Store away from reactive material as defined in Section V, Reactivity Data. Place cardboard between layers of stacked batteries to avoid damage and short circuit. Do not allow metallic materials to simultaneously contact both terminals.

**Other Precautions:** Sodium bicarbonate, soda ash, sand, or lime should be kept in same general area for emergency use. Keep away from sources of ignition during charging see Section IV on generation of hydrogen gas. If battery case is broken, avoid direct contact with internal components.

**SECTION VIII  
CONTROL MEASURES**

**Respiratory Protection (Specific Type):** Respirator required when PEL is exceeded or employee witnesses respiratory irritation. (see Section VI, Health Hazard Data).

**Ventilation:** Must be provided when charging in an enclosed area. (29CFR1910.178(g) and .305(j)(7))

Mechanical (general): Acceptable at 1 to 4 air exchanges/hour or to maintain air concentrations below the PEL.

Local Exhaust: Preferred

Other: Local building/fire codes may require explosion proof fans and equipment

**Protective Gloves:** Acid resistant

**Eye Protection:** Preferred, safety glasses, goggles, face shield

**Other Protective Clothing or Equipment:** Acid resistant aprons, boots, and protective clothing

**Work Hygienic Practices:** Good Personal hygiene and work practices are mandatory.

**SECTION XI  
OTHER REGULATORY INFORMATION**

<b>NFPA Hazard Rating</b>	<b>Sulfuric Acid</b>	<b>Lead</b>	<b>U.S. DOT:</b> Battery Wet, Filled with Acid	
Health (Blue)	3	3	Hazard Class/Division	8
Flammability (Red)	0	0	ID Number	UN2794
Reactivity (Yellow)	2	0	Packing Group	III
Note: Sulfuric acid is water-reactive if concentrated.			Label Requirement	Corrosive

**RCRA:** Spent lead-acid batteries are not regulated as hazardous waste when recycled. Spilled sulfuric acid is a characteristic hazardous waste, EPA hazardous waste number D002 (corrosivity).

**CERCLA (Superfund) and EPCRA (Emergency Planning and Community Right to Know ACT)**

- a) Reportable Quantity (RQ) for spilled 100% sulfuric acid is 1000 lbs.
- b) Sulfuric acid is a listed "Extremely Hazardous Substance" under EPCRA with a Threshold Planning Quantity (TPQ) of 1000 lbs.
- c) EPCRA Section 312 Tier II reporting required for batteries if sulfuric acid is present in quantities of 500 lbs. or more and/or lead is present in quantities of 10,000 lbs. or more.

**California Prop 65:** Batteries, battery posts, terminals and related accessories contain lead and lead compounds, and other chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

**WASH HANDS AFTER HANDLING.**

For additional information concerning East Penn Manufacturing Co., Inc. products or questions concerning the content of this MSDS please contact your East Penn representative. This information is accurate to the best of East Penn Mfg. Co.'s knowledge or obtained from sources believed by East Penn to be accurate. Before using any product, read all warnings and directions on the label.

# APPENDIX B

## BATTERY MAINTENANCE REPORT

Date \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Battery Location and/or Number \_\_\_\_\_

No. of Cells \_\_\_\_\_ Type \_\_\_\_\_ Date Mfg. \_\_\_\_\_ Date Installed \_\_\_\_\_

Charger Output \_\_\_\_\_ Ambient Air Temperature \_\_\_\_\_ °F

Total Battery Voltage \_\_\_\_\_ Panel Meter Volts \_\_\_\_\_ Installer \_\_\_\_\_

### INDIVIDUAL CELL READINGS

Cell No.	Serial No.	Volts	Cell Ohmic Value	Connector Ohmic Value	Cell No.	Serial No.	Volts	Cell Ohmic Value	Connector Ohmic Value	Cell No.	Serial No.	Volts	Cell Ohmic Value	Connector Ohmic Value
1					21					41				
2					22					42				
3					23					43				
4					24					44				
5					25					45				
6					26					46				
7					27					47				
8					28					48				
9					29					49				
10					30					50				
11					31					51				
12					32					52				
13					33					53				
14					34					54				
15					35					55				
16					36					56				
17					37					57				
18					38					58				
19					39					59				
20					40					60				

Remarks and Recommendations \_\_\_\_\_

Readings Taken By \_\_\_\_\_

Readings should be taken at installation and at least annually thereafter.

**Notation:** This form must be completed and submitted with any product warranty claim.

**"POWERED FOR PERFORMANCE"®**  
**EAST PENN manufacturing co., inc.**

DISTRIBUTED BY:

Lyon Station, PA 19536-0147 • Phone: 610-682-6361 • Fax: 610-682-4781

Order Department Hotline: 610-682-4231

www.eastpennunigy.com • E-mail: sales@eastpennunigy.com

E.P.M. Form No. 0395 Rev. 12/06 © 2006 by EPM Printed in U.S.A.