



POWER PROTECTION

Series 600™ UPS
Multi-Module Three Phase
338 kVA to 1000 kVA; 60 Hz

**Installation
Manual**

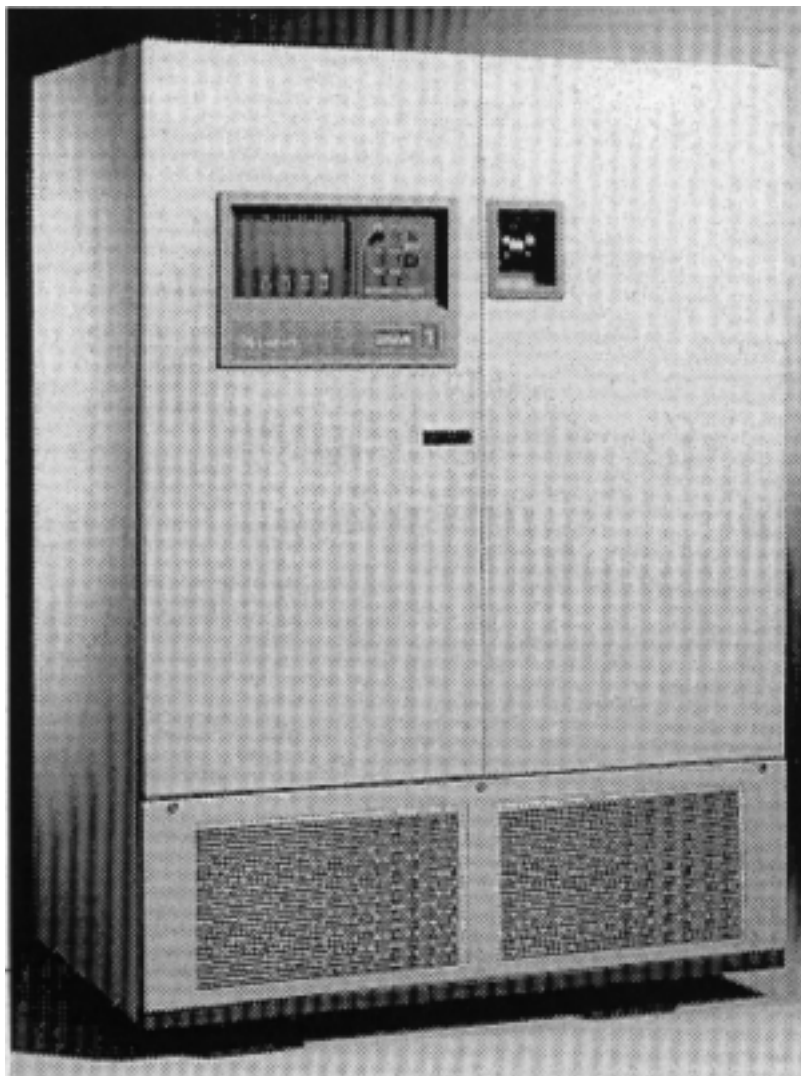


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IMPORTANT SAFETY INSTRUCTIONS

Save These Instructions.

This manual contains important instructions that should be followed during installation of your Series 600 UPS and batteries.



WARNING

EXERCISE EXTREME CARE WHEN HANDLING UPS CABINETS TO AVOID EQUIPMENT DAMAGE OR INJURY TO PERSONNEL. THE UPS MODULE WEIGHT RANGES FROM 8300 POUNDS (3765 KG) TO 17400 POUNDS (7893 KG).

LOCATE CENTER OF GRAVITY SYMBOLS BEFORE HANDLING EACH CABINET. TEST LIFT AND BALANCE THE CABINETS BEFORE TRANSPORTING. MAINTAIN MINIMUM TILT FROM VERTICAL AT ALL TIMES.

MODULES AND SYSTEM CONTROL CABINETS (SCC'S) HAVE HOLES INTENDED FOR RIGGING BARS OR CHAINS. PREVENT CHAINS OR CABLES FROM CONTACTING CABINET BY USING SPREADER BAR AND ADEQUATE PADDING.

MODULES ARE SUPPLIED WITH BOLT-ON BRACKETS FOR USE WITH FORKLIFT. RECTANGULAR HOLES ARE PROVIDED FOR USE WITH ROL-A-LIFTS.

FOLLOW ALL BATTERY SAFETY PRECAUTIONS WHEN INSTALLING, CHARGING, OR SERVICING BATTERIES. IN ADDITION TO THE HAZARD OF ELECTRIC SHOCK, GAS PRODUCED BY BATTERIES CAN BE EXPLOSIVE AND SULFURIC ACID CAN CAUSE SEVERE BURNS.

IN CASE OF FIRE INVOLVING ELECTRICAL EQUIPMENT, ONLY CARBON DIOXIDE FIRE EXTINGUISHERS, OR THOSE APPROVED FOR USE IN ELECTRICAL FIRE FIGHTING, SHOULD BE USED.

EXTREME CAUTION IS REQUIRED WHEN PERFORMING MAINTENANCE.

BE CONSTANTLY AWARE THAT THE UPS SYSTEM CONTAINS HIGH DC AS WELL AS AC VOLTAGES.

CHECK FOR VOLTAGE WITH BOTH AC AND DC VOLTMETERS PRIOR TO MAKING CONTACT.



WARNING

LOCATE CENTER OF GRAVITY SYMBOLS AND DETERMINE UNIT WEIGHT BEFORE HANDLING CABINET.



If you require assistance for any reason, call the toll-free Liebert Customer Service & Support number; 1-800-543-2378. For CS&S to assist you expediently, please have the following information available:

Part Numbers: _____
Serial Numbers: _____
kVA Rating: _____
Date Purchased: _____
Date Installed: _____
Location: _____
Input Voltage: _____
Output Voltage: _____
Battery Reserve Time: _____

1.0 SAFETY PRECAUTIONS

Read this manual thoroughly, paying special attention to the sections that apply to you, before working with the UPS. Retain this section for use by installing personnel.

Under typical operation and with all UPS doors closed, only normal safety precautions are necessary. The area around the UPS system should be kept free from puddles of water, excess moisture, or debris.

Special safety precautions are required for procedures involving handling, installation, and maintenance of the UPS system or the battery. Observe all safety precautions in this manual before handling or installing the UPS system. Observe all safety precautions in the **Operation and Maintenance Manual**, before as well as during performance of all maintenance procedures. Observe all battery safety precautions before working on or near the battery.

This equipment contains several circuits that are energized with high voltage. Only test equipment designated for troubleshooting should be used. This is particularly true for oscilloscopes. Always check with an AC and DC voltmeter to ensure safety before making contact or using tools. Even when the power is turned Off, dangerously high potentials may exist at the capacitor banks and at the batteries.

ONLY qualified service personnel should perform maintenance on the UPS system. When performing maintenance with any part of the equipment under power, service personnel and test equipment should be standing on rubber mats. The service personnel should wear insulating shoes for isolation from direct contact with the floor (earth ground).

Unless all power is removed from the equipment, one person should never work alone. A second person should be standing by to assist and summon help in case an accident should occur.

Three types of messages are used throughout the manual to stress important text. Carefully read the text below each Warning, Caution, and Note and use professional skills and prudent care when performing the actions described by that text.

A **Warning** signals the presence of a possible serious, life-threatening condition. For example:



WARNING

LETHAL VOLTAGES MAY BE PRESENT WITHIN THIS UNIT EVEN WHEN IT IS APPARENTLY NOT OPERATING. OBSERVE ALL CAUTIONS AND WARNINGS IN THIS MANUAL. FAILURE TO DO SO COULD RESULT IN SERIOUS INJURY OR DEATH. DO NOT WORK ON OR OPERATE THIS EQUIPMENT UNLESS YOU ARE FULLY QUALIFIED TO DO SO!! NEVER WORK ALONE.

A **Caution** indicates a condition that could seriously damage equipment and possibly injure personnel. For example:



CAUTION

Extreme care is necessary when removing shoring braces. Do not strike the cabinet with hammers or other tools.

A **Note** emphasizes important text. If the note is not followed, equipment could be damaged or may not operate properly. For example:



NOTE

If the UPS system has a blown fuse, the cause should be determined before you replace the fuse. Contact Liebert Customer Service and Support.




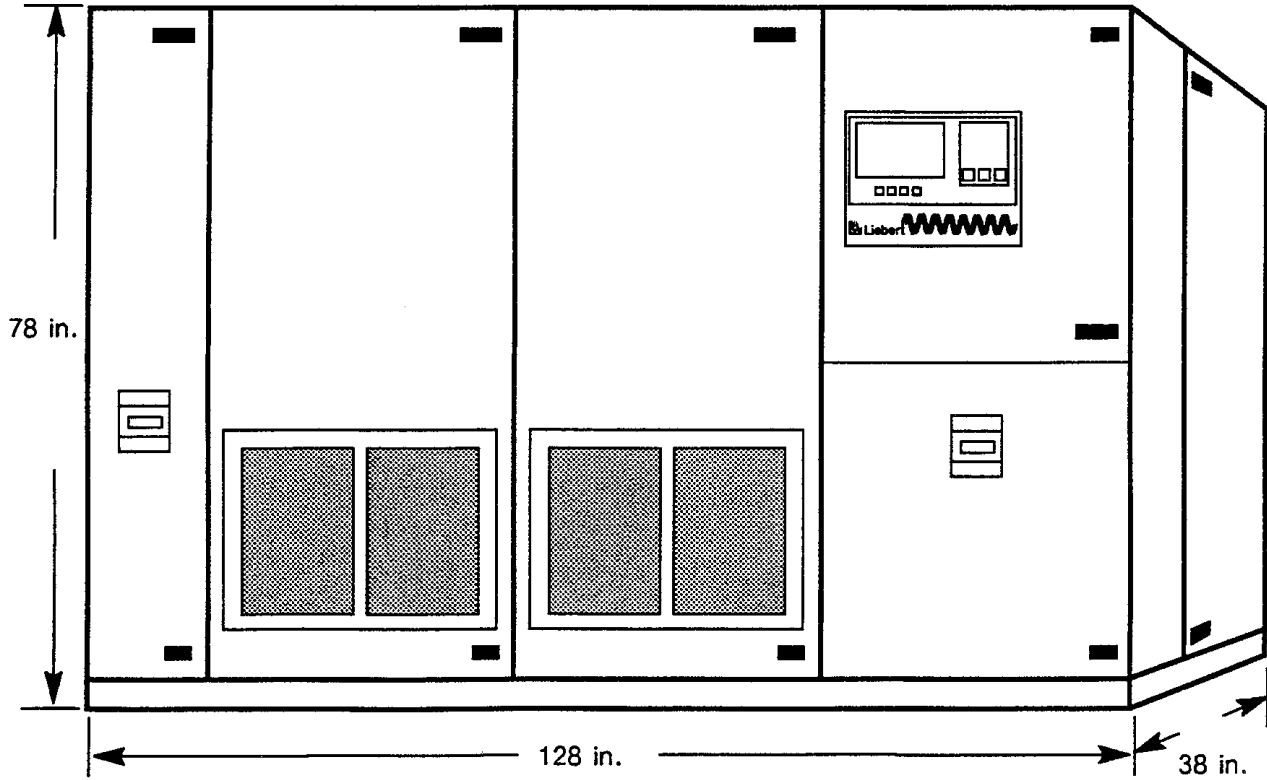
WARNING
LOCATE CENTER OF GRAVITY SYMBOLS 
AND DETERMINE UNIT WEIGHT
BEFORE HANDLING CABINET.

Figure 1 Multi-Module 338 kVA UPS



Each UPS module is shipped as two or three separate cabinets for easier handling.
Refer to the Shipping Split Detail drawing for dimensions and weights of your units.

2.0 INSTALLATION CONSIDERATIONS

Install your Series 600 UPS in accordance with the submittal drawing package and the following procedures.

A Liebert authorized representative must perform the initial system check-out and start-up to ensure proper system operation. Equipment warranties will be voided unless system start-up is performed by a Liebert authorized representative. Contact your local Liebert sales representative or Liebert Customer Service and Support at **1-800-543-2378** to arrange for system start-up.



CAUTION

Read this manual thoroughly before attempting to wire or operate the unit. Improper installation is the most significant cause of UPS start-up problems.

Do not install this equipment near gas or electric heaters. It is preferable to install the UPS in a restricted location to prevent access by unauthorized personnel.

Proper planning will speed unloading, location, and connection of the UPS. **Refer to Figure 4 through Figure 68 and Appendix A - Series 600 UPS Site Planning Data.**

Use the shortest output distribution cable runs possible, consistent with logical equipment arrangements and with allowances for future additions if planned.

Recommended ambient operating temperature is 25°C (77°F). Relative humidity must be less than 95%, non-condensing. Note that room ventilation is necessary, but air conditioning may not be required. Maximum ambient operating temperature is 40°C (104°F). The batteries should not exceed 25°C (77°F). At elevations above 4,000 feet (1219 meters) derating may be required (consult your Liebert sales representative).

1. Even though your Liebert UPS unit is at least 91% efficient, the heat output is substantial. For more specific information, see **Appendix A - Series 600 UPS Site Planning Data**. Be sure environmental conditioning systems can accommodate this BTU load, even during utility outages.
2. The routing (inside the facility) to the installation site, as well as the floor at the final equipment location, must be capable of supporting the cabinet weight and the weight of any moving equipment. The modules weigh between 8300 and 17400 pounds. Refer to **Appendix A - Series 600 UPS Site Planning Data**.
3. Plan the routing to ensure that the unit can move through all aisleways, doorways, and around corners without risking damage.



CAUTION

Observe all battery safety precautions when working on or near the battery.

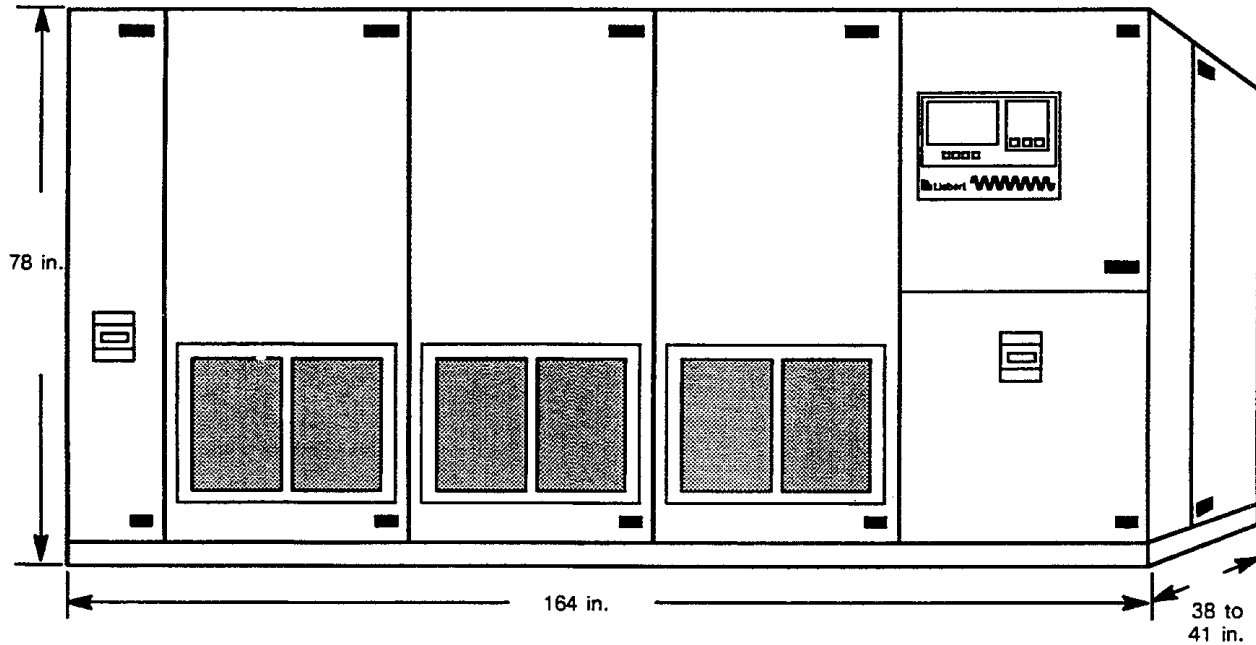


WARNING

**LOCATE CENTER OF GRAVITY SYMBOLS
AND DETERMINE UNIT WEIGHT
BEFORE HANDLING CABINET.**



Figure 2 Multi-Module 400 to 1000 kVA UPS



Cabinet depth of 400 and 500 kVA modules is 38 inches.
Cabinet depth of 625 and 750 (HL) kVA modules is 41 inches.

Refer to drawings for 208 VAC dimensions (338 to 500 kVA)
and for 750 (LL) and 1000 kVA modules (not shown).

Each UPS module is shipped as two or three separate cabinets for easier handling.
Refer to the Shipping Split Detail drawing for dimensions and weights of your units.

3.0 UNLOADING AND HANDLING

The UPS module is shipped as separate cabinets to allow easy handling at the site. Because the weight distribution in the cabinets is uneven, use extreme care during handling and transport.



WARNING

ONLY QUALIFIED PERSONNEL SHOULD HANDLE THIS EQUIPMENT. EXERCISE EXTREME CARE WHEN HANDLING UPS CABINETS TO AVOID EQUIPMENT DAMAGE OR INJURY TO PERSONNEL. THE UPS MODULE WEIGHT RANGES FROM 8300 POUNDS TO 17400 POUNDS.

LOCATE CENTER OF GRAVITY SYMBOLS BEFORE HANDLING EACH CABINET. TEST LIFT AND BALANCE THE CABINET BEFORE TRANSPORTING. MAINTAIN MINIMUM TILT FROM VERTICAL AT ALL TIMES.

MODULES AND SYSTEM CONTROL CABINETS (SCC'S) HAVE HOLES INTENDED FOR RIGGING BARS OR CHAINS. PREVENT CHAINS OR CABLES FROM CONTACTING CABINET BY USING SPREADER BAR AND ADEQUATE PADDING.

MODULES ARE SUPPLIED WITH BOLT-ON BRACKETS FOR USE WITH FORKLIFT. RECTANGULAR HOLES ARE PROVIDED FOR USE WITH ROL-A-LIFTS.

To reduce the possibility of shipping damage, cabinets are shored with 2x4 bracing, secured with screw-type nails. This shoring must be carefully removed prior to unloading.



CAUTION

Extreme care is necessary when removing shoring braces. Do not strike cabinet with hammers or other tools.

4.0 INSPECTIONS

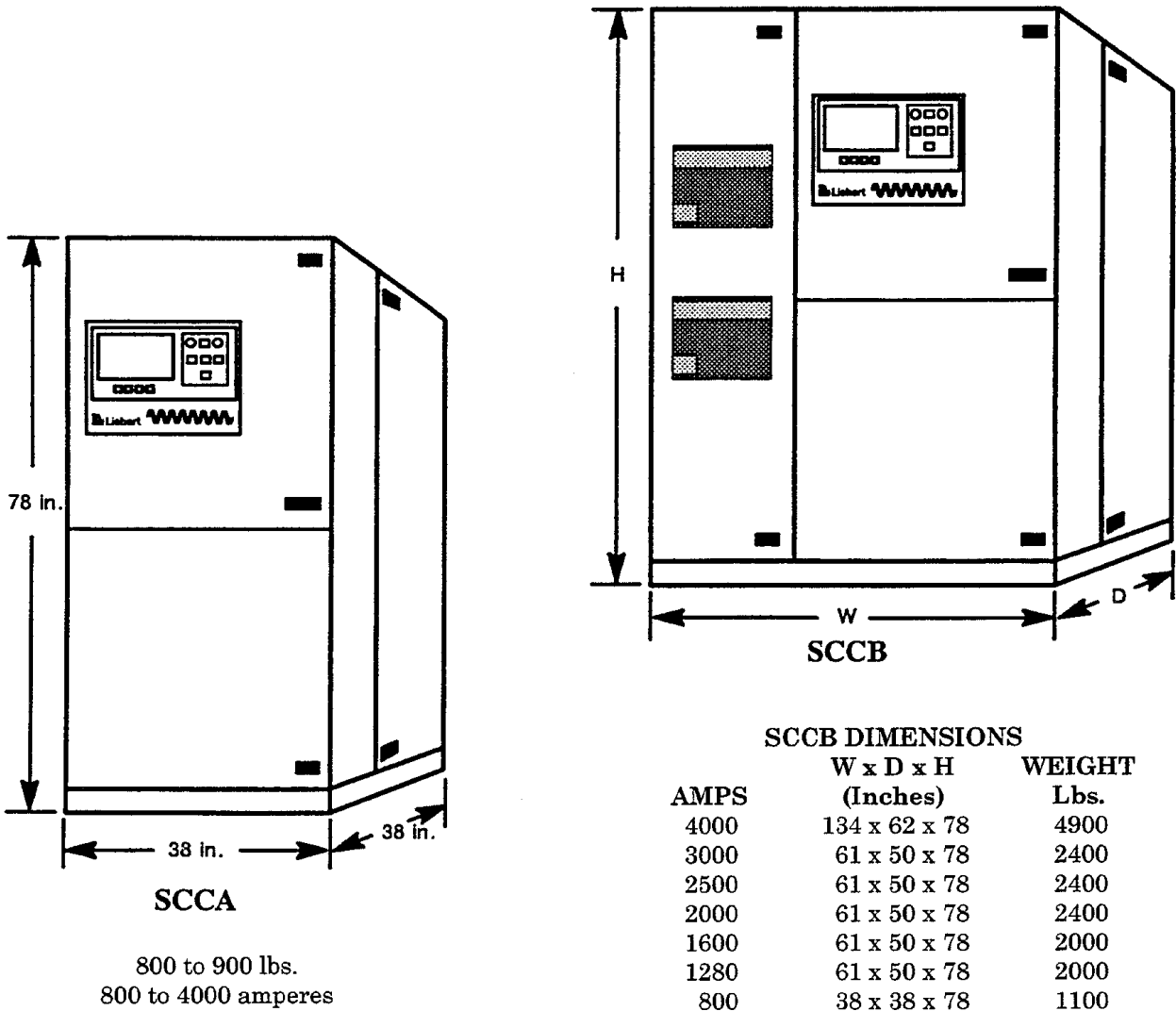
4.1 External Inspections

1. While the UPS system is still on the truck, inspect the equipment and shipping container(s) for any signs of damage or mishandling. Do not attempt to install the system if damage is apparent. If any damage is noted, file a damage claim with the shipping agency within 24 hours and contact Liebert Customer Service and Support at 1-800-543-2378 to inform them of the damage claim and the condition of the equipment.
2. Locate the bag containing the keys for the front access door. The bag is attached to the cabinet.
3. Compare the contents of the shipment with the bill of lading. Report any missing items to the carrier and to Liebert Customer Service and Support immediately.
4. Check the nameplate on the cabinets to verify that the model numbers correspond with the one specified. Record the model numbers and serial numbers in the front of this installation manual. A record of this information is necessary should servicing become required.

4.2 Internal Inspections

1. Verify that all items have been received.
2. If spare parts were ordered, verify arrival.
3. Open doors and remove cabinet panels to check for shipping damage to internal components.
4. Check for loose connections or unsecured components in the cabinet(s).
5. Check for installation of circuit breaker line safety shields. There should be no exposed circuit breaker terminals when the cabinet doors are opened.
6. Check for any unsafe condition that may be a potential safety hazard.
7. UPS modules are shipped with internally mounted shipping brackets. The shipping brackets (painted orange) must be removed from the rear (remove rear panels).

Figure 3 System Control Cabinets



TYPES OF SYSTEM CONTROL CABINETS (SCC)

- SCCA** A stand **alone** cabinet containing system control logic for up to six UPS modules, static bypass switch, manually operated disconnects for static bypass switch, but no motor operated system circuit breakers.
- SCCB** A stand alone cabinet containing all of the above plus 2 motor operated system circuit **breakers**.
- SCCC** An integrated configuration (like SCCI) with the static bypass switch rated for **continuous** duty.
- SCCI** System control logic and static bypass switch are **integrated** into a switchboard cabinet manufactured by others, which also includes the system circuit breakers.
- SCCP** A stand alone cabinet similar to SCCB except smaller in width (38 in.) and designed for two UPS modules (a **pair**). Current range is 240 to 2000 amperes. Weight ranges from 1000 to 1400 pounds.

5.0 EQUIPMENT LOCATION

1. Handle cabinets in accordance with **WARNINGS** in **3.0 - Unloading and Handling**. Use a suitable material handling device to move each cabinet to its final location. **Exercise extreme care because of the uneven weight distribution.**
2. Carefully lower the cabinets to the floor and position them for cabinet interconnection.
3. Verify that the UPS system is installed in a clean, cool and dry location.
4. Installation and serviceability will be easier if adequate access is provided on all sides of the equipment, but only access to the front and right side is required.
 - a. Verify that there is adequate clearance to open cabinet doors. See drawings and local codes (4 feet is recommended).
 - b. Verify that there is adequate area in front of circuit breakers to perform maintenance. Check installation drawings for location of breakers. Check with local codes.
 - c. Verify that there is adequate clearance above all cabinets to allow exhaust air to flow without restriction (2 feet minimum, unobstructed).
5. Connect the cabinets, internal cables, and bus bars. Refer to Shipping Split Details (**Figure 33** to **Figure 41**) and other drawings.

6.0 BATTERIES

6.1 Battery Safety Precautions

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

When replacing batteries, use the same number and type of batteries.



CAUTION

Lead-acid batteries contain hazardous materials. Batteries must be handled, transported, and recycled or discarded in accordance with federal, state, and local regulations. Because lead is a toxic substance, lead-acid batteries should be recycled rather than discarded.

Do not open or mutilate the battery or batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic. Do not dispose of battery or batteries in a fire. The battery may explode.

A battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on batteries:

- 1. Remove watches, rings, or other metal objects.**
- 2. Use tools with insulated handles.**
- 3. Wear rubber gloves and boots.**
- 4. Do not lay tools or metal parts on top of batteries.**
- 5. Disconnect charging source prior to connecting or disconnecting battery terminals.**
- 6. Determine if battery is inadvertently grounded. If inadvertently grounded, remove source of ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance.**

Lead-acid batteries can present a risk of fire because they generate hydrogen gas. The following procedures should be followed:

- 1. DO NOT SMOKE when near batteries.**
- 2. DO NOT cause flame or spark in battery area.**
- 3. Discharge static electricity from body before touching batteries by first touching a grounded metal surface.**

Battery Safety Precautions in French Per CSA Requirements

Instructions Importantes Concernant La Sécurité

Conserver Ces Instructions



ADVERTISSEMENT

DES PIÈCES SOUS ALIMENTATION SERONT LAISSÉES SANS PROTECTION DURANT CES PROCÉDURES D'ENTRETIEN. UN PERSONNEL QUALIFIÉ EST REQUIS POUR EFFECTUER CES TRAVAUX.

LES FUSIBLES A C.C. DE LA BATTERIE D'ACCUMULATEURS OPÈRENT EN TOUT TEMPS A LA TENSION NOMINALE. LA PRÉSENCE D'UN FUSIBLE A C.C. BRÛLÉ INDIQUE UN PROBLÈME SÉRIEUX. LE REMPLACEMENT DE CE FUSIBLE, SANS AVOIR DÉTERMINÉ LES RAISONS DE LA DÉFECTUOSITÉ, PEUT ENTRAÎNER DES BLESSURES OU DES DOMMAGES SÉRIEUX À L'ÉQUIPEMENT. POUR ASSISTANCE, APPELER LE DÉPARTEMENT DE SERVICE À LA CLIENTÈLE DE LIEBERT.



DANGER

Les accumulateurs plomb-acide contiennent de la matière comportant un certain risque. Les accumulateurs doivent être manipulés, transportés et recyclés ou éliminés en accord avec les lois fédérales, provinciales et locales. Parce que le plomb est une substance toxique, les accumulateurs plomb-acide devraient être recyclés plutôt qu'éliminés.

Il ne faut pas brûler le ou les accumulateurs. L'accumulateur pourrait alors exploser.

Il ne faut pas ouvrir ou endommager le ou les accumulateurs. L'électrolyte qui pourrait s'en échapper est dommageable pour la peau et les yeux.

Un accumulateur représente un risque de choc électrique et de haut courant de court-circuit. Lorsque des accumulateurs sont manipulés, les mesures préventives suivantes devraient être observées:

1. Retirer toutes montre, bagues ou autres objets métalliques.
2. Utiliser des outils avec manchon isolé.
3. Porter des gants et des bottes de caoutchouc.
4. Ne pas déposer les outils ou les pièces métalliques sur le dessus des accumulateurs.
5. Interrompre la source de charge avant de raccorder ou de débrancher les bornes de la batterie d'accumulateurs.
6. Déterminer si l'accumulateur est mis à la terre par erreur. Si oui, défaire cette mise à la terre. Tout contact avec un accumulateur mis à la terre peut se traduire en un choc électrique. La possibilité de tels chocs sera réduite si de telles mises à la terre sont débranchées pour la durée de l'installation ou de l'entretien.

Les accumulateurs plomb-acide présentent un risque d'incendie parce qu'ils génèrent des gaz à l'hydrogène. Les procédures suivantes devront être respectées.

1. **NE PAS FUMER** lorsque près des accumulateurs.
2. **NE PAS** produire de flammes ou d'étincelles près des accumulateurs.
3. Décharger toute électricité statique présente sur votre corps avant de toucher un accumulateur en touchant d'abord une surface métallique mise à la terre.



DANGER

L'électrolyte est un acide sulfurique dilué qui est dangereux au contact de la peau et des yeux. Ce produit est corrosif et aussi conducteur électrique. Les procédures suivantes devront être observées:

1. Porter toujours des vêtements protecteurs ainsi que des lunettes de protection pour les yeux.
2. Si l'électrolyte entre en contact avec la peau, nettoyer immédiatement en rinçant avec de l'eau.
3. Si l'électrolyte entre en contact avec les yeux, arroser immédiatement et généreusement avec de l'eau. Demander pour de l'aide médicale.
4. Lorsque l'électrolyte est renversée, la surface affectée devrait être nettoyée en utilisant un agent neutralisant adéquat. Une pratique courante est d'utiliser un mélange d'approximativement une livre (500 grammes) de bicarbonate de soude dans approximativement un gallon (4 litres) d'eau. Le mélange de bicarbonate de soude devra être ajouté jusqu'à ce qu'il n'y ait plus apparence de réaction (mousse). Le liquide résiduel devra être nettoyé à l'eau et la surface concernée devra être asséchée.

6.2 Battery Installation

A remote battery disconnect switch with overcurrent protection is required per the National Electrical Code. A disconnecting means (per UL1778) such as a module battery disconnect or battery isolation switch should be provided for each parallel string of batteries. Refer to **Figure 66** and **Figure 67**. Contact your Liebert sales representative regarding this option.

1. Install battery racks and batteries per manufacturer's installation and maintenance instructions.
2. Verify battery area has adequate ventilation and battery operating temperature complies with manufacturer's specification.

If you have any questions concerning batteries, battery racks, or accessories, contact Liebert Customer Service and Support at **1-800-543-2378**.

7.0 WIRING CONSIDERATIONS



WARNING

ALL POWER CONNECTIONS MUST BE COMPLETED BY A LICENSED ELECTRICIAN THAT IS EXPERIENCED IN WIRING THIS TYPE OF EQUIPMENT. WIRING MUST BE INSTALLED IN ACCORDANCE WITH ALL APPLICABLE NATIONAL AND LOCAL ELECTRICAL CODES. IMPROPER WIRING MAY CAUSE DAMAGE TO THE EQUIPMENT OR INJURY TO PERSONNEL.



WARNING

VERIFY THAT ALL INCOMING HIGH AND LOW VOLTAGE POWER CIRCUITS ARE DE-ENERGIZED AND LOCKED OUT BEFORE INSTALLING CABLES OR MAKING ANY ELECTRICAL CONNECTIONS.

Refer to **Appendix A - Series 600 UPS Site Planning Data** and installation drawings (**Figure 4** through **Figure 68**). Determine AC currents for your system (kVA, voltage, and optional input filter). Also refer to equipment nameplate for the model number, rating, and voltage. Refer to **Table 1** and **Table 2** for wire termination data.



NOTE

*Use 75°C copper wire. Select wire size based on the ampacities in **Table 3** of this manual, a reprint of Table 310-16 and associated notes of the National Electrical Code (NFPA 70).*



CAUTION

The weight of power cables must be adequately supported to avoid stress on bus bars and lugs. In addition to weight support, the following restraining method is recommended to control cable movement during external fault conditions: Wrap line cables together at 6 inches and 12 inches from the terminals with 5 wraps of 3/8 inch nylon rope or equivalent (tensile strength of 2000 pounds). Support remainder of cable with 5 wraps every 6 inches or 1 wrap every 1 inch.

| Abbreviations for Circuit Breakers | |
|------------------------------------|-----------------------------------|
| BFB | Bypass Feeder Breaker |
| BIB | Bypass Input Breaker |
| CB1 | Module Input Breaker |
| CB2 | Module Output Breaker |
| MBB | Maintenance Bypass Breaker |
| MBD | Module Battery Disconnect |
| MBFB | Maintenance Bypass Feeder Breaker |
| MIB | Maintenance Isolation Breaker |
| RIB | Rectifier Input Breaker |
| SBB | System Bypass Breaker |
| SBS | Static Bypass Switch |

Figure 4 Typical Multi-Module Configurations

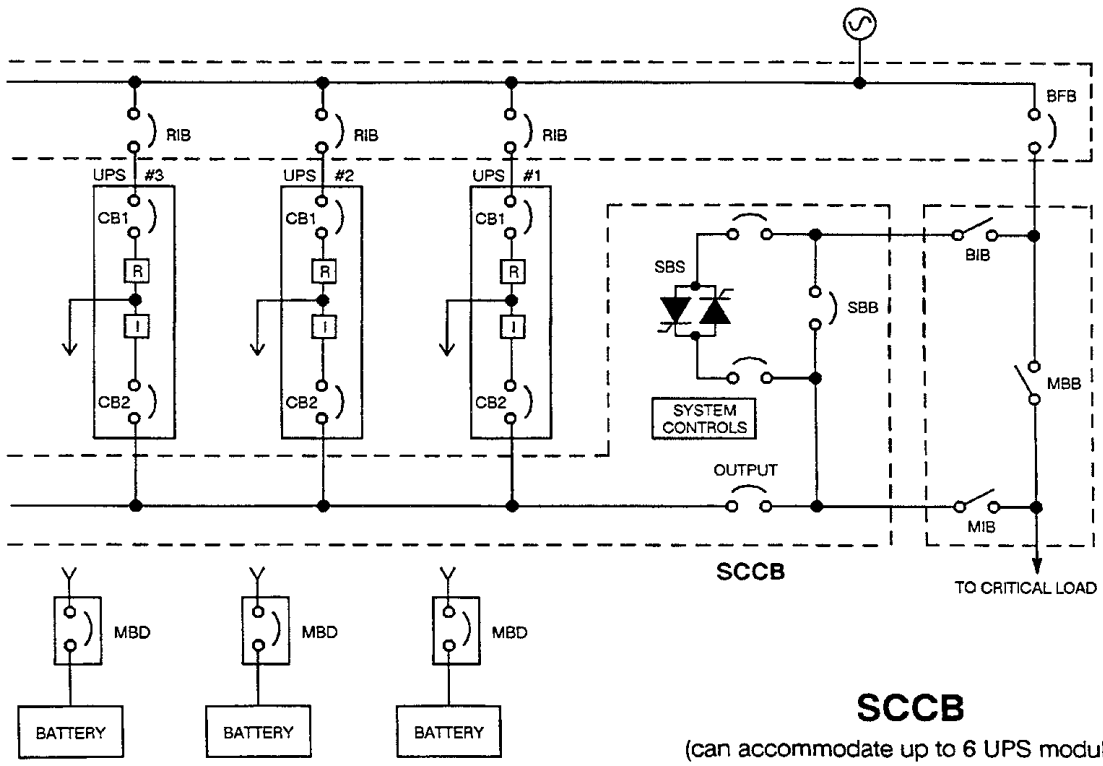
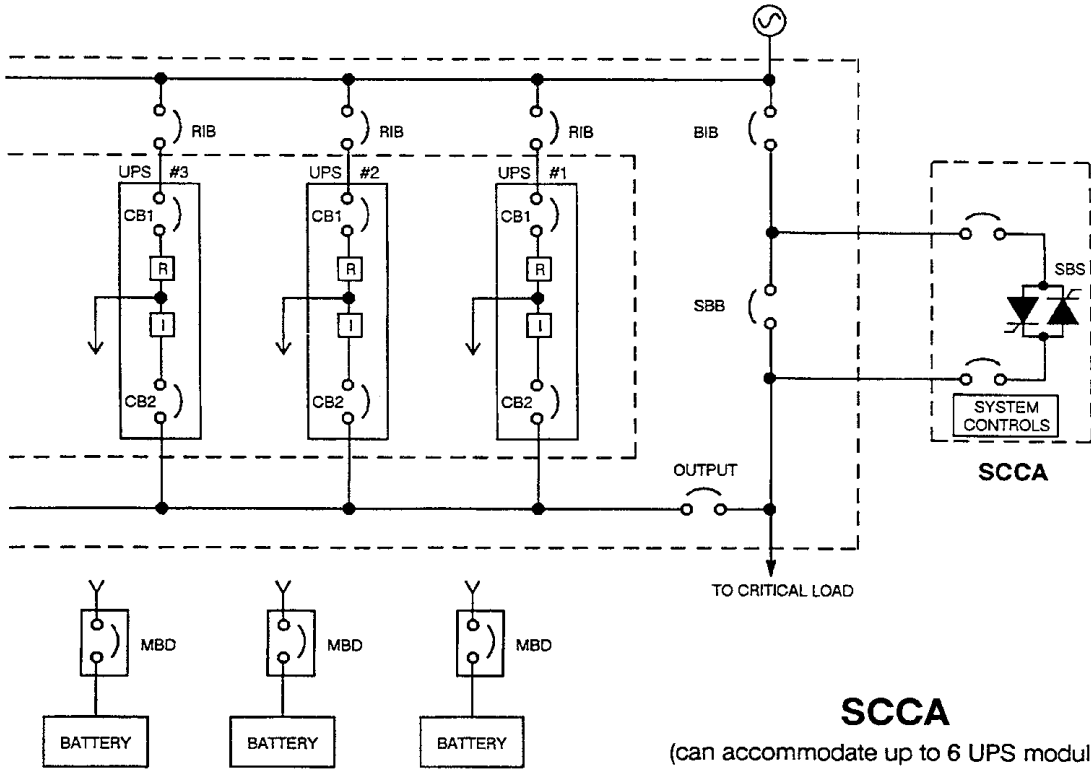
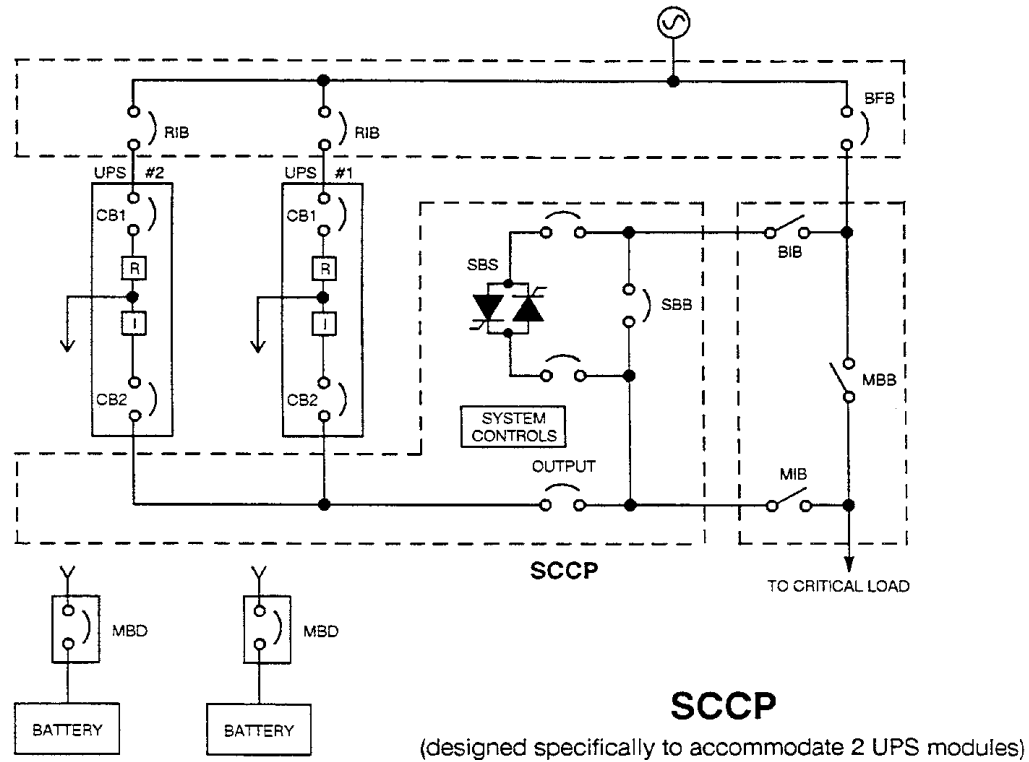
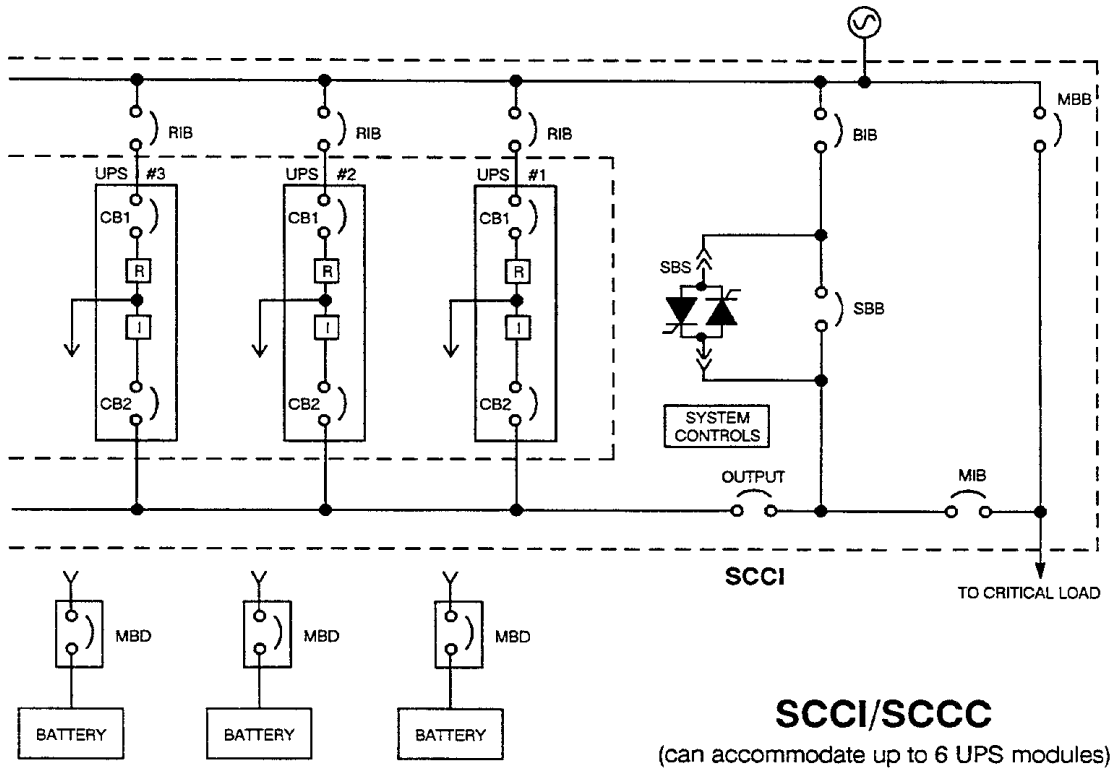


Figure 4 Typical Multi-Module Configurations (continued)



7.1 Power and Control Wiring

1. Power wiring must be run in individual, separate conduits or cable trays. Control wiring must be stranded and run in individual separate steel conduits.



CAUTION

Power and control wiring must be separated!

2. Observe local, state and national electrical codes. Verify utility power and its overcurrent protection rating will accommodate the UPS input rating, including battery recharging.
3. A safety ground wire must be run from building ground to ground point in the UPS Module Cabinet and the SCC. The grounding conductor shall comply with the following conditions of installation:
 - a. An insulated grounding conductor that is green, with or without one or more yellow stripes, is to be installed as part of the branch circuit that supplies the unit or system.
 - b. The grounding conductor described above is to be grounded to earth at the service equipment or, if supplied by a separately derived system, at the supply transformer or motor-generator set.
 - c. The attachment-plug receptacles in the vicinity of the unit or system are all to be of a grounding type, and the grounding conductors serving these receptacles are to be connected to earth ground at the service equipment.
4. Observe clockwise phase rotation of all power wiring. Phase A leads Phase B leads Phase C. A qualified electrician should check the phase rotation.
5. NEC Class I wiring methods are required for control and communication Class 2 circuits.

7.2 Battery Wiring

Power wiring to the batteries connects positive, negative, and ground power cables from the batteries to the associated UPS. Connection of the UPS to the batteries serves to both charge and discharge the batteries (when needed). The battery disconnect (circuit breaker) requires a control cable. Refer to **Figure 66** and **Figure 67**.



CAUTION

Be sure polarity is correct when wiring the batteries to the connected equipment (positive to positive; negative to negative). If polarity is not correct, fuse failures or equipment damage can result.

Call Liebert Customer Service and Support to schedule installation check-out and start-up.



NOTE

Inspection of the battery installation is a service that can be provided by Liebert. A Battery Specialist can perform a detailed inspection of the entire battery system to ensure it meets current IEEE standards. This inspection service is recommended because batteries are a very critical part of the UPS system.

8.0 WIRING CONNECTIONS



WARNING

VERIFY THAT ALL INCOMING HIGH AND LOW VOLTAGE POWER CIRCUITS ARE DE-ENERGIZED AND LOCKED OUT BEFORE INSTALLING CABLES OR MAKING ELECTRICAL CONNECTIONS.

ALL POWER CONNECTIONS MUST BE COMPLETED BY A LICENSED ELECTRICIAN EXPERIENCED IN WIRING UPS EQUIPMENT, AND IN ACCORDANCE WITH ALL APPLICABLE NATIONAL AND LOCAL ELECTRICAL CODES.

IMPROPER WIRING MAY CAUSE DAMAGE TO THE UPS OR INJURY TO PERSONNEL.



CAUTION

All shielded cables, non-shielded cables, non-shielded control wires, non-shielded battery breaker control wires, and non-shielded remote control wires must be housed in individual, separate, steel conduits. Placing multiple cables in the same conduit with other control or power wiring may cause system failure.

Refer to the drawings in this manual and any other drawings provided by Liebert for this installation. Make all of the following connections:

1. AC power cables from input power source circuit breaker (RIB) to UPS Module Input. Observe phase rotation.
2. AC power cables from bypass power source circuit breaker (BIB) to UPS system bypass input at System Control Cabinet (SCC). Observe phase rotation.
3. AC power cables from UPS Module Outputs to SCC or to switchgear for critical load bus. Observe phase rotation.
4. Each UPS Module Output Neutral to SCC or to switchgear for critical load bus.
5. The UPS System Output Neutral is connected to one common point and solidly grounded per requirements of the National Electrical Code. The ground connection inside the UPS SCC cabinet may be required by the power wiring configuration at your site.



CAUTION

UPS bypass and system output neutral must be connected to only one common point in the UPS system. This neutral line must be grounded at the source.

6. DC power cables (and ground) from battery to Module Battery Disconnect (MBD) circuit breaker, and then to UPS Module DC bus. Observe polarity. DC power cables should be installed in conduit with conductors in matched pairs (positive and negative).
7. Module Battery Disconnect control wiring to UPS Module. Module Battery Disconnect control wiring must be housed in individual separate steel conduit. Do not run in power circuit conduit.
8. Control wiring from System Control Cabinet (SCC) to UPS modules. Wiring must be run in individual separate steel conduit.
9. Power and control connections required for the Maintenance Bypass Switchboard.
10. Power connections from SCC to critical load bus. Observe phase rotation.
11. Control wiring to Remote Monitor Panel, if used. Selected alarm messages are also available for customer use through a set of contacts on a separate terminal board. Wiring must be run in individual separate steel conduit.
12. Emergency Power Off control wiring (to SCC) must be run in separate steel conduit.
13. Communications wiring (to SCC) for terminals, site monitoring, or modem must be run in separate steel conduit.
14. Any additional special wiring required at your site.

9.0 WIRING INSPECTION

1. Verify all power connections are tight.
2. Verify all control wire terminations are tight.
3. Verify all power wires and connections have proper spacing between exposed surfaces, phase-to-phase and phase-to-ground.
4. Verify that all control wires are run in individual, separate, steel conduit.

Table 1 Power Wiring Terminals - Factory Supplied

| Connection Type | | | | | |
|---|--|-----------|---|---------|--------|
| UPS Module Rating kVA | AC Input | AC Output | Battery | Neutral | Ground |
| 338 - 1000 | Lugs on circuit breakers, or bus bars (for field supplied lugs). Refer to installation drawings. | | Bus bars for connecting hardware (1/2" on 1-3/4" centers) are provided. A field supplied lug is required. | | |
| Use 75°C copper wire. Select wire size based on the ampacities in Table 310-16 (see Table 3 of this manual) and associated notes of the National Electrical Code (NFPA 70). | | | | | |
| Use commercially available solderless lugs for the wire size required for your application. Connect wire to the lug using tool and procedure specified by the lug manufacturer. | | | | | |

Table 2 Torque Specifications

| Nut and Bolt Combinations | | | | |
|---------------------------|------------------|-----|--|-----|
| Bolt Shaft Size | Grade 2 Standard | | Electrical Connections with Belleville Washers | |
| | Lb-in | N-m | Lb-in | N-m |
| 1/4 | 53 | 6.0 | 46 | 5.2 |
| 5/16 | 107 | 12 | 60 | 6.8 |
| 3/8 | 192 | 22 | 95 | 11 |
| 1/2 | 428 | 48 | 256 | 29 |

| Circuit Breakers With Compression Lugs (For Power Wiring) | | |
|---|-------|-----|
| Current Rating | Lb-in | N-m |
| 400 - 1200 Amps | 300 | 34 |

| Terminal Block Compression Lugs (For Control Wiring) | | |
|--|------------|------------|
| AWG Wire Size or Range | Lb-in | N-m |
| #22 - #14 | 3.5 to 5.3 | 0.4 to 0.6 |

Use the values in this table unless the equipment is labeled with a different torque value.

Table 3 Table 310-16

Allowable Ampacities of Insulated Conductors Rated 0-2000 Volts, 60° to 90°C (140° to 194°F)¹

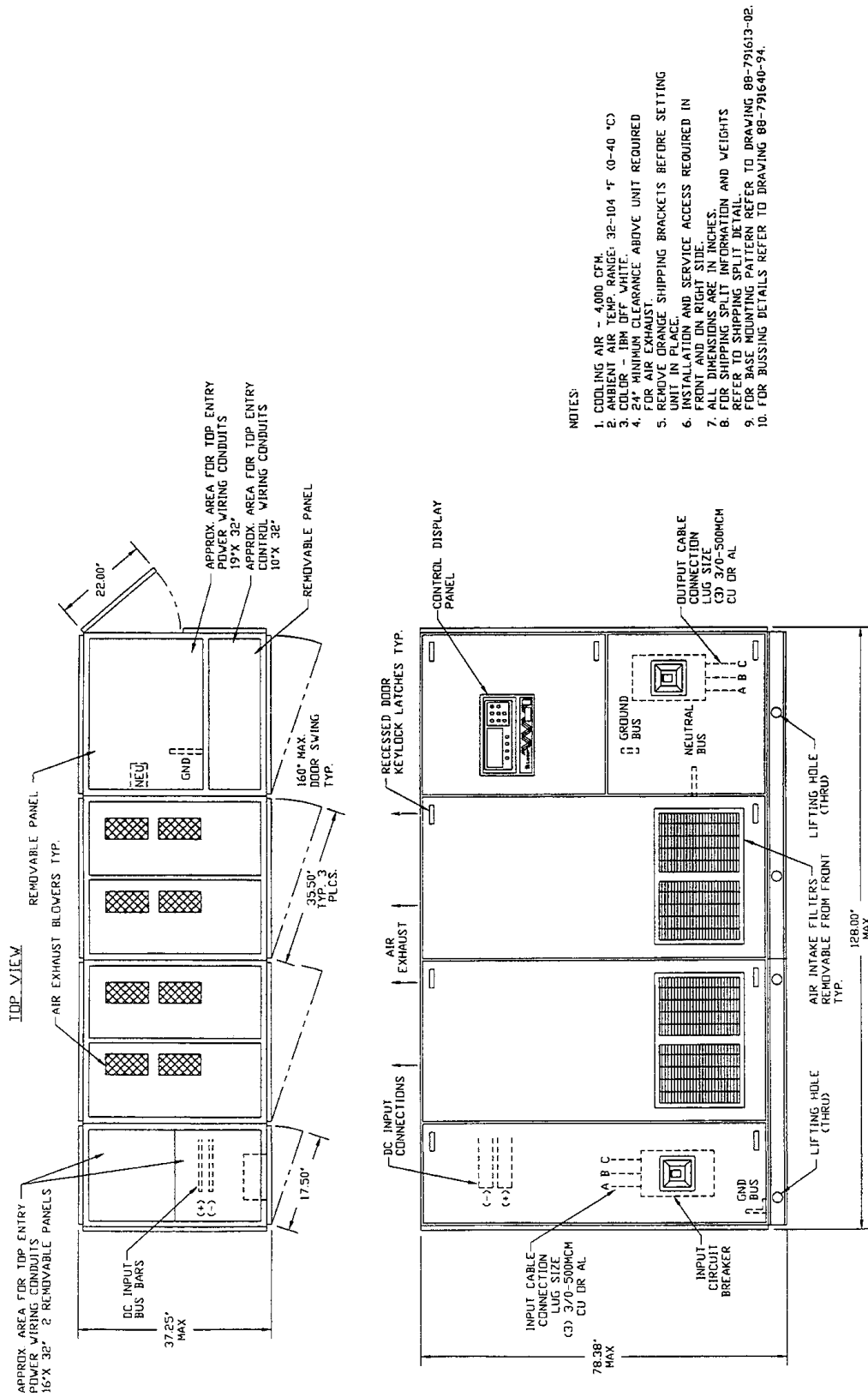
Not More than Three Conductors in Raceway or Cable or Earth (Directly Buried), based on Ambient Temperature of 30° (86°F)

| Size | Temperature Rating of Conductor. See Table 310-13. | | | | | | Size |
|---------------------------|---|---|--|---------------------|--|--|-----------------|
| | 60°C (140°F) | 75°C (167°F) | 90°C (194°F) | 60°C (140°F) | 75°C (167°F) | 90°C (194°F) | |
| | Types TW† UF† | Types FEPW+, RH,RHW†, THHW†, THW†, THWN†, XHHW†, USE†, ZW† | Types TBS, SA, SIS,FEP†, FEPB†,MI, RHH†, RHW-2 THHN†,THHW†, THW-2,THWN-2, USE-2, XHH, XHHW† XHHW-2,ZW-2 | Types TW† UF† | Types RH†, RHW†, THHW†, THW†, THWN†, XHHW†, USE† | Types TBS, SA,SIS, THHN†, THHW†, THWN-2, RHH†, RHW-2, USE-2, XHH, XHHW†, XHHW-2, ZW-2 | |
| Copper | | | Aluminum or Copper-Clad Aluminum | | | | |
| 18 | ..... | ..... | 14 | ..... | ..... | ..... | ..... |
| 16 | ..... | ..... | 18 | ..... | ..... | ..... | ..... |
| 14 | 20† | 20† | 25† | ..... | ..... | ..... | ..... |
| 12 | 25† | 25† | 30† | 20† | 20† | 25† | 12 |
| 10 | 30 | 35† | 40† | 25 | 30† | 35† | 10 |
| 8 | 40 | 50 | 55 | 30 | 40 | 45 | 8 |
| 6 | 55 | 65 | 75 | 40 | 50 | 60 | 6 |
| 4 | 70 | 85 | 95 | 55 | 65 | 75 | 4 |
| 3 | 85 | 100 | 110 | 65 | 75 | 85 | 3 |
| 2 | 95 | 115 | 130 | 75 | 90 | 100 | 2 |
| 1 | 110 | 130 | 150 | 85 | 100 | 115 | 1 |
| 1/0 | 125 | 150 | 170 | 100 | 120 | 135 | 1/0 |
| 2/0 | 145 | 175 | 195 | 115 | 135 | 150 | 2/0 |
| 3/0 | 165 | 200 | 225 | 130 | 155 | 175 | 3/0 |
| 4/0 | 195 | 230 | 260 | 150 | 180 | 205 | 4/0 |
| 250 | 215 | 255 | 290 | 170 | 205 | 230 | 250 |
| 300 | 240 | 285 | 320 | 190 | 230 | 255 | 300 |
| 350 | 260 | 310 | 350 | 210 | 250 | 280 | 350 |
| 400 | 280 | 335 | 380 | 225 | 270 | 305 | 400 |
| 500 | 320 | 380 | 430 | 260 | 310 | 350 | 500 |
| 600 | 355 | 420 | 475 | 285 | 340 | 385 | 600 |
| 700 | 385 | 460 | 520 | 310 | 375 | 420 | 700 |
| 750 | 400 | 475 | 535 | 320 | 385 | 435 | 750 |
| 800 | 410 | 490 | 555 | 330 | 395 | 450 | 800 |
| 900 | 435 | 520 | 585 | 355 | 425 | 480 | 900 |
| 1000 | 455 | 545 | 615 | 375 | 445 | 500 | 1000 |
| 1250 | 495 | 590 | 665 | 405 | 485 | 545 | 1250 |
| 1500 | 520 | 625 | 705 | 435 | 520 | 585 | 1500 |
| 1750 | 545 | 650 | 735 | 455 | 545 | 615 | 1750 |
| 2000 | 560 | 665 | 750 | 470 | 560 | 630 | 2000 |
| Correction Factors | | | | | | | |
| Ambient Temp °C | For ambient temperatures other than 30°C (86°F), multiply the allowable ampacities shown above by the appropriate factor shown below. | | | | | | Ambient Temp °F |
| 21-25 | 1.08 | 1.05 | 1.04 | 1.08 | 1.05 | 1.04 | 70-77 |
| 26-30 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 78-86 |
| 31-35 | .91 | .94 | .96 | .91 | .94 | .96 | 87-95 |
| 36-40 | .82 | .88 | .91 | .82 | .88 | .91 | 96-104 |
| 41-45 | .71 | .82 | .87 | .71 | .82 | .87 | 105-113 |
| 46-50 | .58 | .75 | .82 | .58 | .75 | .82 | 114-122 |
| 51-55 | .41 | .67 | .76 | .41 | .67 | .76 | 123-131 |
| 56-60 | ..... | .58 | .71 | ..... | .58 | .71 | 132-140 |
| 61-70 | ..... | .33 | .58 | ..... | .33 | .58 | 141-158 |
| 71-80 | ..... | ..... | .41 | ..... | ..... | .41 | 159-176 |

† Unless otherwise specifically permitted elsewhere in this Code, the overcurrent protection for conductor types marked with an obelisk (†) shall not exceed 15 amperes for No. 14, 20 amperes for No. 12, and 30 amperes for No. 10 copper; or 15 amperes for No. 12 and 25 amperes for No. 10 aluminum and copper-clad aluminum after any correction factors for ambient temperature and number of conductors have been applied.

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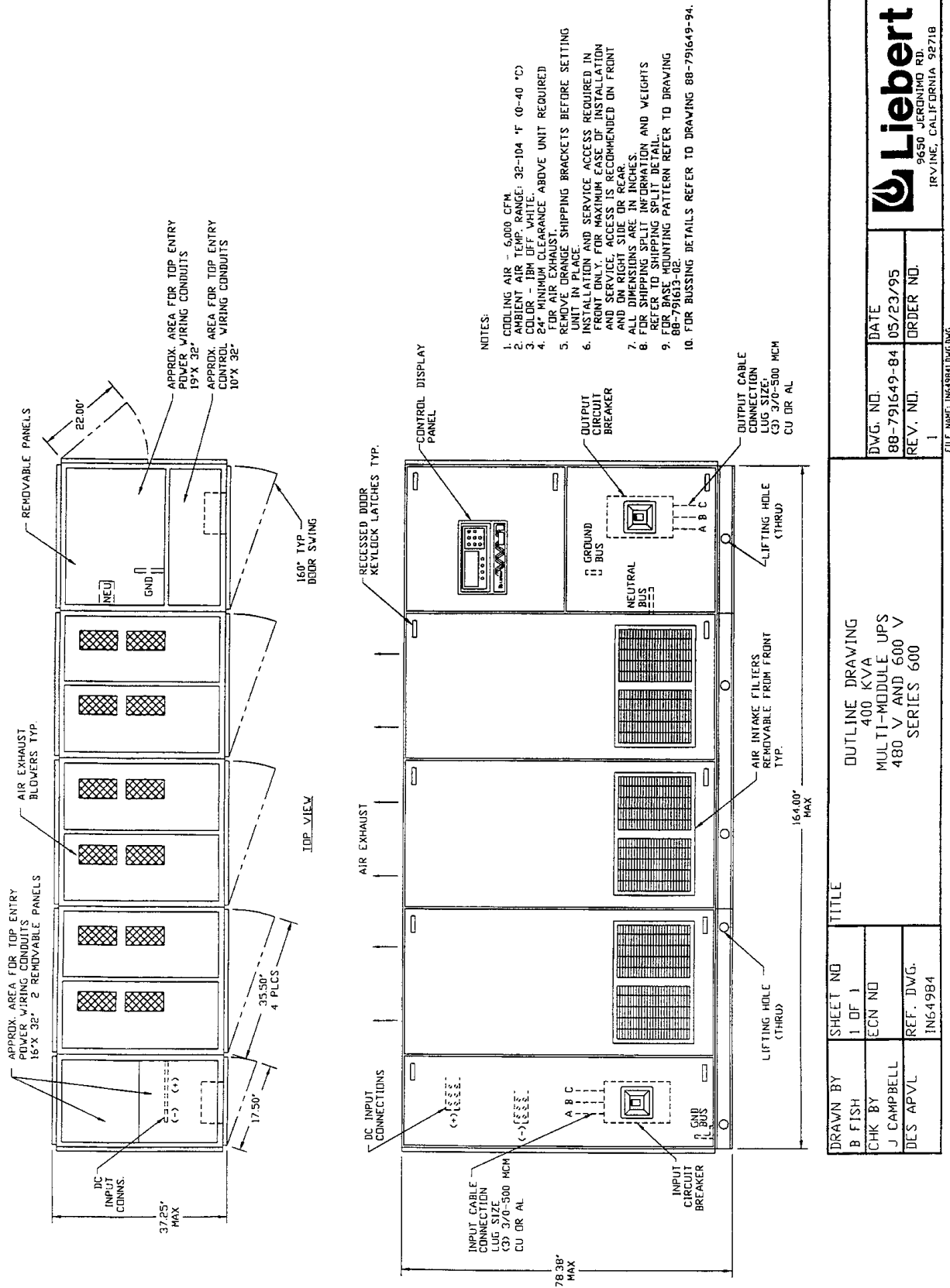
Figure 5 Outline Drawing, 338 kVA



| | | | | | |
|----------------------|--|--------------------------|--|--|--|
| DRAWN BY D MCKAY | | SHEET NO 1 OF 1 | | TITLE OUTLINE DRAWING 338 KVA MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791640-84 | |
| DES APVL | | REF. DWG. NO. ING4084 | | DATE 02/07/95 | |
| | | | | ORDER NO. | |
| | | | | REV. NO. 1 | |



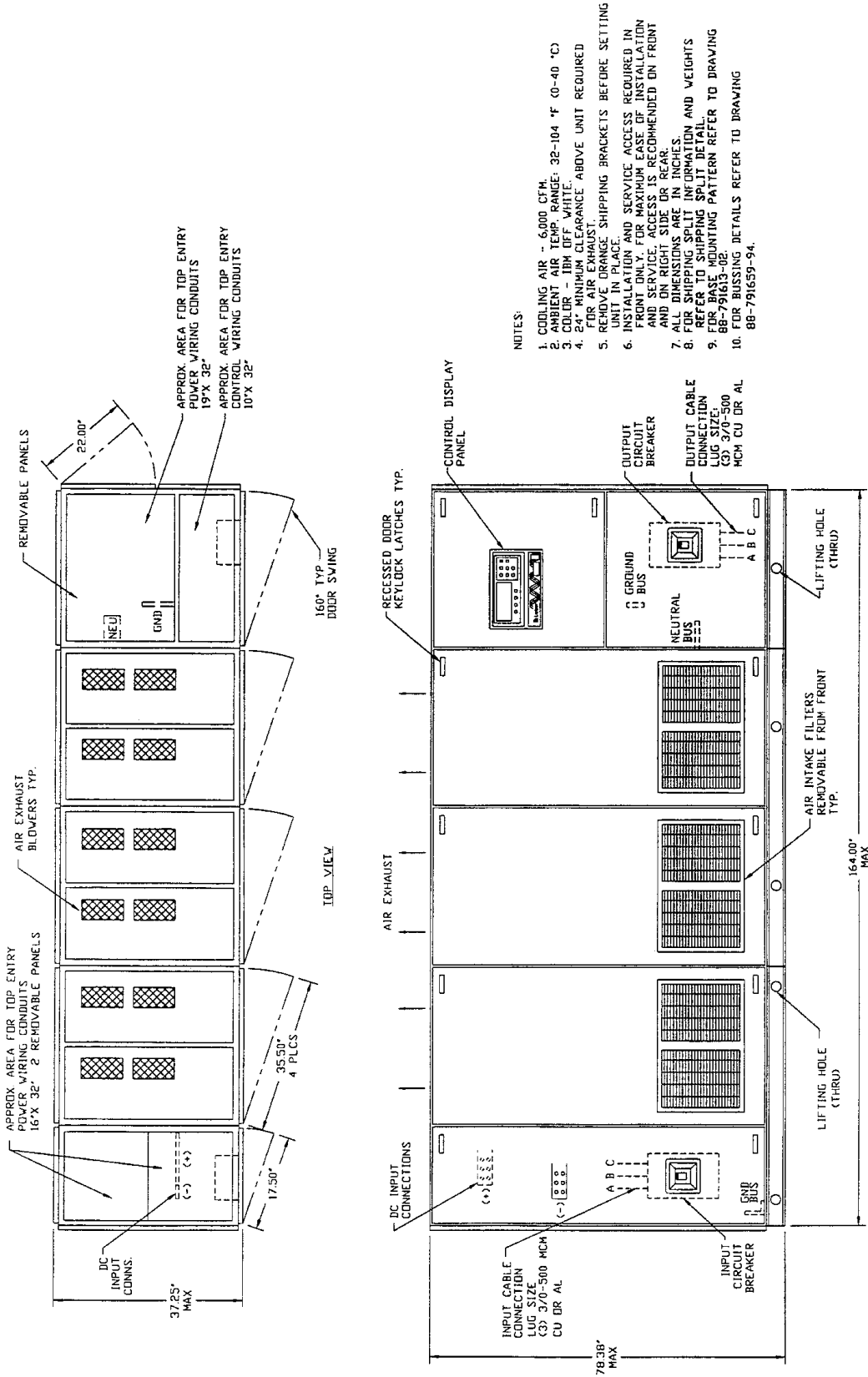
Figure 6 Outline Drawing, 400 kVA



| | |
|---|-----------|
| Liibert 9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | |
| DWG. NO. | DATE |
| 88-791649-84 | 05/23/95 |
| REV. NO. | ORDER NO. |
| 1 | |

| | |
|---|-----------|
| OUTLINE DRAWING 400 KVA MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | |
| DRAWN BY | SHEET NO |
| B FISH | 1 OF 1 |
| CHK BY | ECN NO |
| J CAMPBELL | |
| DES APVL | REF. DWG. |
| | IN64984 |

Figure 7 Outline Drawing, 500 kVA

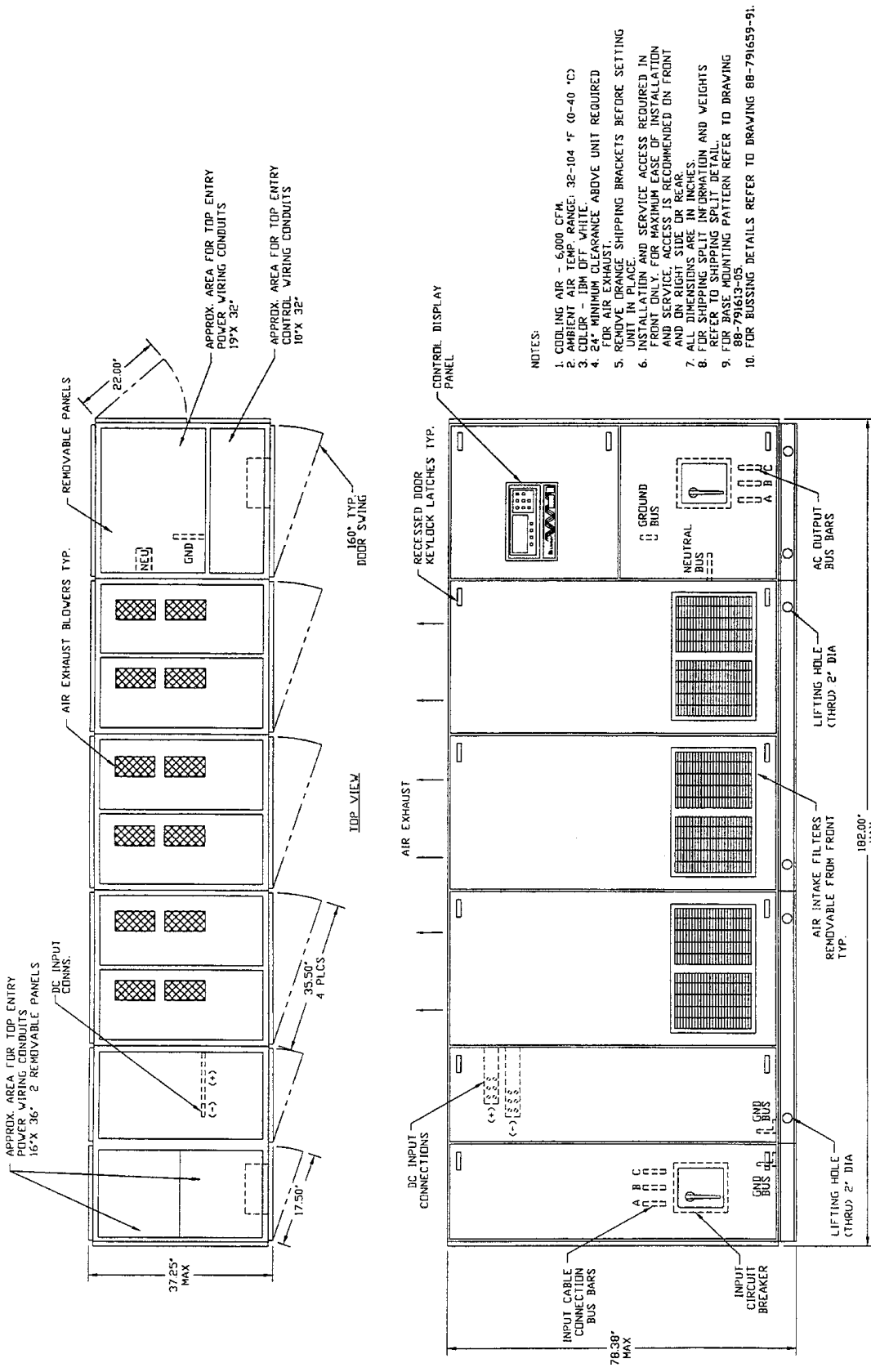


- NOTES:
1. COOLING AIR - 6,000 CFM.
 2. AMBIENT AIR TEMP. RANGE: 32-104 °F (0-40 °C)
 3. ALL DIMENSIONS ARE IN INCHES.
 4. 24" MINIMUM CLEARANCE ABOVE UNIT REQUIRED FOR AIR EXHAUST.
 5. REMOVE ORANGE SHIPPING BRACKETS BEFORE SETTING UNIT IN PLACE.
 6. INSTALLATION AND SERVICE ACCESS REQUIRED IN FRONT ONLY. FOR MAXIMUM EASE OF INSTALLATION AND SERVICE, ACCESS IS RECOMMENDED ON FRONT AND ON RIGHT SIDE OR REAR.
 7. ALL DIMENSIONS ARE IN INCHES.
 8. FOR SHIPPING WEIGHT INFORMATION AND WEIGHTS FOR BASE MOUNTING PATTERN REFER TO DRAWING 88-791613-02.
 9. FOR BASE MOUNTING PATTERN REFER TO DRAWING 88-791613-02.
 10. FOR BUSSING DETAILS REFER TO DRAWING 88-791659-94.

| | | | |
|--|---------------------|------------------|--|
| DWG. NO. 88-791659-84 | | DATE 05/30/95 | |
| REV. NO. 1 | | ORDER NO. | |
| TITLE OUTLINE DRAWING 500 KVA MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | | | |
| DRAWN BY B FISH | SHEET NO 1 OF 1 | TITLE | |
| CHK BY J CAMPBELL | ECN NO | TITLE | |
| DES APVL IN65984 | REF DWG. IN65984 | TITLE | |



Figure 8 Outline Drawing, 500 kVA, 208 VAC



NOTES:

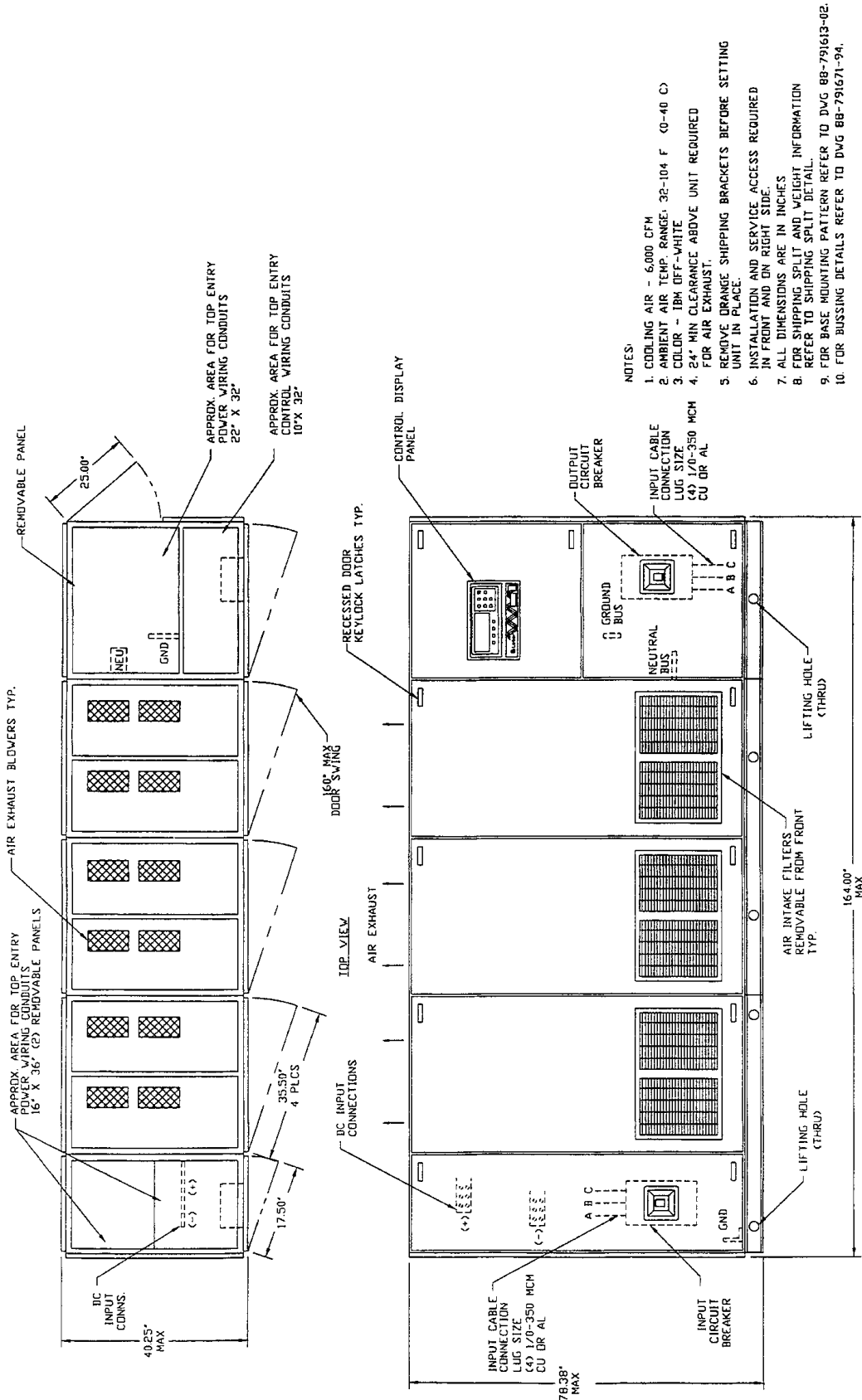
1. COOLING AIR - 6,000 CFM.
2. AMBIENT AIR TEMP. RANGE: 32-104 °F (0-40 °C)
3. AIR FLOW RATE: 1000 CFM
4. 24" MINIMUM CLEARANCE ABOVE UNIT REQUIRED FOR AIR EXHAUST
5. REMOVE ORANGE SHIPPING BRACKETS BEFORE SETTING UNIT IN PLACE
6. INSTALLATION AND SERVICE ACCESS REQUIRED IN FRONT ONLY. FOR MAXIMUM EASE OF INSTALLATION AND SERVICE, ACCESS IS RECOMMENDED ON FRONT AND ON RIGHT SIDE OR REAR.
7. ALL DIMENSIONS ARE IN INCHES.
8. FOR SHIPPING, SPLIT INFORMATION AND WEIGHTS REFER TO SHIPPING PATTERN REF ID DRAWING 88-791659-05
9. FOR BUSSING DETAILS REFER TO DRAWING 88-791659-91.
10. FOR BUSSING DETAILS REFER TO DRAWING 88-791659-91.

| | | | | | |
|----------------------|--|----------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE OUTLINE DRAWING 500 KVA MULTI-MODULE UPS 208 V INPUT - 208 / 120 V OUTPUT SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791659-81 | |
| DES APVL | | REF. DWG. IN65981 | | DATE 05/30/95 | |
| | | | | ORDER NO. | |



FILE NAME: INS8811.DWG

Figure 9 Outline Drawing, 625 kVA

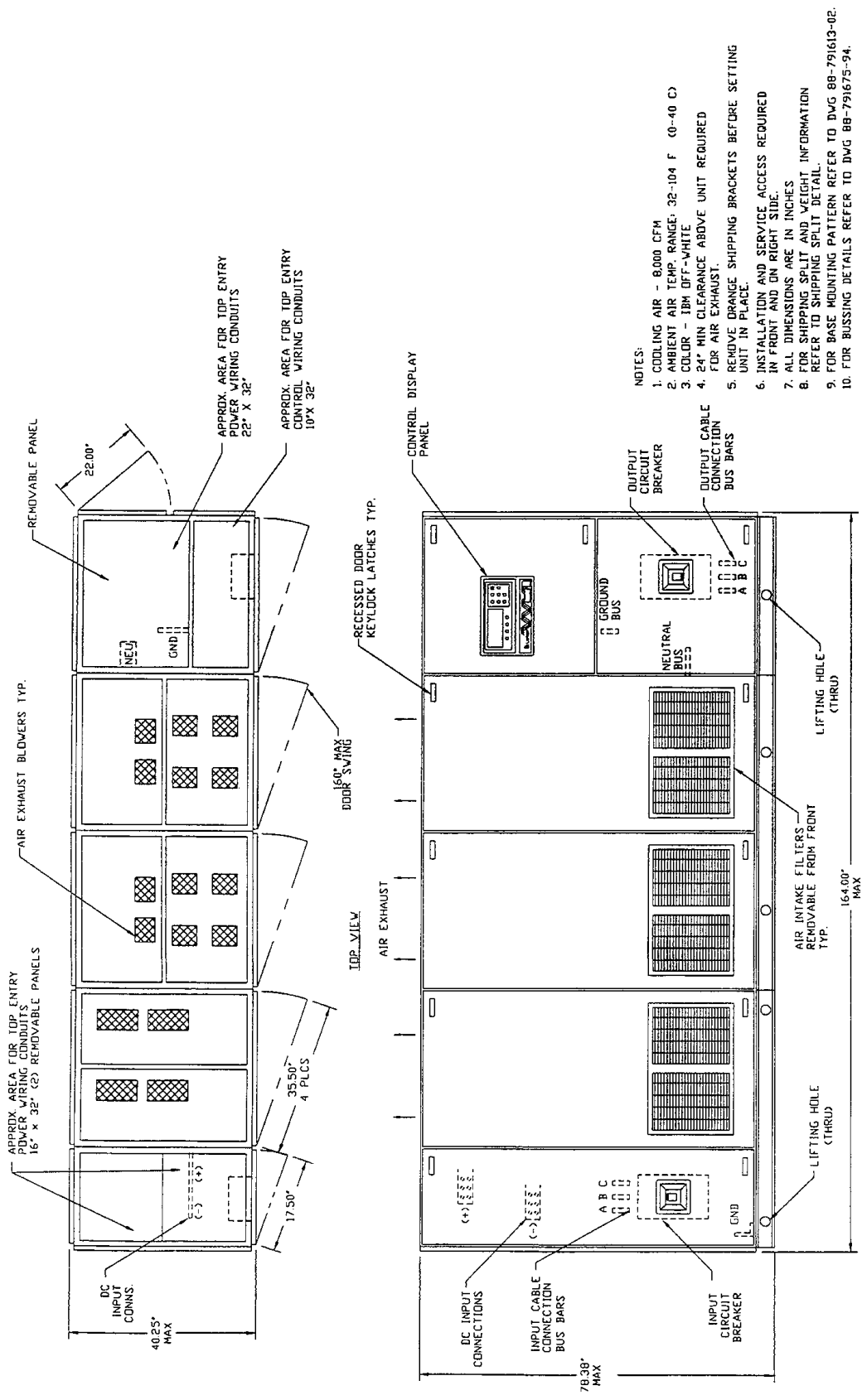


- NOTES:
1. COOLING AIR - 6,000 CFM
 2. AMBIENT AIR TEMP. RANGE: 32-104 F (0-40 C)
 3. COLOR - 1BM OFF-WHITE
 4. 24" MIN CLEARANCE ABOVE UNIT REQUIRED FOR AIR EXHAUST.
 5. REMOVE ORANGE SHIPPING BRACKETS BEFORE SETTING UNIT IN PLACE.
 6. INSTALLATION AND SERVICE ACCESS REQUIRED IN FRONT AND ON RIGHT SIDE.
 7. ALL DIMENSIONS ARE IN INCHES
 8. FOR SHIPPING SPLIT AND WEIGHT INFORMATION REFER TO SHIPPING PATTERN DETAIL.
 9. FOR BASE MOUNTING PATTERN REFER TO DWG 88-791613-02.
 10. FOR BUSSING DETAILS REFER TO DWG 88-791671-94.

| | | | | | |
|----------------------|--|----------------------|--|--|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE OUTLINE DRAWING 625 KVA MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791671-84 | |
| DES' APVL | | REF. DWG. 1N67184 | | DATE 05/31/95 | |
| | | | | ORDER NO. | |
| | | | | REV. NO. 1 | |
| | | | | FILE NAME: INST181DWG | |



Figure 10 Outline Drawing, 750 kVA (High Link - 240 Cells)



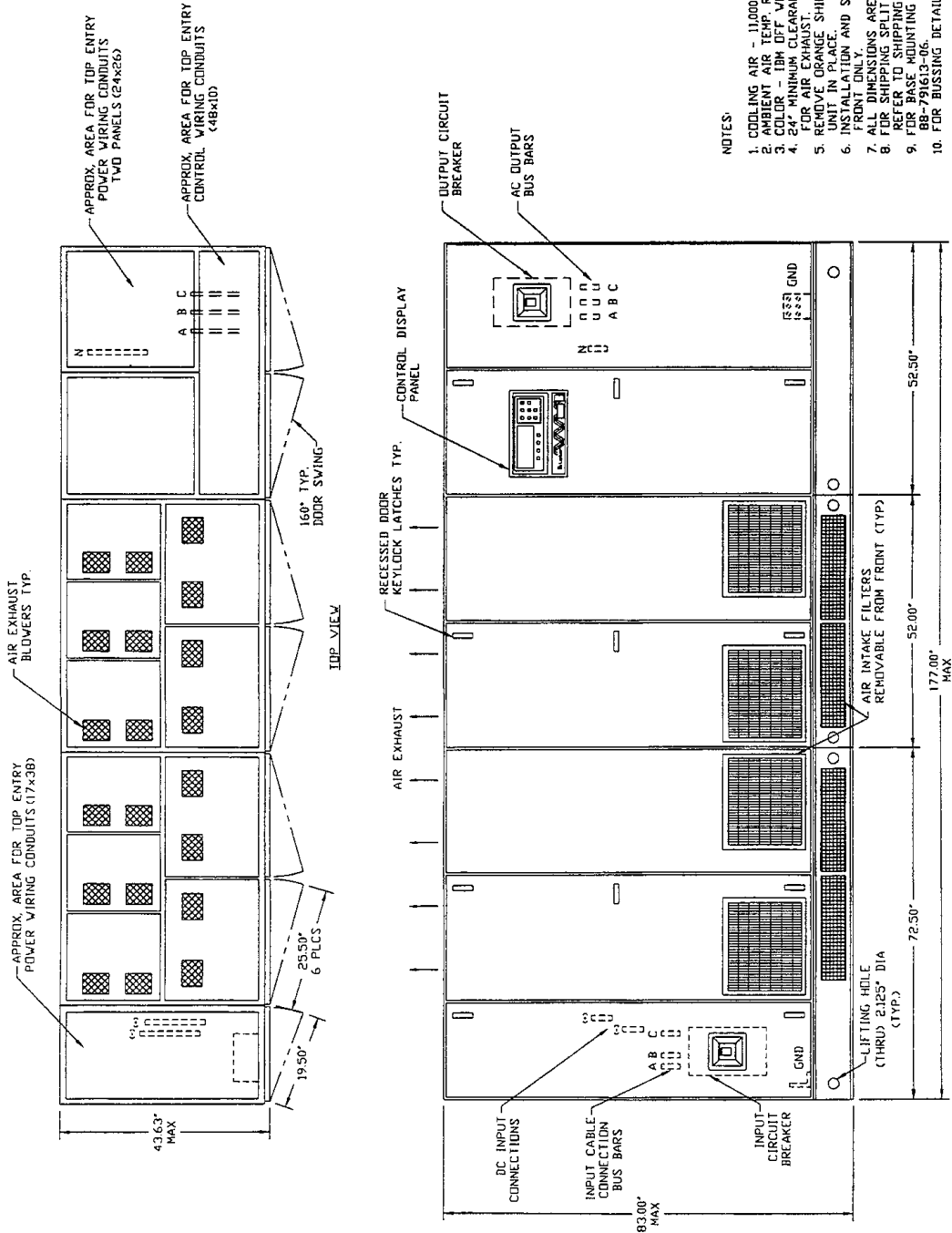
- NOTES:
1. COOLING AIR - 8,000 CFM
 2. AMBIENT AIR TEMP. RANGE: 32-104 F (0-40 C)
 3. COLOR - IBM OFF-WHITE
 4. 24" MIN CLEARANCE ABOVE UNIT REQUIRED FOR AIR EXHAUST.
 5. REMOVE DRANCE SHIPPING BRACKETS BEFORE SETTING UNIT IN PLACE.
 6. INSTALLATION AND SERVICE ACCESS REQUIRED IN FRONT AND ON RIGHT SIDE.
 7. ALL DIMENSIONS ARE IN INCHES
 8. FOR SHIPPING SPLIT AND WEIGHT INFORMATION REFER TO SHIPPING SPLIT DETAIL.
 9. FOR BASE BUSSING PATTERN REFER TO DWG 88-791613-02.
 10. FOR BASE BUSSING DETAILS REFER TO DWG 88-791675-94.

| | | | | | |
|----------------------|--|----------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE OUTLINE DRAWING 750 KVA - 240 CELL MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791675-84 | |
| DES APVL | | REF. DWG. ING7584 | | DATE 06/01/95 | |
| | | | | ORDER NO. | |

FILE NAME: ING7584.DWG



Figure 11 Outline Drawing, 750 kVA (Low Link - 180 Cells)



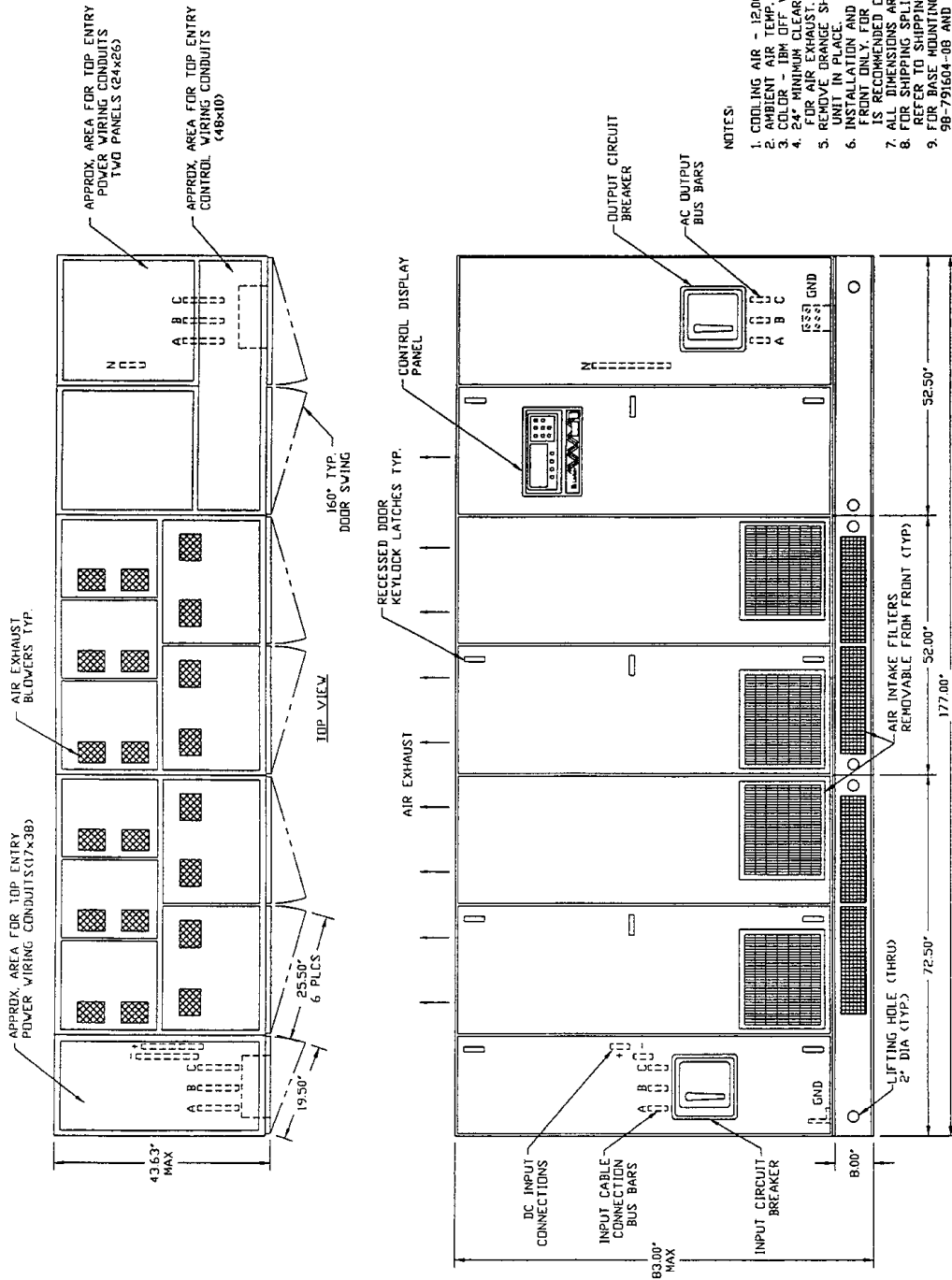
- NOTES:
1. COOLING AIR - 11,000 CFM.
 2. AMBIENT AIR TEMP. RANGE. 32-104 °F (0-40 °C)
 3. COLOR - 1BM OFF WHITE.
 4. 2" MINIMUM CLEARANCE ABOVE UNIT REQUIRED
 5. REMOVE ORANGE SHIPPING BRACKETS BEFORE SETTING UNIT IN PLACE
 6. INSTALLATION AND SERVICE ACCESS REQUIRED IN FRONT ONLY.
 7. ALL DIMENSIONS ARE IN INCHES.
 8. FOR SHIPPING SPLIT INFORMATION AND WEIGHTS REFER TO SHIPPING SPLIT DETAIL.
 9. FOR BASE MOUNTING PATTERN REFER TO DRAWING 88-791613-06.
 10. FOR BUSSING DETAIL REFER TO DRAWING 88-791676-44.

| | | | | | |
|----------------------|--|--------------------------|--|-------------------------------|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE OUTLINE DRAWING | |
| CHK BY J CAMPBELL | | EON NO | | 750 KVA - 180 CELL | |
| DES APVL | | REF. DWG. IN67624 | | FRONT ACCESS MULTI-MODULE UPS | |
| | | DWG. NO. 88-791676-24 | | DATE 06/06/95 | |
| | | REV. NO. | | ORDER NO. | |
| | | 1 | | 1 | |



FILE NAME: IN67624.DWG

Figure 12 Outline Drawing, 1000 kVA

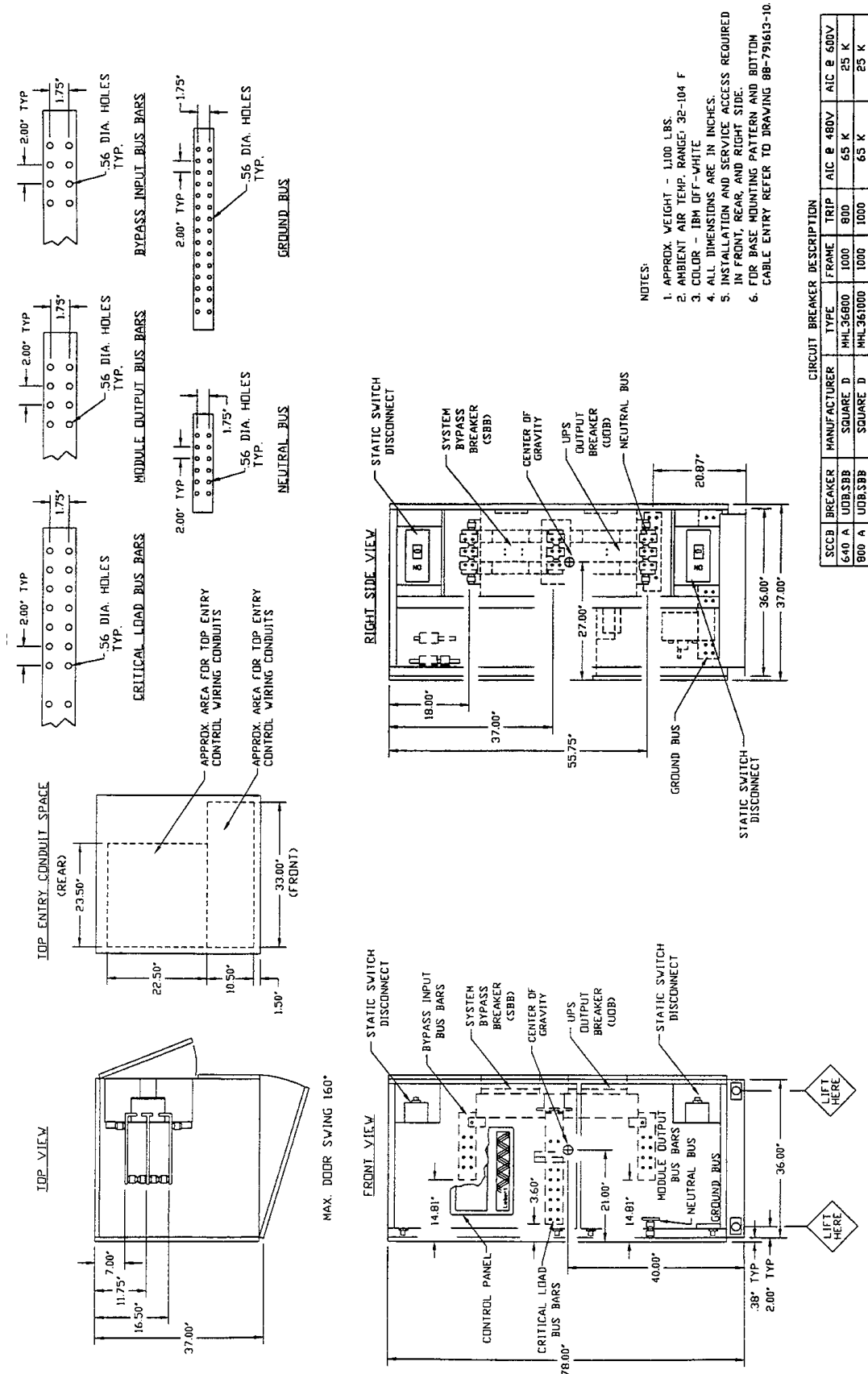


- NOTES:
1. COOLING AIR - 12000 CFM.
 2. AMBIENT AIR TEMP. RANGE. 32-104 °F (0-40 °C)
 3. COLOR - IBM OFF WHITE.
 4. 24" MINIMUM CLEARANCE ABOVE UNIT REQUIRED FOR AIR EXHAUST.
 5. REMOVE ORANGE SHIPPING BRACKETS BEFORE SETTING UNIT IN PLACE.
 6. INSTALLATION AND SERVICE ACCESS REQUIRED IN REAR OF UNIT FOR REAR AND RIGHT SIDE ACCESS.
 7. ALL DIMENSIONS ARE IN INCHES.
 8. FOR SHIPPING SPLIT INFORMATION AND WEIGHTS REFER TO SHIPPING PATTERN DETAIL.
 9. FOR BASE MOUNTING PATTERN REFER TO DRAWING 98-791604-08 AND 98-791604-09.
 10. FOR BUSSING DETAIL REFER TO DRAWING 88-791685-44.

| | | | | | |
|----------------------|--|----------------------|--|--|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE OUTLINE DRAWING 1000 KVA FRONT ACCESS MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791685-24 | |
| DES APVL | | REF. DWG. IN68524 | | DATE 06/07/95 | |
| | | | | ORDER NO. | |



Figure 13 Outline Drawing, System Control Cabinet (SCCB) 640 to 800 Amps

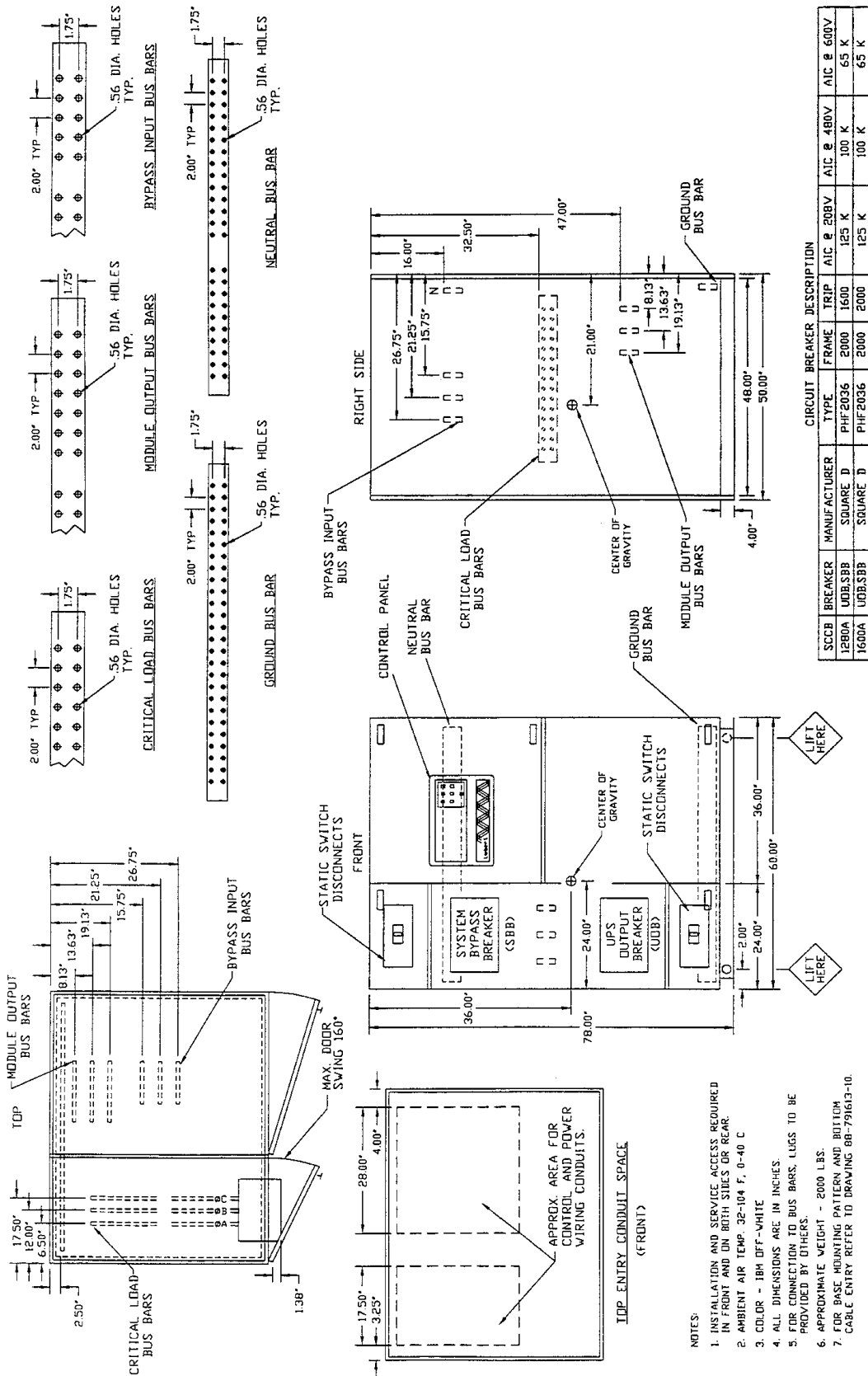


Liabert
 9650 JERONIMO RD.
 IRVINE, CALIFORNIA 92718

FILE NAME: IN61423.DWG

| | | | |
|------------|-----------|-------------------------------|-----------|
| DRAWN BY | SHEET NO | TITLE | |
| B FISH | 1 OF 1 | SYSTEM CONTROL CABINET (SCCB) | |
| CHK BY | ECN NO | 640 800 AMP | |
| J CAMPBELL | | SERIES 600 | |
| DES APVL | REF. DWG. | DWG. NO. | DATE |
| | IN61423 | 88-791614-23 | 06/08/95 |
| | | REV. NO. | ORDER NO. |
| | | 1 | |

Figure 14 Outline Drawing, System Control Cabinet (SCCB) 1280 to 1600 Amps

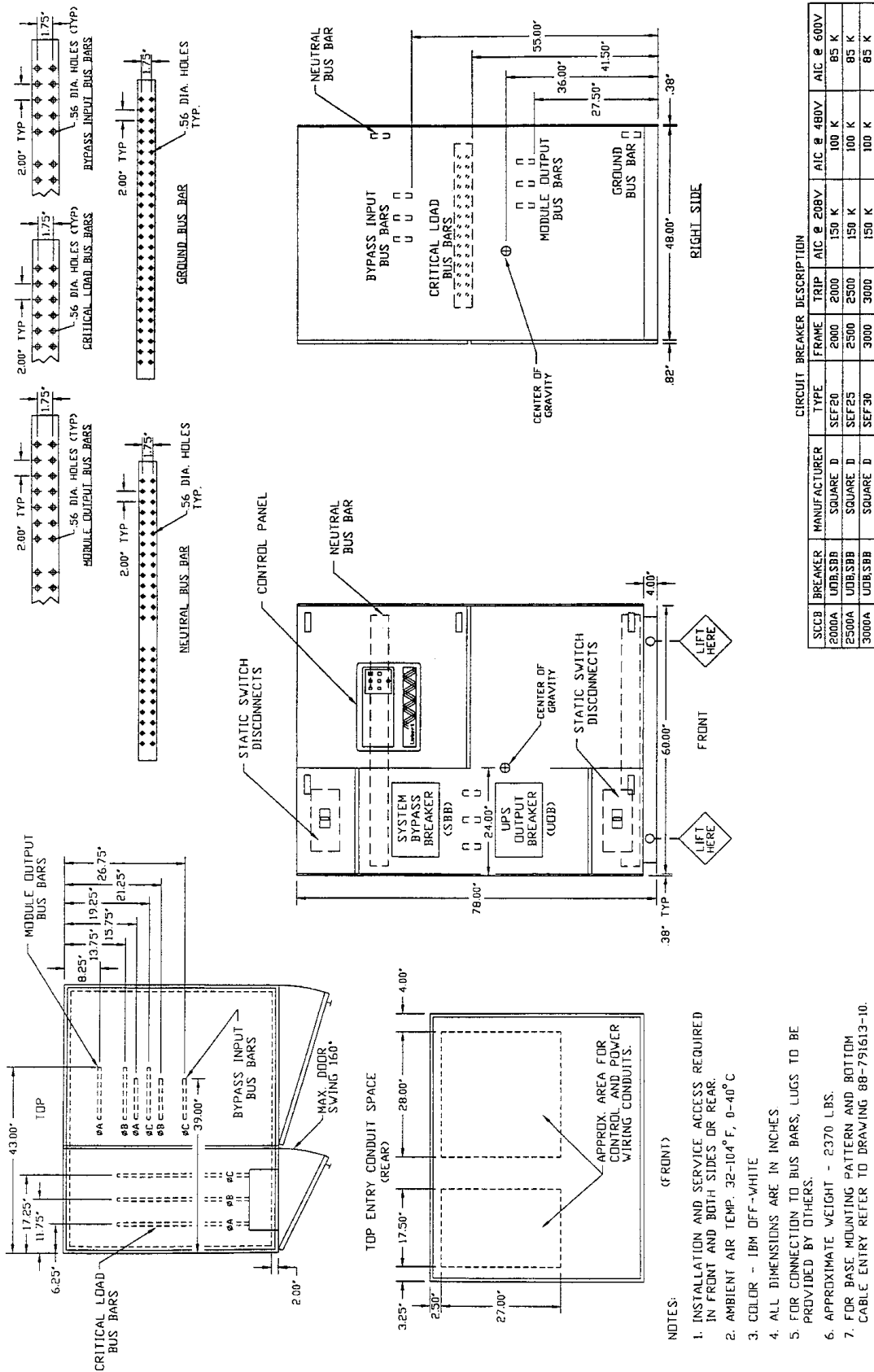


| CIRCUIT BREAKER DESCRIPTION | | | | | |
|-----------------------------|--------------|---------|-------|------|------------|
| SCCB BREAKER | MANUFACTURER | TYPE | FRAME | TRIP | AIC @ 600V |
| 1280A | UDS/SBB | PHF2036 | 2000 | 1600 | 100 K |
| 1600A | UDS/SBB | PHF2036 | 2000 | 2000 | 100 K |
| | | | | | 65 K |
| | | | | | 65 K |

- NOTES:
1. INSTALLATION AND SERVICE ACCESS REQUIRED IN FRONT AND ON BOTH SIDES OR REAR.
 2. AMBIENT AIR TEMP. 32-104 F. 0-40 C
 3. COLOR - 1BM OFF-WHITE
 4. ALL DIMENSIONS ARE IN INCHES.
 5. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 6. APPROXIMATE WEIGHT - 2000 LBS.
 7. FOR BASE MOUNTING PATTERN AND BOTTOM CABLE ENTRY REFER TO DRAWING 88-791610-10.

| | | | |
|---|----------------------|--|------------------|
| DRAWN BY B FISH | SHEET NO 1 OF 1 | TITLE OUTLINE DRAWING SYSTEM CONTROL CABINET (SCCB) 1280 - 1600 AMP SERIES 600 | |
| | | ECN NO | DATE 06/08/95 |
| CHK BY J CAMPBELL | REF. DWG. IN61424 | REV. NO. 1 | ORDER NO. |
| 9650 FERNWOOD RD. IRVINE, CALIFORNIA 92718 | | | |

Figure 15 Outline Drawing, System Control Cabinet (SCCB) 2000 to 3000 Amps



CIRCUIT BREAKER DESCRIPTION

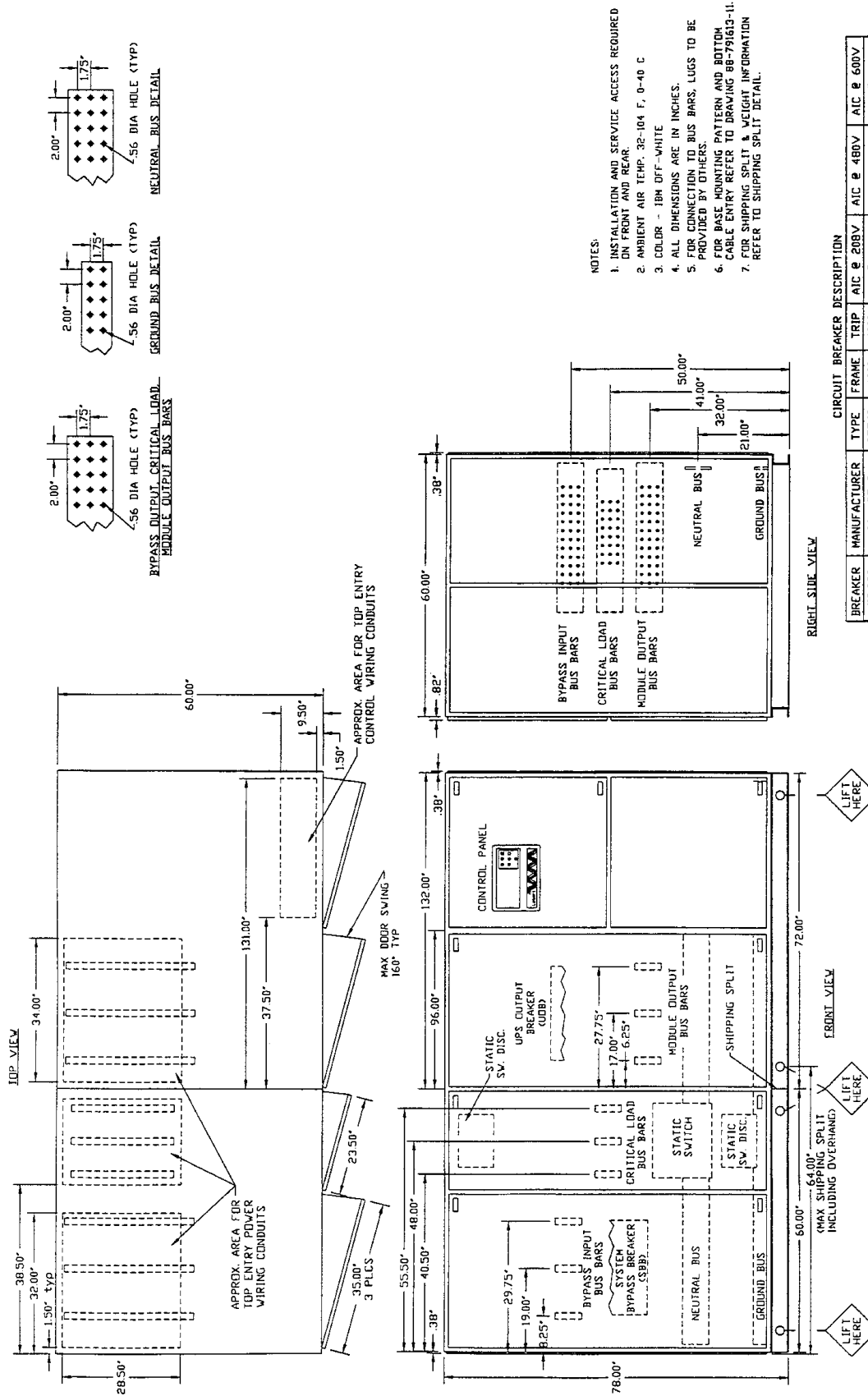
| SCCB BREAKER | MANUFACTURER | TYPE | FRAME | TRIP | AIC @ 208V | AIC @ 480V | AIC @ 600V |
|--------------|--------------|-------|-------|-------|------------|------------|------------|
| 2000A | SQUARE D | SEF20 | 2000 | 150 K | 100 K | 100 K | 85 K |
| 2500A | SQUARE D | SEF25 | 2500 | 150 K | 100 K | 100 K | 85 K |
| 3000A | SQUARE D | SEF30 | 3000 | 3000 | 150 K | 100 K | 85 K |

| | | | |
|--|--|----------------------|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | |
| CHK BY J CAMPBELL | | ECN NO | |
| DES APVL | | REF. DWG. IN61425 | |
| TITLE OUTLINE DRAWING SYSTEM CONTROL CABINET (SCCB) 2000 - 3000 AMP SERIES 600 | | | |
| DWG. NO. 88-791614-25 | | DATE 06/08/95 | |
| REV. NO. 1 | | ORDER NO. | |



FILE NAME: IN61425.DWG

Figure 16 Outline Drawing, System Control Cabinet (SCCB) 4000 Amps



- NOTES:
1. INSTALLATION AND SERVICE ACCESS REQUIRED ON FRONT AND REAR.
 2. AMBIENT AIR TEMP. 32-104 F. 0-40 C
 3. COLOR - 1BM DTF-WHITE
 4. ALL DIMENSIONS ARE IN INCHES.
 5. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 6. FOR BASE MOUNTING PATTERN AND BOTTOM CABLE ENTRY REFER TO DRAWING 88-791613-11.
 7. FOR SHIPPING SPLIT & WEIGHT INFORMATION REFER TO SHIPPING SPLIT DETAIL.

CIRCUIT BREAKER DESCRIPTION

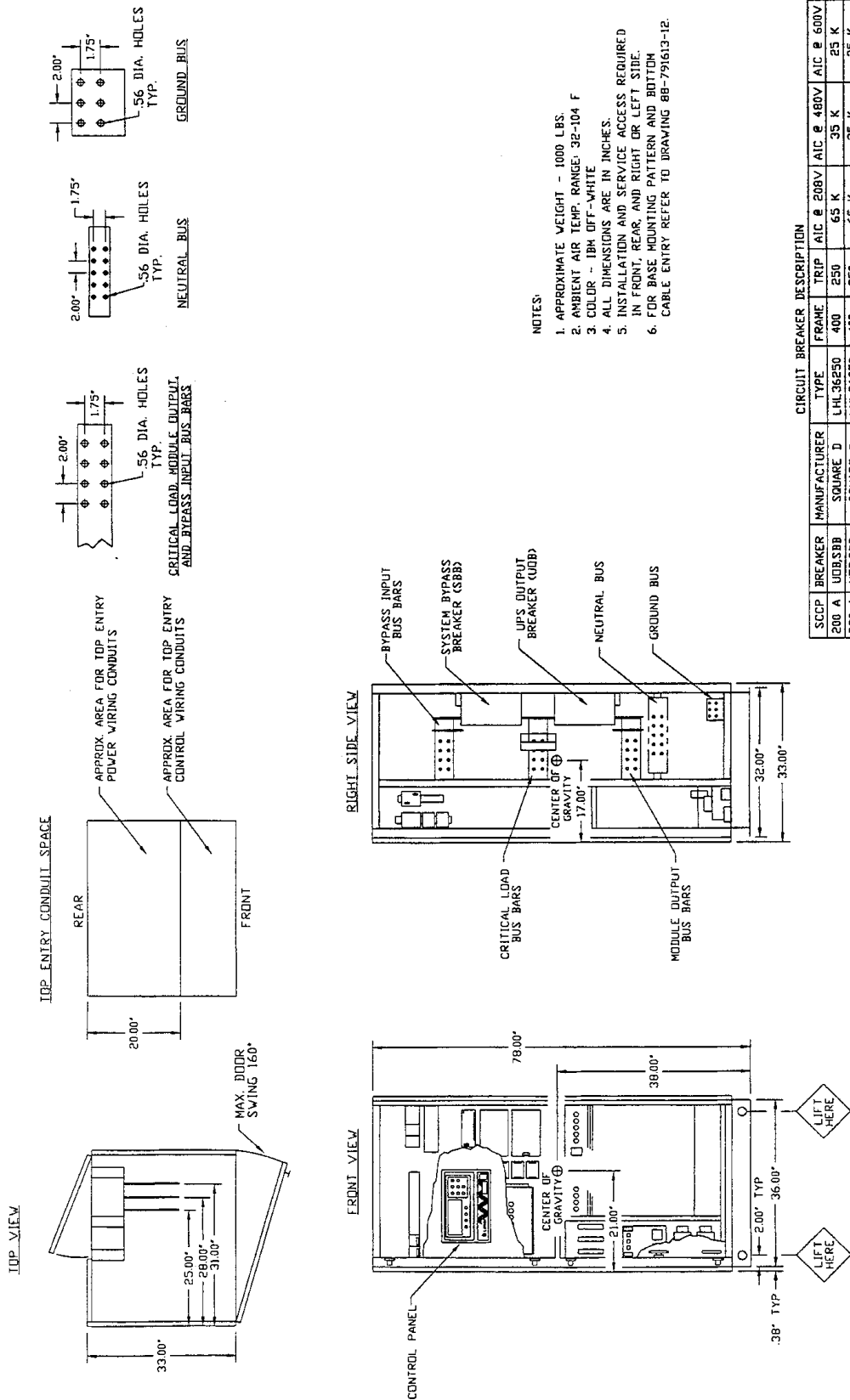
| BREAKER | MANUFACTURER | TYPE | FRAME | TRIP | AIC @ 208V | AIC @ 480V | AIC @ 600V |
|---------|--------------|------|-------|-------|------------|------------|------------|
| UBB,SBB | SEF 40 | 4000 | 4000 | 150 K | 100 K | 85 K | |

| | | | | | |
|----------------------|--|----------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE OUTLINE DRAWING SYSTEM CONTROL CABINET (SCCB) 4000 AMP SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791614-26 | |
| DES APVL | | REF. DWG. IN61426 | | DATE 06/09/95 | |
| | | | | ORDER NO. | |

FILE NAME: IN61426.DWG




Figure 17 Outline Drawing, System Control Cabinet (SCCP) 200 to 480 Amps



CIRCUIT BREAKER DESCRIPTION

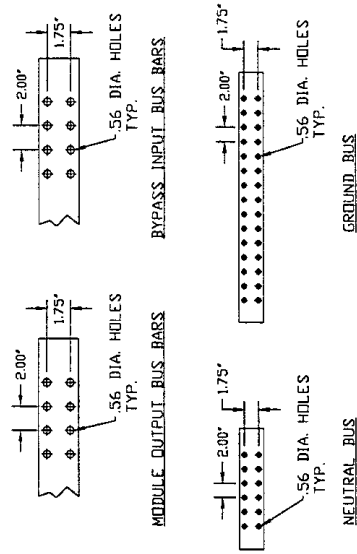
| SCCP | BREAKER | MANUFACTURER | TYPE | FRAME | TRIP | AIC @ 208V | AIC @ 480V | AIC @ 600V |
|-------|---------|--------------|----------|-------|------|------------|------------|------------|
| 200 A | UDBSBB | SQUARE D | LHL36250 | 400 | 250 | 65 K | 35 K | 25 K |
| 260 A | UDBSBB | SQUARE D | LHL36350 | 400 | 350 | 65 K | 35 K | 25 K |
| 360 A | UDBSBB | SQUARE D | MHL36450 | 1000 | 450 | 65 K | 65 K | 25 K |
| 480 A | UDBSBB | SQUARE D | MHL36600 | 1000 | 600 | 65 K | 65 K | 25 K |

| | | | | | |
|----------------------|--|----------------------|--|--|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE OUTLINE DRAWING SYSTEM CONTROL CABINET (SCCP) 200 - 480 AMP SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791614-27 | |
| DES. APVL ING1427 | | REF. DWG. ING1427 | | DATE 06/08/95 | |
| | | | | ORDER NO. | |

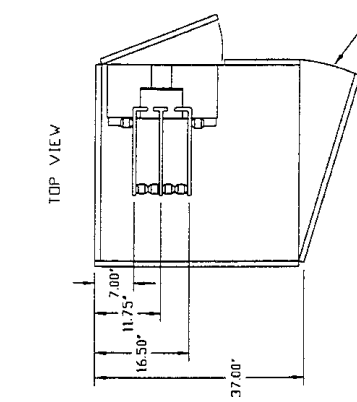
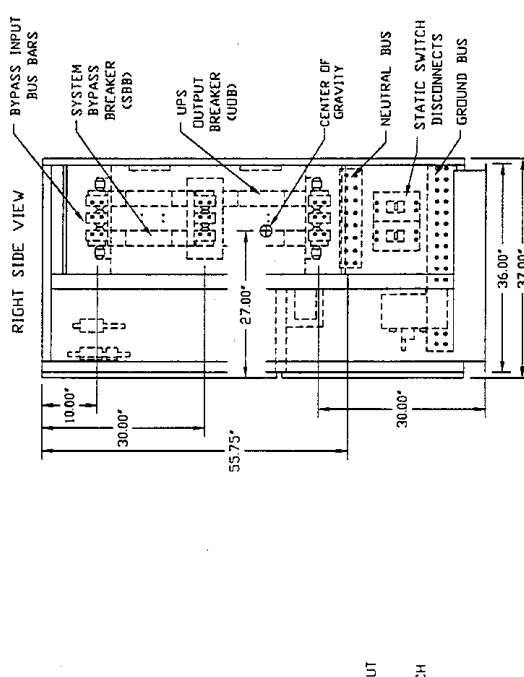
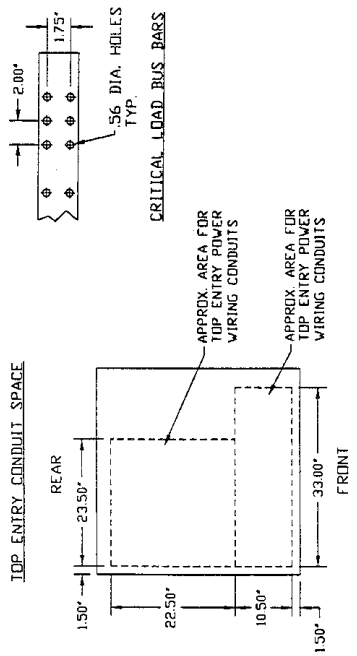

 9850 JERONIMO RD.
 IRVINE, CALIFORNIA 92718

FILE NAME: ING1427.DWG

Figure 18 Outline Drawing, System Control Cabinet (SCCP) 560 to 960 Amps



- NOTES:
1. APPROXIMATE WEIGHT - 1000 LBS.
 2. AMBIENT AIR TEMP. RANGE: 32-104 F
 3. COLOR - 10M OFF-WHITE
 4. ALL DIMENSIONS ARE IN INCHES.
 5. INSTALLATION AND SERVICE ACCESS REQUIRED IN FRONT, RIGHT AND REAR OR LEFT SIDE.
 6. CABLE ENTRY REFER TO DRAWING 88-791613-13.



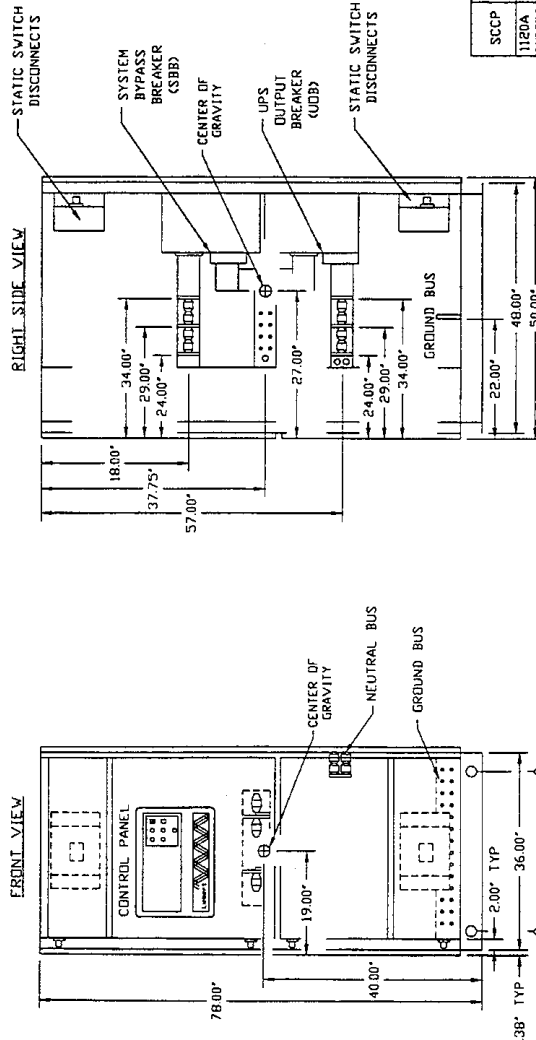
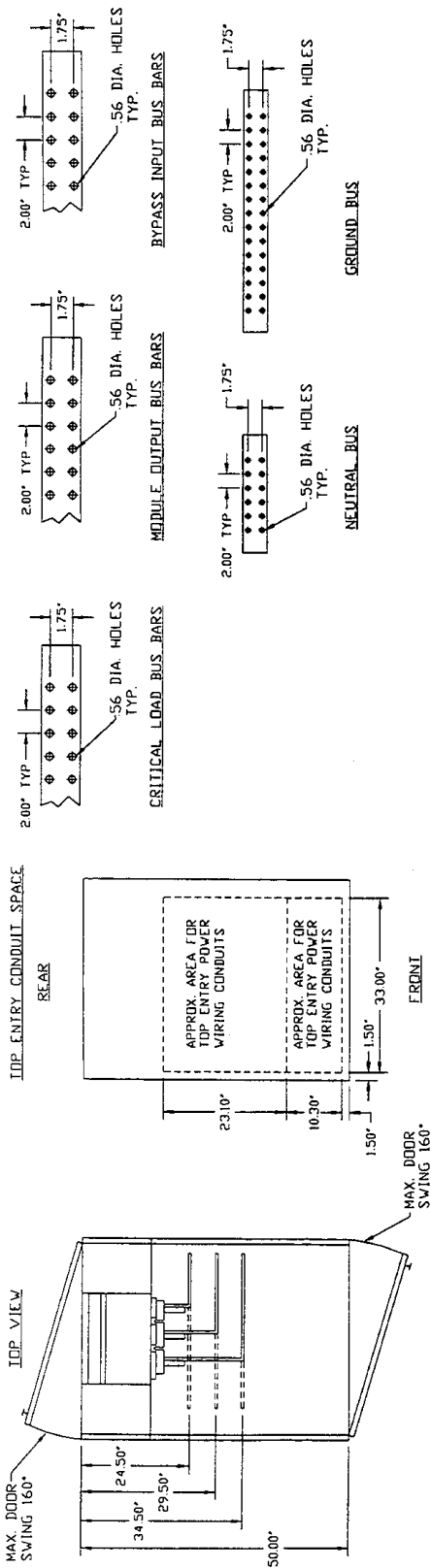
| SCCP BREAKER | | CIRCUIT BREAKER DESCRIPTION | | | | |
|---------------|--------------|-----------------------------|------------|------------|------------|------|
| TYPE | MANUFACTURER | TRIP | AIC @ 200V | AIC @ 480V | AIC @ 600V | |
| 560 A UOB/SBB | SQUARE D | MHL36700 | 1000 | 700 | 65 K | 25 K |
| 640 A UOB/SBB | SQUARE D | MHL36800 | 1000 | 800 | 65 K | 25 K |
| 800 A UOB/SBB | SQUARE D | MHL361000 | 1000 | 1000 | 65 K | 25 K |
| 960 A UOB/SBB | SQUARE D | MHL361200 | 1200 | 1200 | 65 K | 25 K |

| | | | |
|--|--|----------------------|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | |
| CHK BY J CAMPBELL | | ECN NO | |
| DES APVL | | REF. DWG. IN61428 | |
| TITLE OUTLINE DRAWING SYSTEM CONTROL CABINET (SCCP) 560 - 960 AMP SERIES 600 | | | |
| DWG. NO. 88-791614-28 | | DATE 06/08/95 | |
| REV. NO. 1 | | ORDER NO. | |

FILE NAME: IN61428.DWG



Figure 19 Outline Drawing, System Control Cabinet (SCCP) 1280 to 2000 Amps



NOTES:

1. APPROXIMATE WEIGHTS: 1250 LBS. (1280 - 1600 AMP), 1400 LBS. (2000 AMP)
2. AMBIENT AIR TEMP. RANGE: 32-104 F
3. COLOR - 1BM OFF-WHITE
4. ALL DIMENSIONS ARE IN INCHES.
5. INSTALLATION AND SERVICE ACCESS REQUIRED IN FRONT, REAR, AND ONE SIDE.
6. FOR BASE MOUNTING PATTERN AND BOTTOM CABLE ENTRY REFER TO DRAWING 88-791613-13.

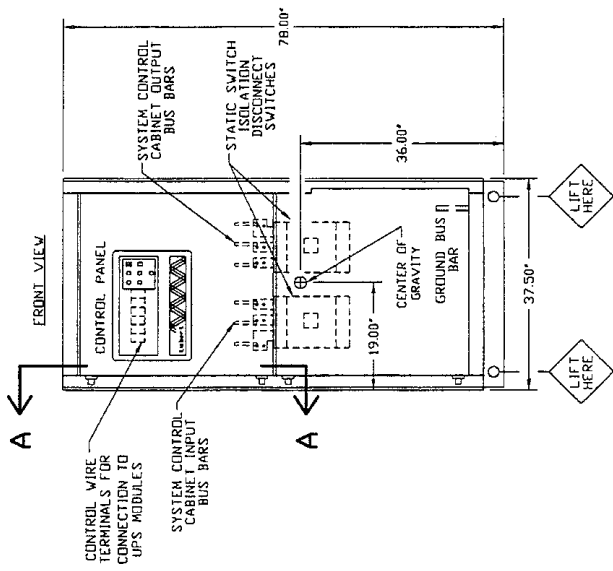
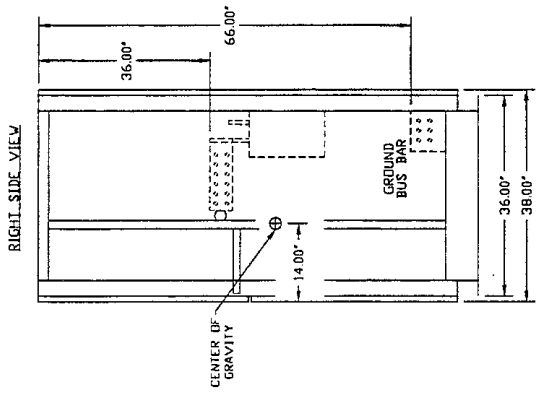
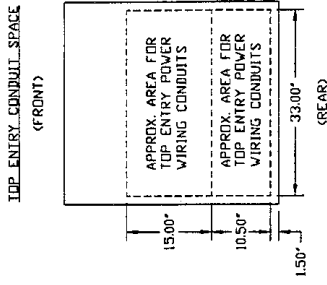
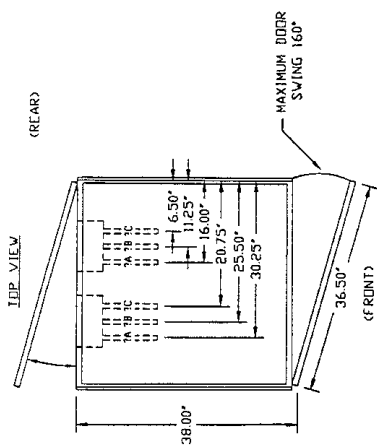
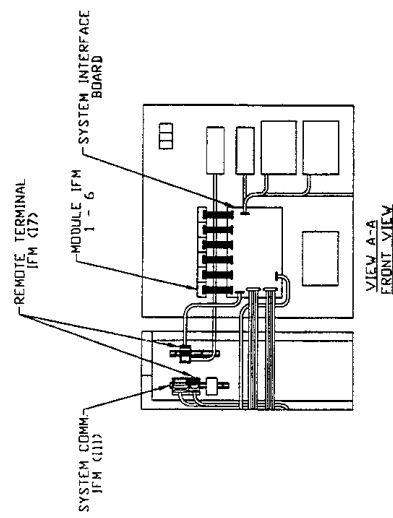
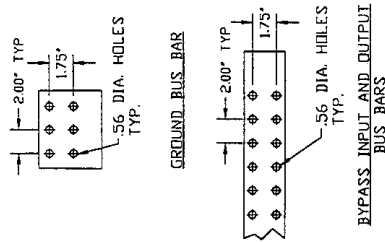
CIRCUIT BREAKER DESCRIPTION

| SCCP BREAKER | MANUFACTURER | TYPE | FRAME | TRIP | AIC |
|--------------|--------------|----------|---------|------|-------|
| 1180A | UDBSBB | SQUARE D | PHF2035 | 2000 | 1400 |
| 1280A | UDBSBB | SQUARE D | PHF2036 | 2000 | 1600 |
| 1600A | UDBSBB | SQUARE D | PHF2036 | 2000 | 125 K |
| 2000A | UDBSBB | SQUARE D | SEF20 | 2000 | 2000 |

| | | | |
|---|--|----------------------|--|
| DRAWN BY B. FISH | | SHEET NO 1 OF 1 | |
| CHK BY J. CAMPBELL | | ECN NO | |
| DES. APVL DES. APVL | | REF. DWG. IN61429 | |
| TITLE OUTLINE DRAWING SYSTEM CONTROL CABINET (SCCP) 1120 - 2000AMP SERIES 600 | | | |
| DWG. NO. 88-791614-29 | | DATE 06/09/95 | |
| REV. NO. 1 | | ORDER NO. | |



Figure 20 Outline Drawing, System Control Cabinet (SCCA) 2000 to 4000 Amps

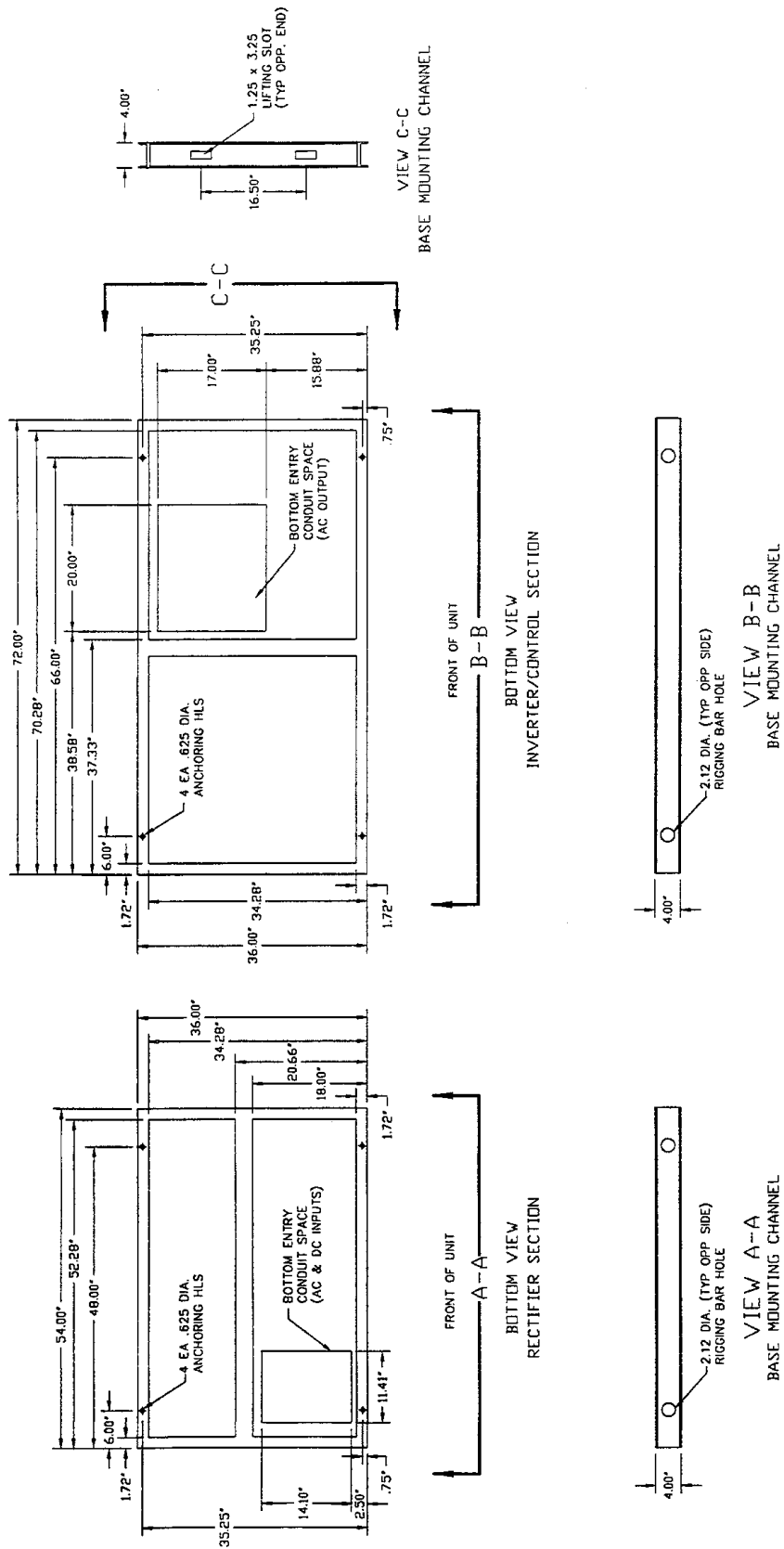



- NOTES:
1. INSTALLATION AND SERVICE ACCESS REQUIRED ON FRONT, REAR, AND ONE SIDE.
 2. AMBIENT AIR TEMP. 32-104 F. 0-40 C
 3. COLOR - IBM DIF-WHITE
 4. ALL DIMENSIONS ARE IN INCHES.
 5. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 6. APPROXIMATE WEIGHT - 900 LBS.
 7. FOR BASE MOUNTING PATTERN AND BOTTOM CABLE ENTRY REFER TO DRAWING 88-791613-14.

| | | | | | |
|-----------------------|--|-----------------------|--|--|--|
| DRAWN BY B. FISH | | SHEET NO. 1 OF 1 | | TITLE OUTLINE DRAWING SYSTEM CONTROL CABINET (SCCA) SYSTEM 2000 - 4000 AMP STAND ALONE CONFIGURATION SERIES 600 | |
| CHK BY J. CAMPBELL | | ECN NO. | | DRAWN DATE 06/09/95 | |
| DES APVL | | REF. DWG. IN614-30 | | ORDER NO. | |
| | | REV. NO. 1 | | FILE NAME: IN61400.DWG | |



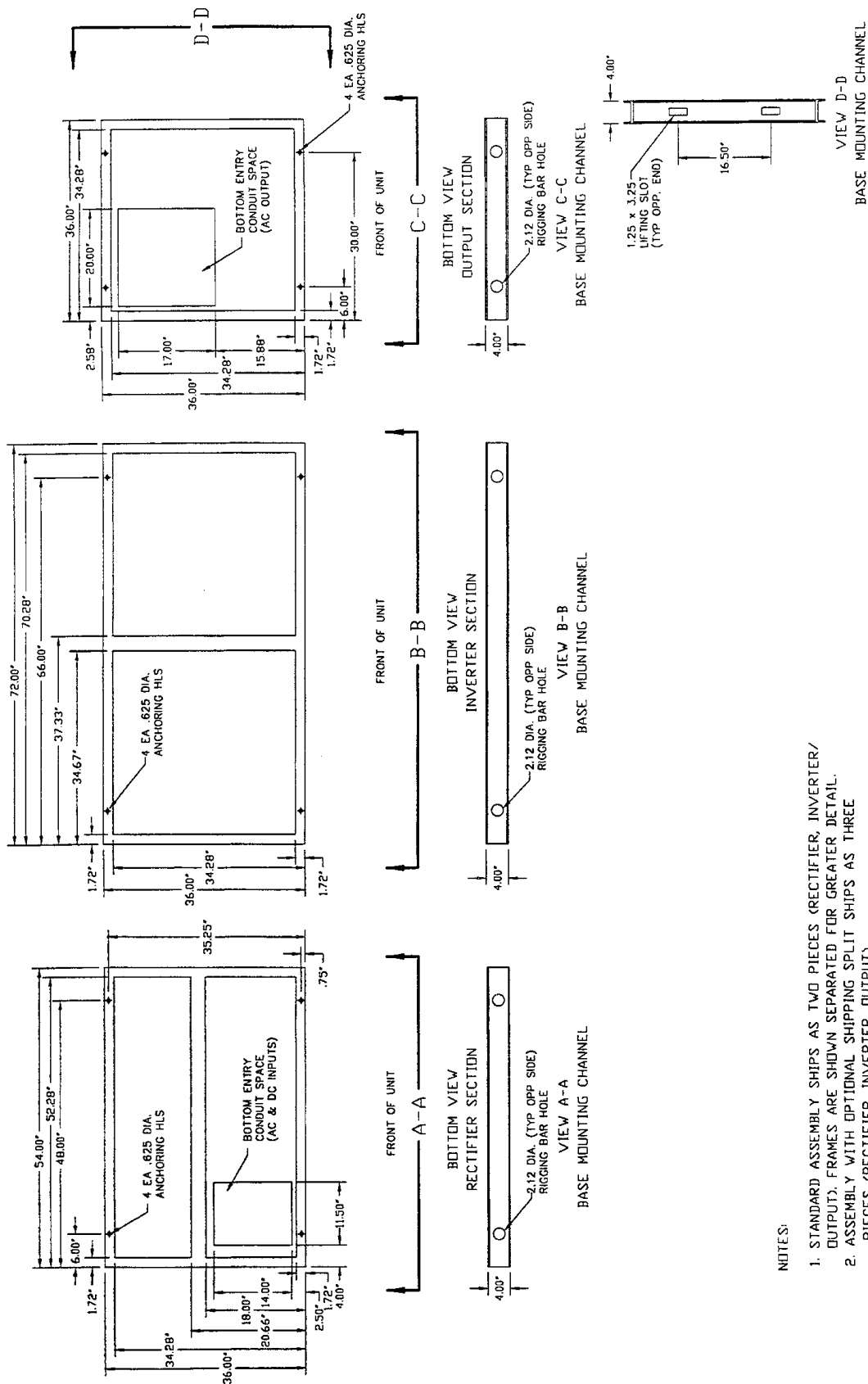
Figure 21 Base Mounting Details, 338 kVA



| | | | | | |
|--|--|----------------------|--|---|------------------|
| DRAWN BY B. FISH | | SHEET NO 1 OF 1 | | TITLE BASE MOUNTING PATTERNS 338 KVA SINGLE AND MULTI MODULE SERIES 600 | |
| CHK BY J. CAMPBELL | | ECN NO | | DWG. NO. 88-791613-02 | DATE 06/14/95 |
| DES. APVL DES. APVL | | REF. DWG. DMG1302 | | REV. NO. 1 | ORDER NO. |
|  9650 JERUNING RD. IRVINE, CALIFORNIA 92718 | | | | | |

FILE NAME: DMG1302.DWG

Figure 22 Base Mounting Details, 400 and 500 kVA



NOTES:

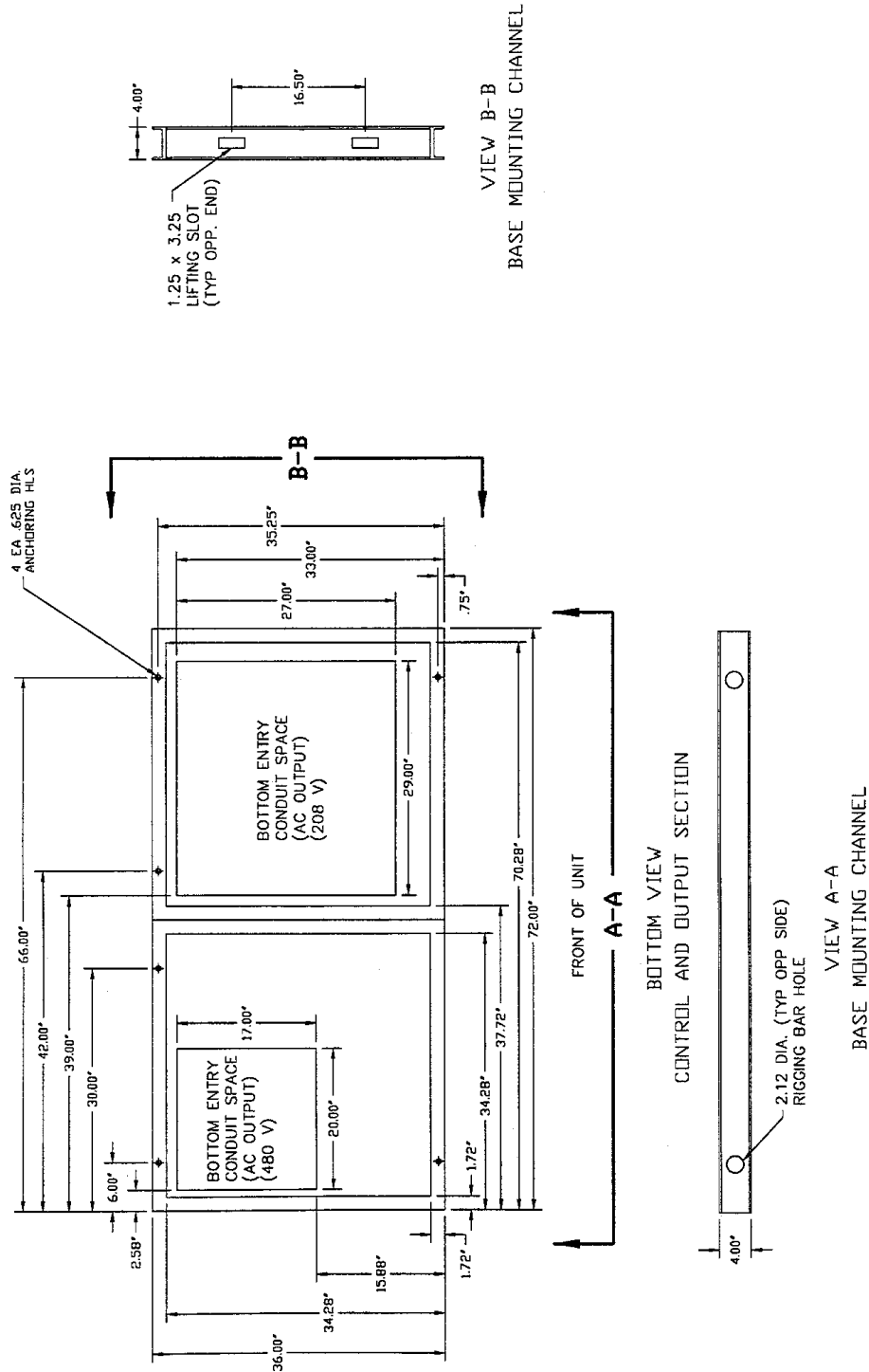
1. STANDARD ASSEMBLY SHIPS AS TWO PIECES (RECTIFIER, INVERTER/ OUTPUT). FRAMES ARE SHOWN SEPARATED FOR GREATER DETAIL.
2. ASSEMBLY WITH OPTIONAL SHIPPING SPLIT SHIPS AS THREE PIECES (RECTIFIER, INVERTER, OUTPUT).

| | | | | | |
|----------------------|--|--------------------------|--|--|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE BASE MOUNTING PATTERNS 400 AND 500 KVA, 480 AND 600 V SINGLE AND MULTI MODULE SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. DM61303 | |
| DES APVL | | REV. NO. 1 | | DATE 06/14/95 | |
| | | REV. NO. 88-791613-03 | | ORDER NO. | |
| | | DWG. NO. 88-791613-03 | | DATE 06/14/95 | |

Libert
9650 JERONIMO RD.
IRVINE, CALIFORNIA 92718

FILE NAME: DM61303.DWG

Figure 23 Base Mounting Details, 400 and 500 kVA, 208 VAC, Rectifier and Inverter Sections

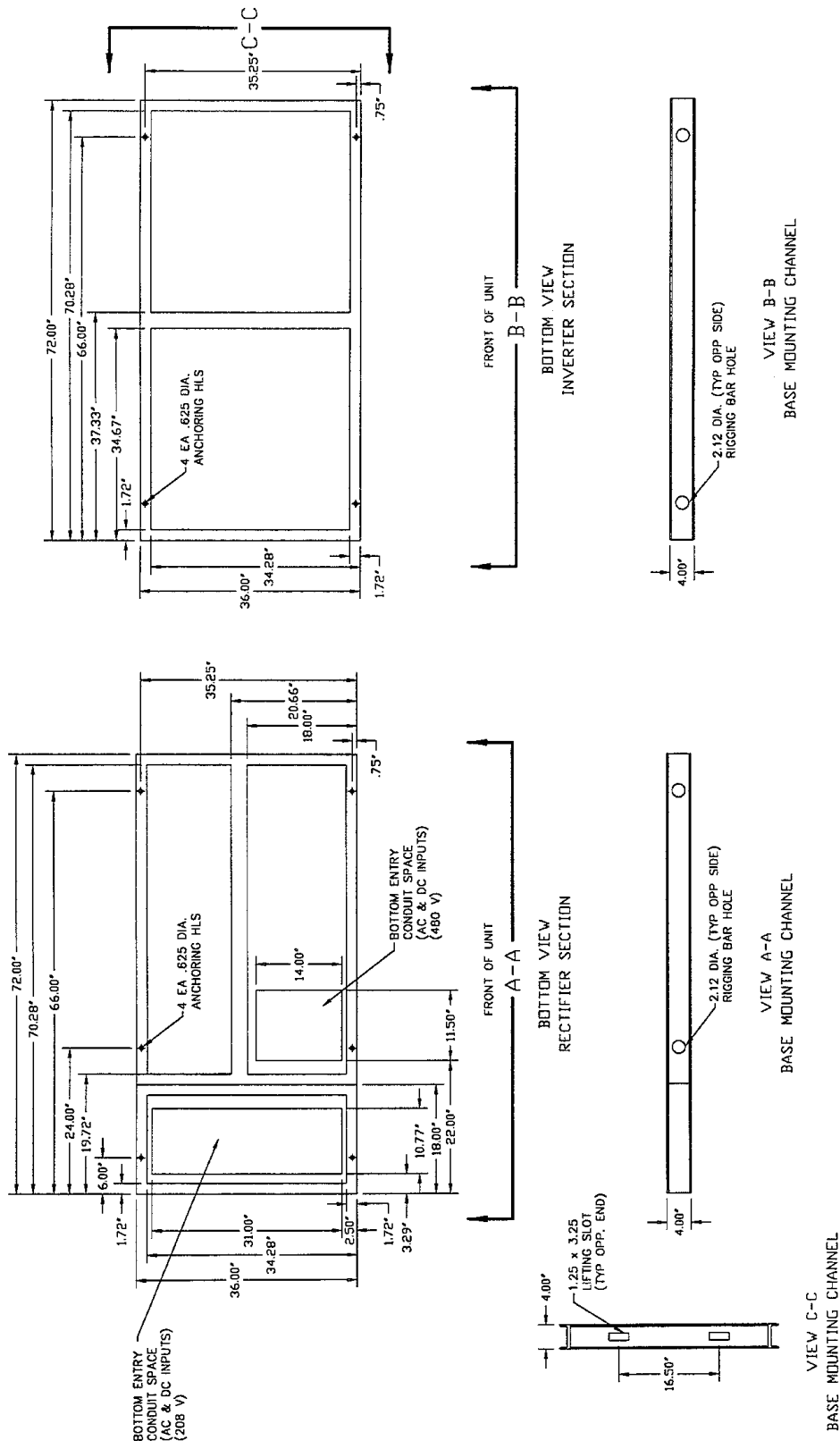


| | | | | |
|----------|--------------|-----------|----------|---|
| DRAWN BY | T HECKMAN | SHEET NO | 1 OF 1 | BASE MOUNTING DETAILS 400 AND 500 KVA 208V OUTPUT SINGLE AND MULTI MODULE UPS CONTROL AND OUTPUT SECTION SERIES 600 |
| CHK BY | J CAMPBELL | ECN NO | | |
| DES APVL | | REF. DWG. | DM61306 | |
| | | | | |
| DWG. NO. | 88-791613-06 | DATE | 01/08/96 | |
| REV. NO. | 2 | ORDER NO. | | |



FILE NAME: DM61306.DWG

Figure 24 Base Mounting Details, 400 and 500 kVA, 208 VAC, Control and Output Sections




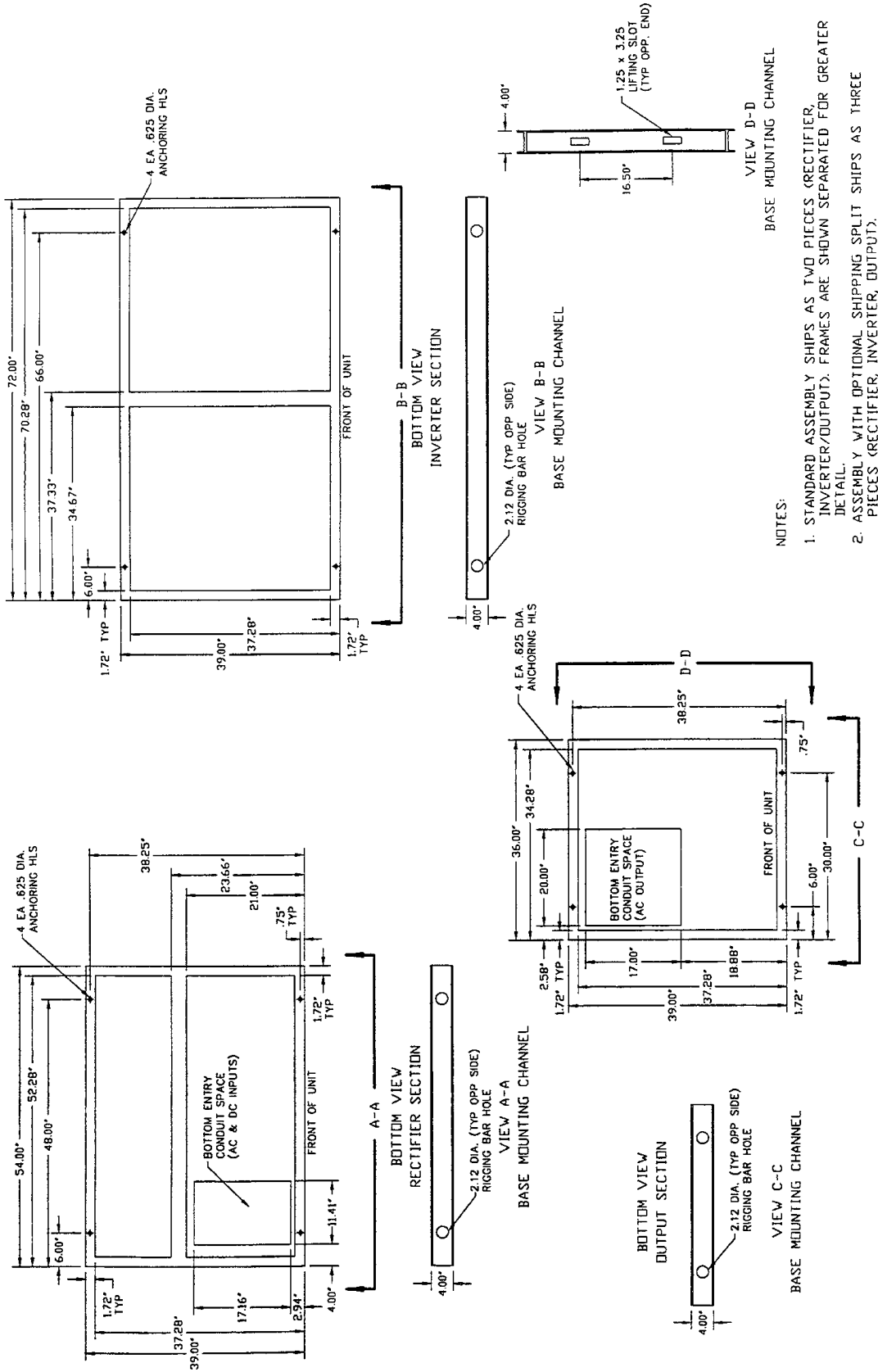
| | | | | | |
|--|--|----------------------|--|--|--|
| DRAWN BY T. HECKMAN | | SHEET NO 1 OF 1 | | TITLE BASE MOUNTING PATTERNS 400 AND 500 KVA 208V INPUT SINGLE AND MULTI MODULE UPS RECTIFIER AND INVERTER SERIES 600 | |
| CHK BY J. CAMPBELL | | ECN NO | | DATE 01/08/96 | |
| DES APVL | | REF. DWG. DM61305 | | ORDER NO. | |
| REV. NO. | | 2 | | FILE NAME: DM61305.DWG | |
| DWG. NO. 88-791613-05 | | DATE 01/08/96 | | | |
|  9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | | | | | |

Figure 25 Base Mounting Details, 625 kVA and 750 kVA (High Link - 240 Cells)

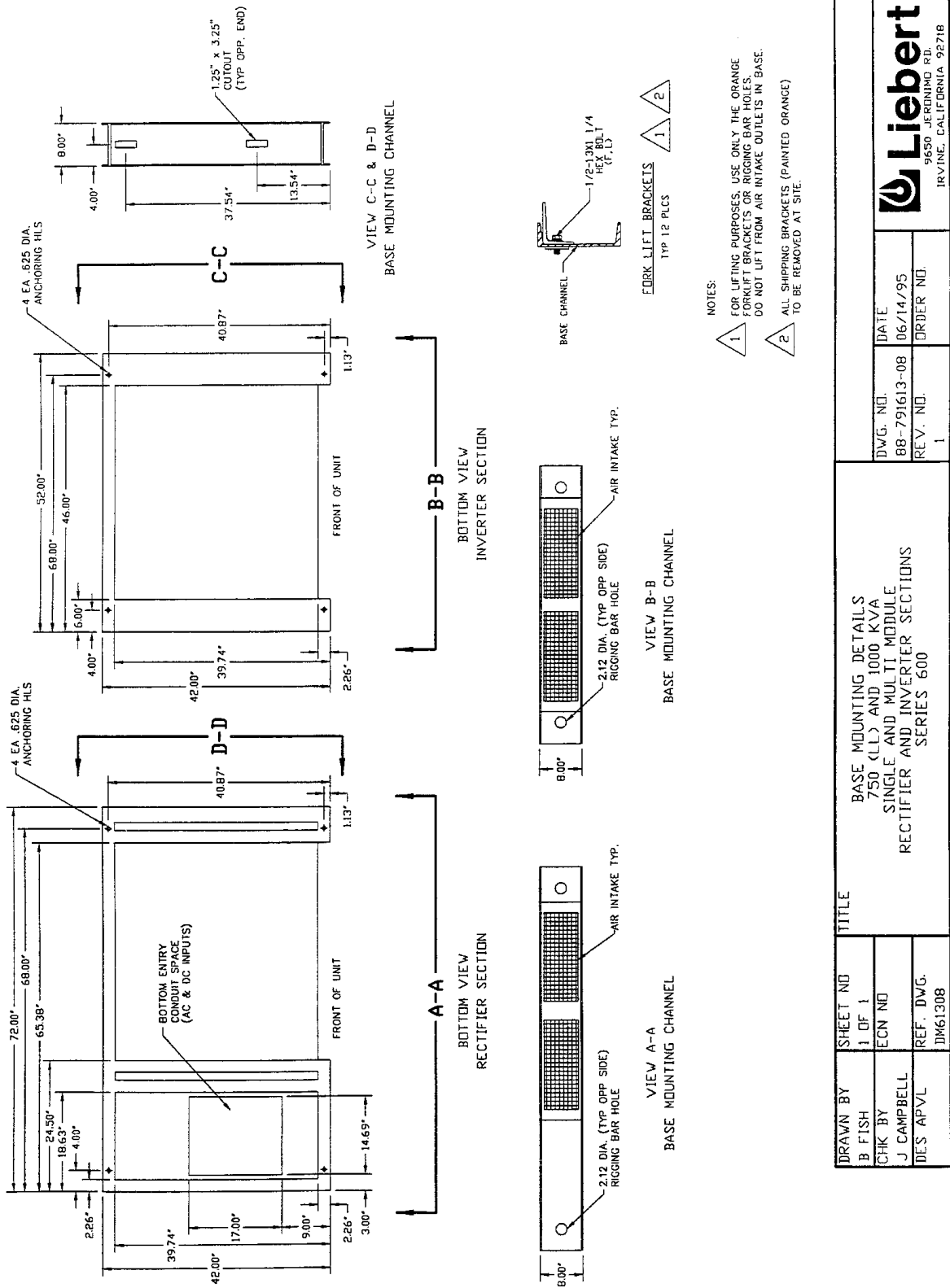


| | | | | | |
|----------------------|--|----------------------|--|--|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE BASE MOUNTING DETAILS 625 AND 750 (HL) KVA ALL VOLTAGES SINGLE AND MULTI MODULE SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791613-07 | |
| DES APVL | | REF. DWG. DM61307 | | DATE 06/14/95 | |
| | | | | ORDER NO. | |
| | | | | REV. NO. 1 | |



FILE NAME: DM61307.DWG

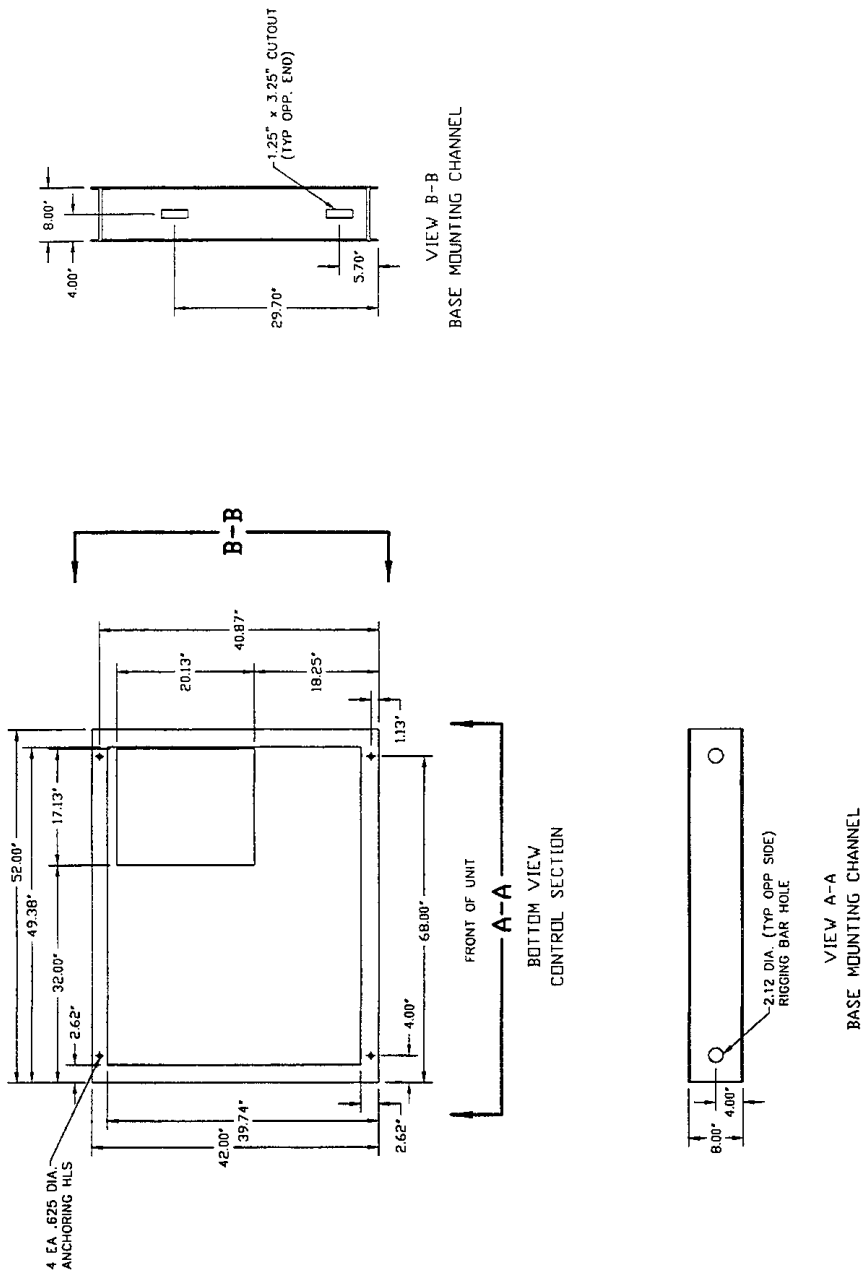
Figure 26 Base Mounting Details, 750 kVA (Low Link - 180 Cells) and 1000 kVA, Rectifier and Inverter Sections



| | | | | | |
|----------------------|--|----------------------|--|---|------------------|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE BASE MOUNTING DETAILS 750 (LL) AND 1000 KVA SINGLE AND MULTI MODULE RECTIFIER AND INVERTER SECTIONS SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791613-08 | DATE 06/14/95 |
| DES APVL | | REF. DWG. DM61308 | | REV. NO. 1 | ORDER NO. |

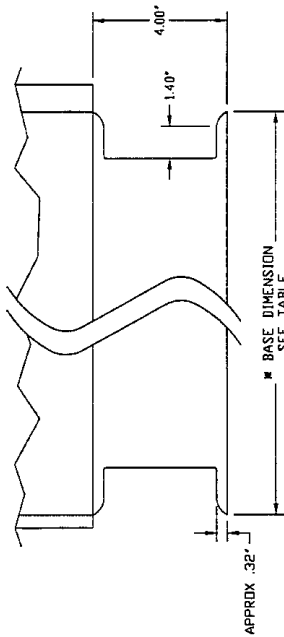
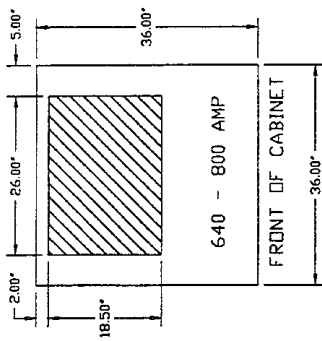
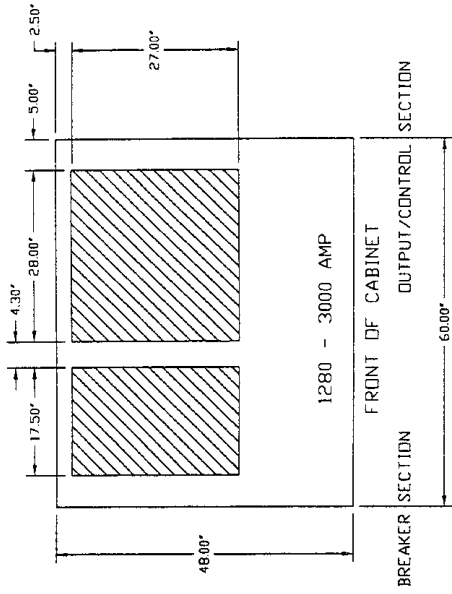
T.E.C. NAME: DM613081.DWG
IRVINE, CALIFORNIA 92718

Figure 27 Base Mounting Details, 750 kVA (Low Link - 180 Cells) and 1000 kVA, Control Section



| | | | |
|----------------------|----------------------|--|------------------|
| DRAWN BY B FISH | SHEET NO 1 OF 1 | TITLE | |
| | | BASE MOUNTING DETAILS 750 (LL) AND 1000 KVA SINGLE AND MULTI MODULE CONTROL SECTION SERIES 600 | |
| CHK BY J CAMPBELL | ECN NO | DWG. NO. 88-791613-09 | DATE 06/14/95 |
| DES APVL DM61309 | REF. DWG. DM61309 | REV. NO. 1 | ORDER NO. |
| | | FILE NAME: B661309.DWG | |
| | | 9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | |

Figure 28 Base Mounting Patterns, System Control Cabinets (SCCB) 640 to 3000 Amps



BASE CHANNEL DETAIL (FRONT & REAR)
SIDE VIEW

| AMP | BASE DEPTH |
|----------------------|------------|
| 640 THRU 800 | 36" |
| 2000 THRU 3000 | 48" |

- NOTES:
1. SHADED AREAS (REMOVABLE PLATES) INDICATE LOCATIONS FOR BOTTOM ENTRY OF CUSTOMER'S CABLES IF DESIRED.
 2. THE REMOVABLE PLATES SHOWN ARE LOCATED APPROXIMATELY 4 INCHES FROM THE CABINET BASE MOUNTING SURFACE (e.g. CONCRETE FLOOR).
 3. TOLERANCE ON ALL DIMENSIONS IS $\pm .25$ "
 4. ALL DIMENSIONS ARE IN INCHES.


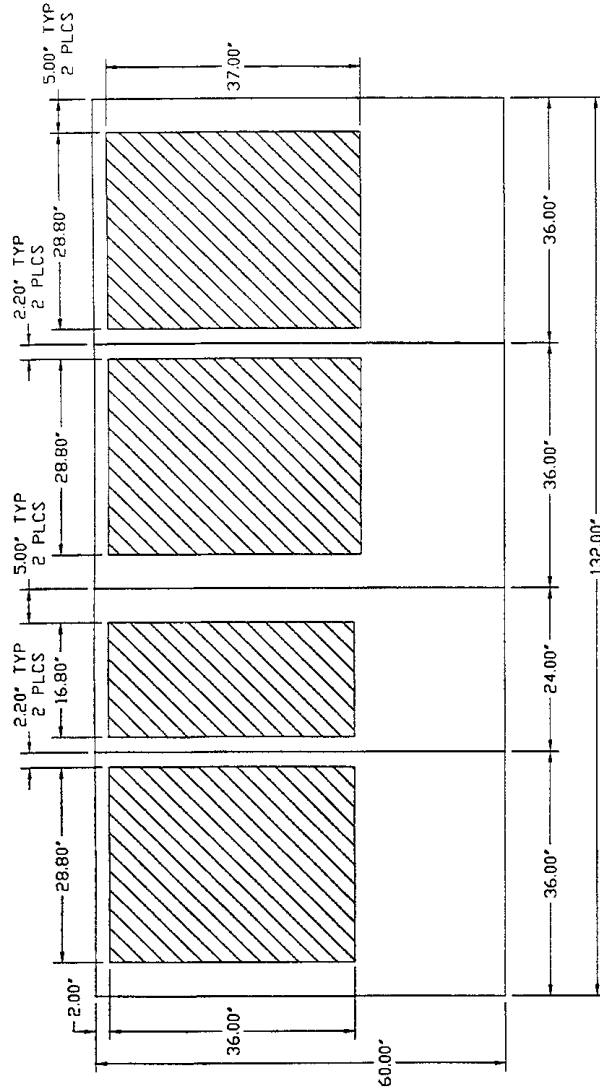
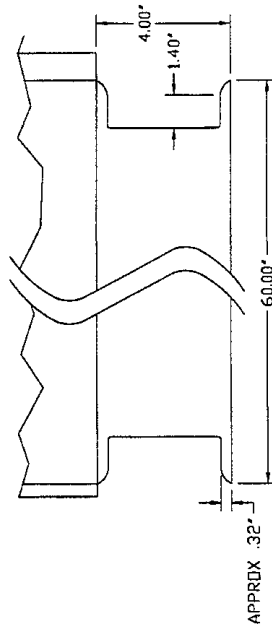
| | | | | | |
|-----------------------|--|--------------------|--|--|--|
| DRAWN BY B. FISH | | SHEET NO 1 OF 1 | | TITLE BASE MOUNTING PATTERNS 640 - 3000 AMP SYSTEM CONTROL CABINETS (SCCB) SERIES 600 | |
| CHK BY J. CAMPBELL | | ECN NO | | DVG. NO. 88-791613-10 | |
| DES. APVL | | REF. DWG. | | DATE 06/14/95 | |
| | | | | ORDER NO. | |
| | | | | 1 | |
| | | | | FILE NAME: DM61310.DWG | |
| | | | |  9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | |

Figure 29 Base Mounting Patterns, System Control Cabinets (SCCB) 4000 Amps



FRONT OF CABINET



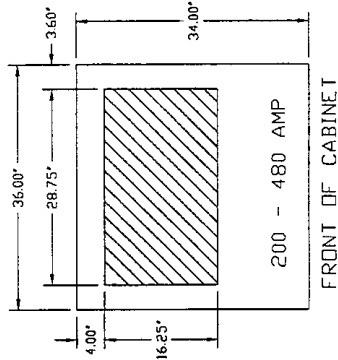
BASE CHANNEL DETAIL (FRONT & REAR)
SIDE VIEW

NOTES:

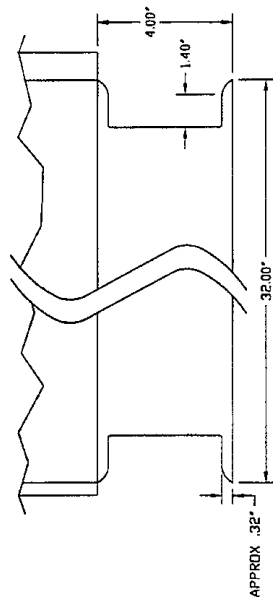
1. SHADED AREAS (REMOVABLE PLATES) INDICATE LOCATIONS FOR BOTTOM ENTRY OF CUSTOMER'S CABLES IF DESIRED.
2. THE REMOVABLE PLATES SHOWN ARE LOCATED APPROXIMATELY 4 INCHES FROM THE CABINET BASE MOUNTING SURFACE (e.g. CONCRETE FLOOR).
3. TOLERANCE ON ALL DIMENSIONS IS $\pm .25$ "
4. ALL DIMENSIONS ARE IN INCHES.

| | | | | | |
|----------------------|----------------------|---|--|--------------------------|------------------|
| DRAWN BY B FISH | SHEET NO 1 OF 1 | TITLE BASE MOUNTING PATTERNS 4000 AMP SYSTEM CONTROL CABINETS (SCCB) SERIES 600 | | DWG. NO. 88-791613-11 | DATE 06/14/95 |
| CHK BY J CAMPBELL | ECN NO | | | REV. NO. 1 | ORDER NO. |
| DES' APVL DM61311 | REF. DWG. DM61311 | | | FILE NAME: DM61311.DWG | |
| | | Liibert 9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | | | |

Figure 30 Base Mounting Patterns, System Control Cabinets (SCCP) 200 to 480 Amps




200 - 480 AMP
FRONT OF CABINET



BASE CHANNEL DETAIL (FRONT & REAR)
SIDE VIEW

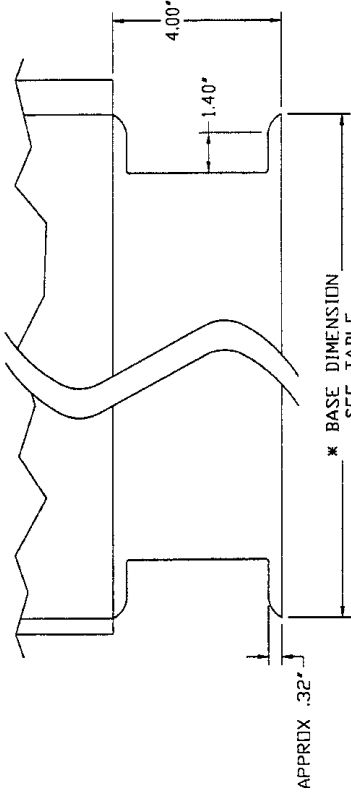
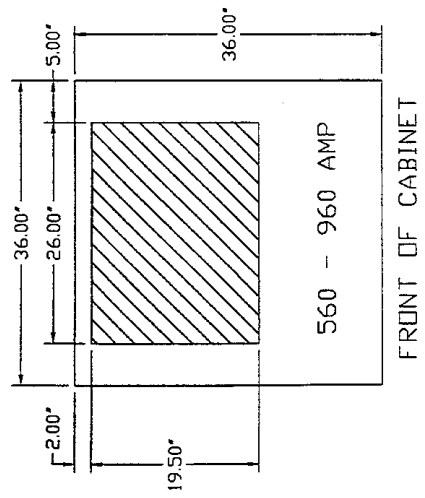
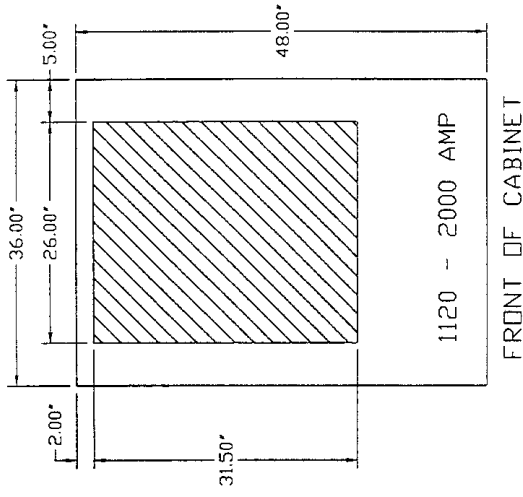
NOTES:

1. SHADED AREAS (REMOVABLE PLATES) INDICATE LOCATIONS FOR BOTTOM ENTRY OF CUSTOMER CABLES IF DESIRED.
2. THE REMOVABLE PLATES SHOWN ARE LOCATED APPROXIMATELY 4 INCHES FROM THE CABINET BASE MOUNTING SURFACE (e.g. CONCRETE FLOOR).
3. TOLERANCE ON ALL DIMENSIONS IS $\pm .25'$
4. ALL DIMENSIONS ARE IN INCHES.

| | | | | | |
|---|----------------------|--|--|--------------------------|------------------|
| DRAWN BY B FISH | SHEET NO 1 OF 1 | TITLE BASE MOUNTING PATTERNS 200 - 480 AMP SYSTEM CONTROL CABINETS (SCCB) SERIES 600 | | DWG. NO. 88-791613-12 | DATE 06/14/95 |
| CHK BY J CAMPBELL | ECN NO | | | REV. NO. | ORDER NO. |
| DES APVL | REF. DWG. DM61312 | | | 1 | |
|  Liebert 9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | | | | | |

FILE NAME: DM61312.DWG

Figure 31 Base Mounting Patterns, System Control Cabinets (SCCP) 560 to 2000 Amps




| AMP | BASE DEPTH |
|----------------|------------|
| 560 THRU 960 | 36" |
| 1120 THRU 2000 | 48" |

- NOTES:
1. SHADED AREAS (REMOVABLE PLATES) INDICATE LOCATIONS FOR BOTTOM ENTRY OF CUSTOMER'S CABLES IF DESIRED.
 2. THE REMOVABLE PLATES SHOWN ARE LOCATED APPROXIMATELY 4 INCHES FROM THE CABINET BASE MOUNTING SURFACE (e.g. CONCRETE FLOOR).
 3. TOLERANCE ON ALL DIMENSIONS IS $\pm .25$ "
 4. ALL DIMENSIONS ARE IN INCHES.

BASE CHANNEL DETAIL (FRONT & REAR)
SIDE VIEW

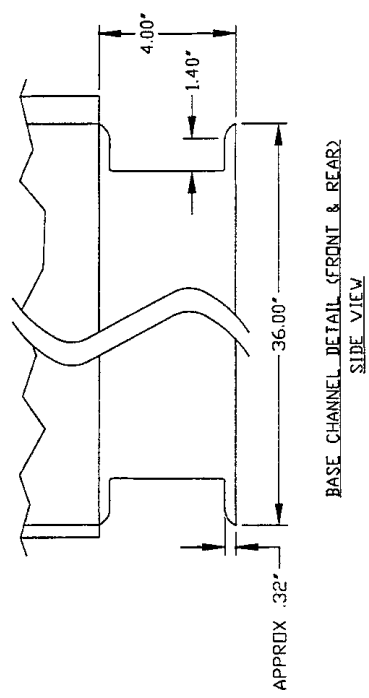
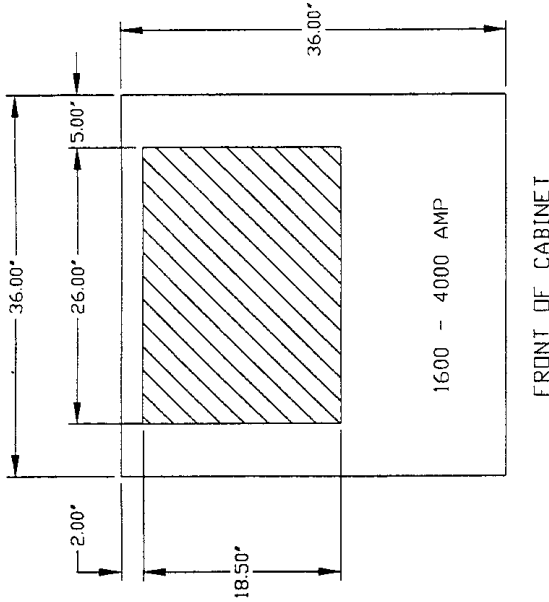
| | | | |
|--------------------|----------------------|---|--------------------------|
| DRAWN BY B FISH | SHEET NO 1 OF 1 | TITLE BASE MOUNTING PATTERNS 560 - 2000 AMP SYSTEM CONTROL CABINETS (SCCB) SERIES 600 | |
| | CHK BY J CAMPBELL | ECN NO | DWG. NO. 88-791613-13 |
| DES' APVL | REF. DWG. DM61313 | DATE 06/14/95 | ORDER NO. |



 9650 JERONIMO RD.
 IRVINE, CALIFORNIA 92718

FILE NAME: DM61313.DWG

Figure 32 Base Mounting Patterns, System Control Cabinets (SCCA) 1600 to 4000 Amps



- NOTES:
1. SHADED AREAS (REMOVABLE PLATES) INDICATE LOCATIONS FOR BOTTOM ENTRY OF CUSTOMER'S CABLES IF DESIRED.
 2. THE REMOVABLE PLATES SHOWN ARE LOCATED APPROXIMATELY 4 INCHES FROM THE CABINET BASE MOUNTING SURFACE (e.g. CONCRETE FLOOR).
 3. TOLERANCE ON ALL DIMENSIONS IS $\pm .25$.
 4. ALL DIMENSIONS ARE IN INCHES.


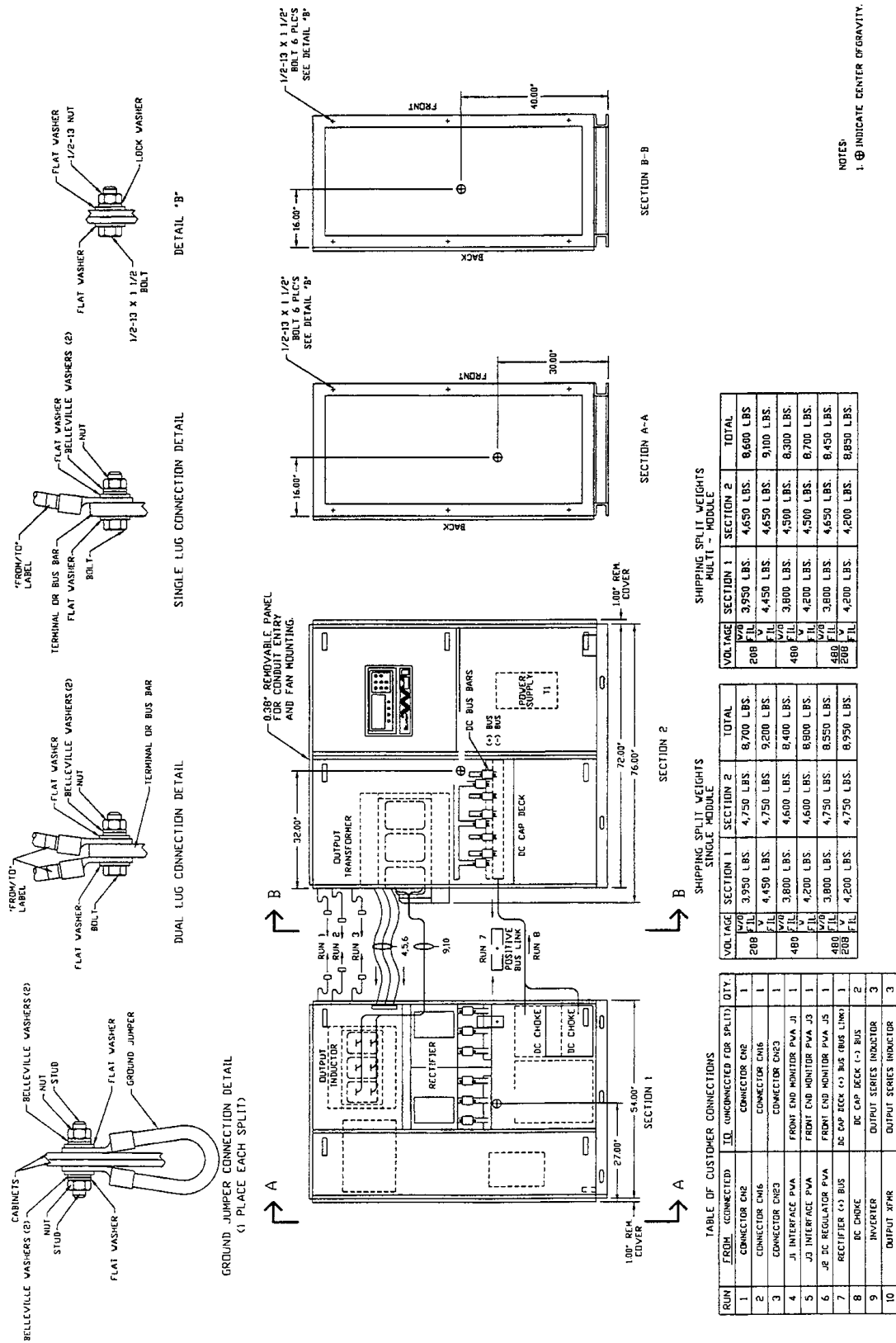
| | | | | | |
|-----------------------|----------------------|--|--|--|------------------|
| DRAWN BY B. FISH | SHEET NO 1 OF 1 | TITLE BASE MOUNTING PATTERNS 1600 - 4000 AMP SYSTEM CONTROL CABINETS (SCCB) SERIES 600 | | DWG. NO. 88-791613-14 | DATE 06/14/95 |
| CHK BY J. CAMPBELL | ECN NO | | | REV. NO. 1 | ORDER NO. |
| DES. APVL | REF. DWG. DM61314 | | |  9650 FERONIMO RD. IRVINE, CALIFORNIA 92718 | |

Figure 33 Shipping Split Detail, 338 kVA



NOTES:
1. ⊕ INDICATE CENTER OF GRAVITY.

| | | | |
|---|--|----------------------|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | |
| CHK BY J CAMPBELL | | ECN NO | |
| DES APVL | | REF. DWG. SS61201 | |
| SHIPPING SPLIT DETAIL 338 KVA SINGLE & MULTI MODULE UPS SERIES 600 | | | |
| DWG. NO. 88-791612-01 | | DATE 06/12/95 | |
| REV. NO. 1 | | ORDER NO. | |
| 9650 JERDING RD. IRVINE, CALIFORNIA 92718 | | | |

Figure 34 Shipping Split Detail, 400 and 500 kVA

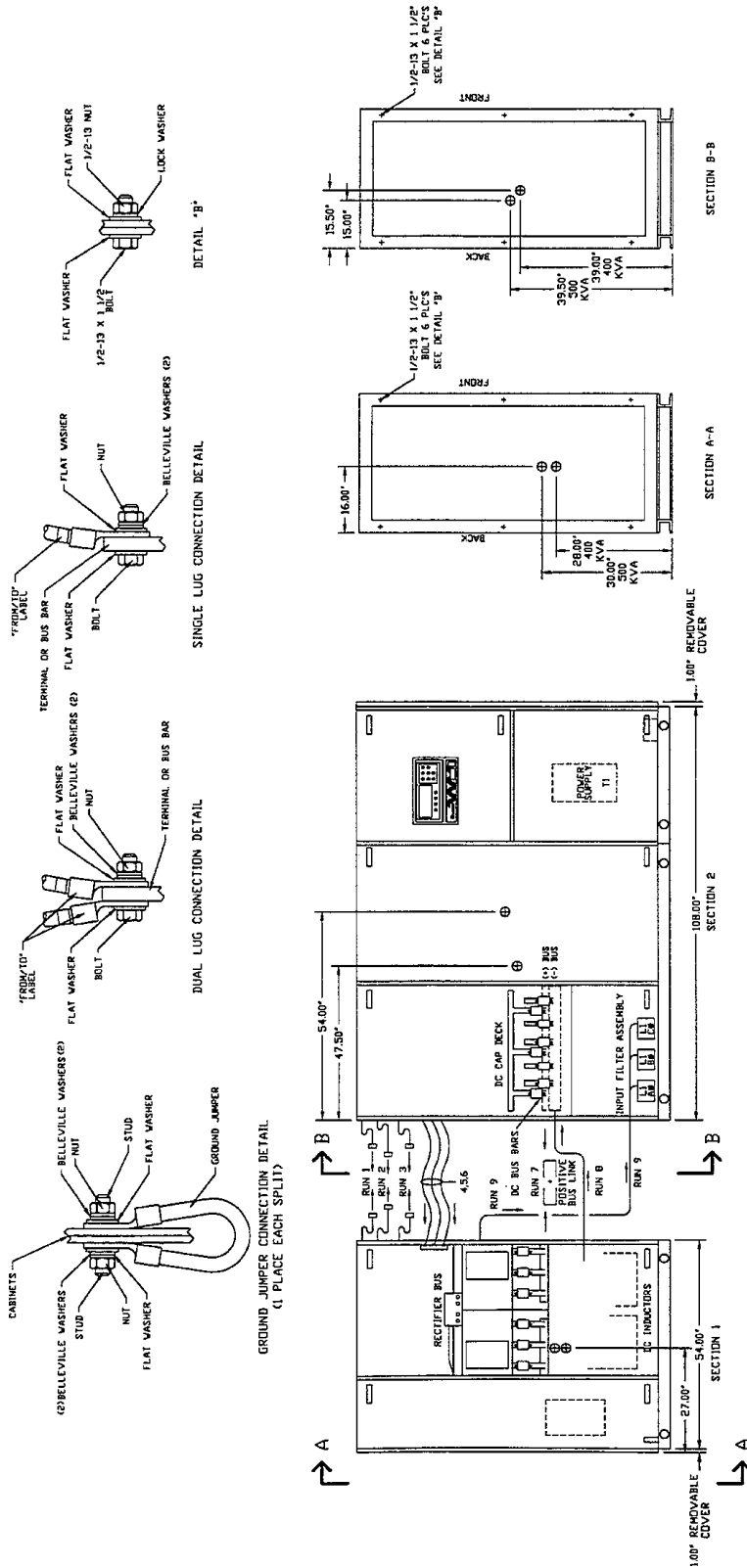


TABLE OF CUSTOMER CONNECTIONS

| RUN | REQ'D | CONNECTED | UNCONNECTED FOR SPLIT | QTY. |
|-----|------------------------------|-----------|-----------------------|------|
| 1 | CONNECTOR CNE | 1 | 1 | 1 |
| 2 | CONNECTOR CNE | 1 | 1 | 1 |
| 3 | CONNECTOR CNE | 1 | 1 | 1 |
| 4 | RIBBON CABLE 5 | 1 | 1 | 1 |
| 5 | RIBBON CABLE 7 | 1 | 1 | 1 |
| 6 | RIBBON CABLE 9 | 1 | 1 | 1 |
| 7 | RECTIFIER C-3 BUS (BUS LING) | 1 | 1 | 1 |
| 8 | DC CAPACITOR C-3 BUS | 1 | 1 | 1 |
| 9 | DC CHOKE | 1 | 1 | 1 |

SHIPPING SPLIT WEIGHTS

| KVA | SECTION 1 | SECTION 2 | TOTAL |
|-----|------------|------------|-------------|
| 400 | 4,000 LBS. | 5,900 LBS. | 9,900 LBS. |
| 500 | 4,250 LBS. | 6,050 LBS. | 10,300 LBS. |

| KVA | SECTION 1 | SECTION 2 | TOTAL |
|-----|------------|------------|-------------|
| 400 | 4,150 LBS. | 6,450 LBS. | 10,600 LBS. |
| 500 | 4,500 LBS. | 6,650 LBS. | 11,150 LBS. |

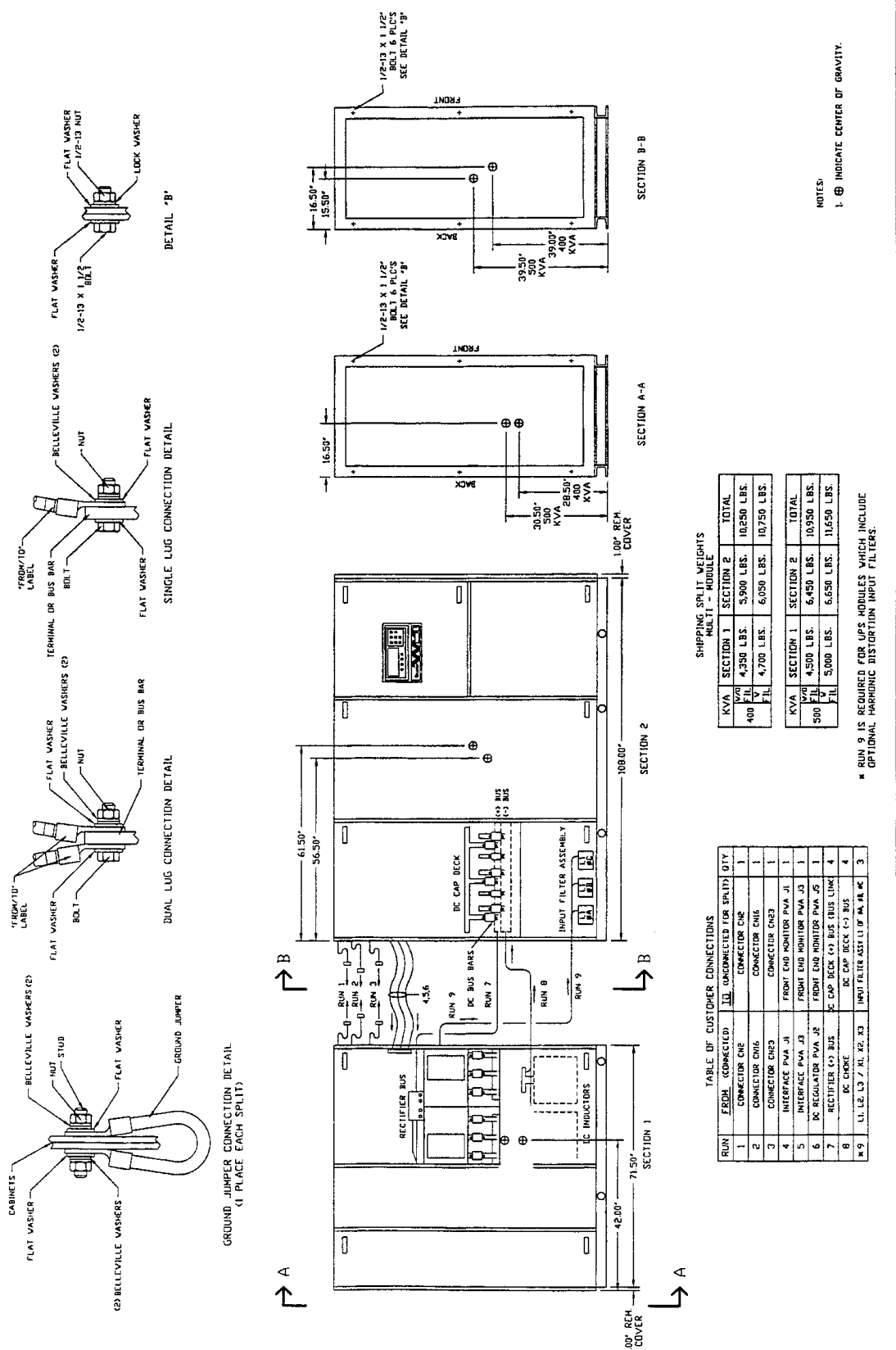
NOTES:
1. ⊕ INDICATE CENTER OF GRAVITY

| | | | | | |
|----------------------|--|--------------------|--|--|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE SHIPPING SPLIT DETAIL 400 AND 500 KVA MULTI-MODULE UPS 480V AND 600V SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791612-04 | |
| DES APVL SS61204 | | REF. DWG. | | ORDER NO. | |
| | | DATE 06/12/95 | | REV. NO. 1 | |

FILE NAME: SSGR2K1.DWG



Figure 35 Shipping Split Detail, 400 and 500 kVA, 208 VAC



SHIPPING SPLIT WEIGHTS
MULTI - MODULE

| KVA | SECTION 1 | SECTION 2 | TOTAL |
|-----|------------|------------|-------------|
| 400 | 4,350 LBS. | 5,900 LBS. | 10,250 LBS. |
| | FTL | 6,050 LBS. | 10,750 LBS. |
| 500 | 4,500 LBS. | 6,450 LBS. | 10,950 LBS. |
| | FTL | 5,000 LBS. | 11,650 LBS. |

TABLE OF CUSTOMER CONNECTIONS

| RUN | FEDM (CONNECTED) | JL (CONNECTED FOR SPLIT) | QTY |
|-----|-------------------------|---------------------------------|-----|
| 1 | CONNECTOR CNE | CONNECTOR CNE | 1 |
| 2 | CONNECTOR CNE | CONNECTOR CNE | 1 |
| 3 | CONNECTOR CNE | CONNECTOR CNE | 1 |
| 4 | INTERFACE PVA J1 | FRONT END MONITOR PVA J1 | 1 |
| 5 | INTERFACE PVA J3 | FRONT END MONITOR PVA J3 | 1 |
| 6 | DC REGULATOR PVA J2 | FRONT END MONITOR PVA J2 | 1 |
| 7 | RECTIFIER C-3 BUS | DC CAP DECK C-3 BUS LINE | 4 |
| 8 | DC CHARGE | DC CAP DECK C-3 BUS | 4 |
| 8,9 | L1, L2, L3 / N1, N2, N3 | INPUT FILTER ASSEMBLY OF PVA J4 | 3 |

* RUN 9 IS REQUIRED FOR UPS MODULES WHICH INCLUDE OPTIONAL HARMONIC DISTORTION INPUT FILTERS.

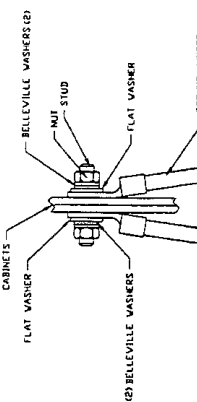
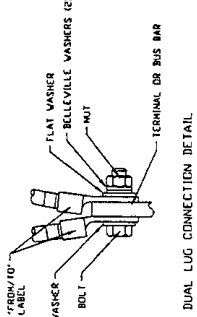
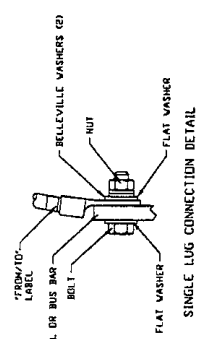
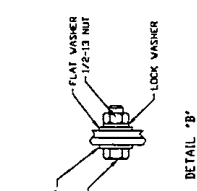
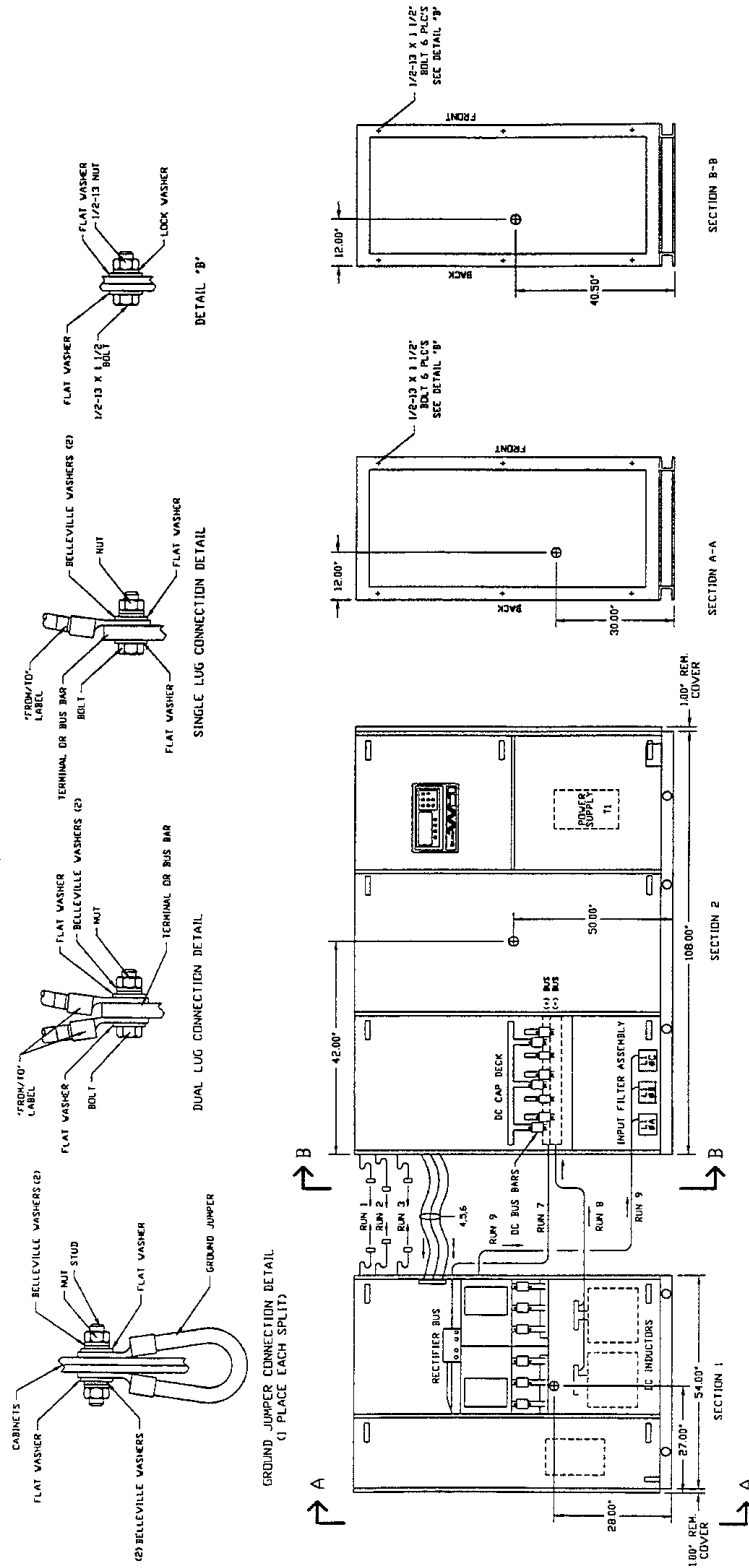
NOTES
1. ⊕ INDICATE CENTER OF GRAVITY.

| | | | | | |
|----------------------|--|----------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE SHIPPING SPLIT DETAIL 400 AND 500 KVA MULTI-MODULE UPS | |
| CHK BY J CAMPBELL | | ECN NO | | 208 V INPUT - 208 / 120 V OUTPUT SERIES 600 | |
| DES APVL | | REF. DWG. SS61206 | | DWG. NO. 88-791612-06 | |
| | | | | DATE 06/13/95 | |
| | | | | ORDER NO. | |
| | | | | REV. NO. 1 | |



FILE NAME: SS61206.DWG

Figure 36 Shipping Split Detail, 625 kVA



NOTES:
1. ⊕ INDICATE CENTER OF GRAVITY.

SHIPPING SPLIT WEIGHTS
SINGLE MODULE

| KVA | SECTION 1 | SECTION 2 | TOTAL |
|-----|------------|------------|-------------|
| 625 | 4,500 LBS. | 8,000 LBS. | 12,500 LBS. |
| | 4,900 LBS. | 8,250 LBS. | 13,150 LBS. |

SHIPPING SPLIT WEIGHTS
MULTI - MODULE

| KVA | SECTION 1 | SECTION 2 | TOTAL |
|-----|------------|------------|-------------|
| 625 | 4,500 LBS. | 7,800 LBS. | 12,300 LBS. |
| | 4,900 LBS. | 8,050 LBS. | 12,950 LBS. |

TABLE OF CUSTOMER CONNECTIONS

| RUN | FROM CONNECTED | TO UNCONNECTED FOR SPLIT | QTY. |
|-----|---------------------------|----------------------------------|------|
| 1 | CONNECTOR CNE | CONNECTOR CNE | 1 |
| 2 | CONNECTOR CNE | CONNECTOR CNE | 1 |
| 3 | CONNECTOR CNE | CONNECTOR CNE | 1 |
| 4 | INTERFACE PVA | FRONT END MONITOR PVA J1 | 1 |
| 5 | INTERFACE PVA | FRONT END MONITOR PVA J2 | 1 |
| 6 | DC REGULATOR PVA | FRONT END MONITOR PVA J2 | 1 |
| 7 | RECTIFIER C-BUS | DC CAP DECK C-BUS BRK C-4 | 4 |
| 8 | DC CHARGE | DC CAP DECK C-BUS BRK C-4 | 4 |
| 9 | 1 L, 1 R / 1 L, 1 R (OPT) | 2X TRAP ASST. LI OF PVA, PVA C-3 | 3 |

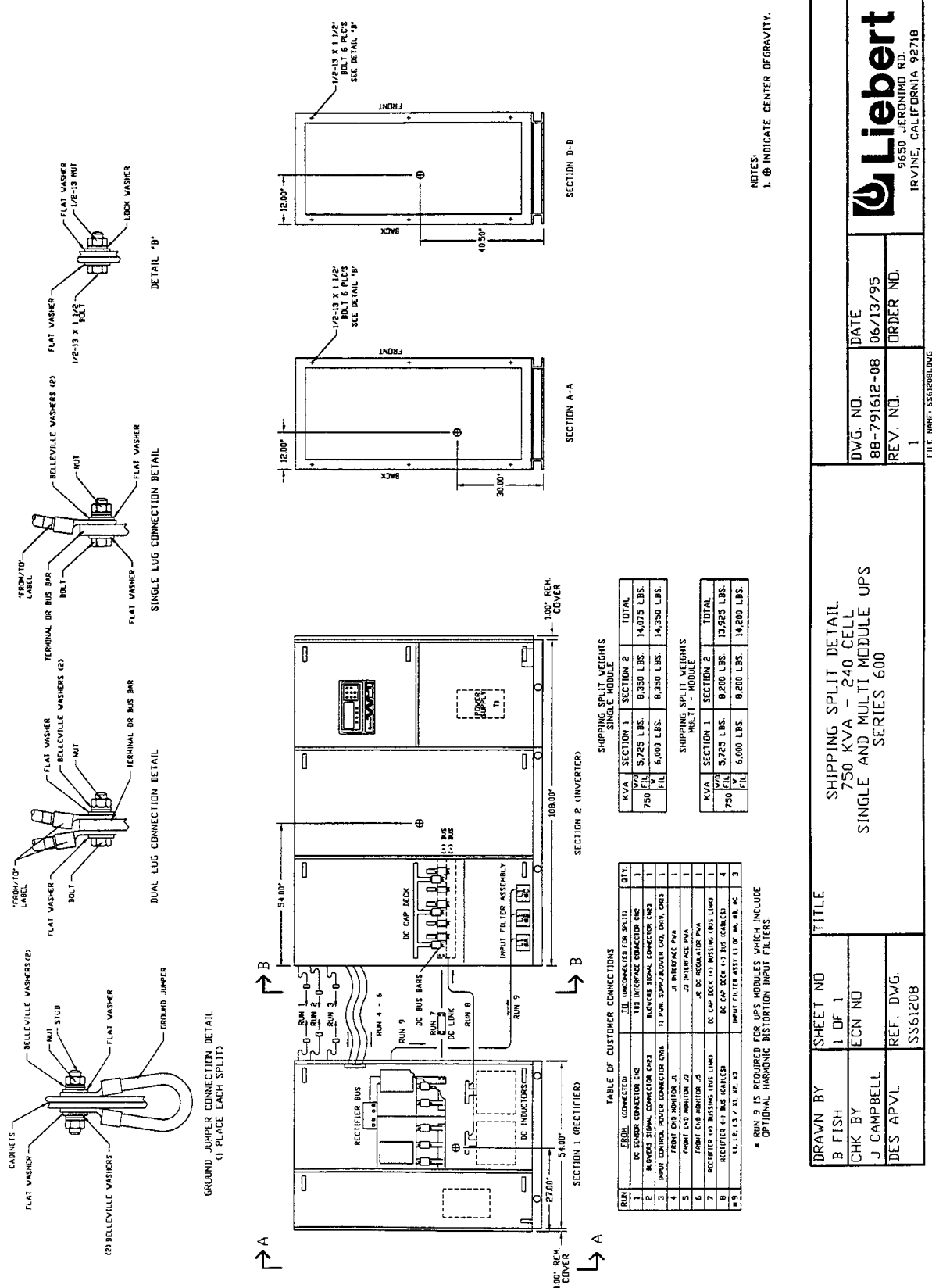
* RUN 9 IS REQUIRED FOR UPS MODULES WHICH INCLUDE OPTIONAL HARMONIC DISTORTION INPUT FILTERS.

| | | | | |
|----------------------|--|--------------------|--|------------------|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | TITLE SHIPPING SPLIT DETAIL 625 KVA SINGLE AND MULTI MODULE UPS SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | DWG. NO. 88-791612-07 | DATE 06/13/95 |
| DES APVL SS61207 | | REF. DWG. | REV. NO. 1 | ORDER NO. |

9650 JERONIMO RD.
 IRVINE, CALIFORNIA 92718

FILE NAME: SS6B07.DWG

Figure 37 Shipping Split Detail, 750 kVA (High Link - 240 Cells)



NOTES:
1. Ⓞ INDICATE CENTER OF GRAVITY.

SHIPPING SPLIT WEIGHTS

| SINGLE MODULE | | | |
|---------------|------------|------------|-------------|
| KVA | SECTION 1 | SECTION 2 | TOTAL |
| 750 | 5,725 LBS. | 8,350 LBS. | 14,075 LBS. |
| 750 | 6,000 LBS. | 8,350 LBS. | 14,350 LBS. |

| MULTI - MODULE | | | |
|----------------|------------|------------|-------------|
| KVA | SECTION 1 | SECTION 2 | TOTAL |
| 750 | 5,725 LBS. | 8,200 LBS. | 13,925 LBS. |
| 750 | 6,000 LBS. | 8,200 LBS. | 14,200 LBS. |

TABLE OF CUSTOMER CONNECTIONS

| RUN | DESCRIPTION | QTY. |
|-----|-----------------------------------|------|
| 1 | DC BATTERY CONNECTOR END | 1 |
| 2 | DC BATTERY SIGNAL CONNECTOR END | 1 |
| 3 | INPUT CONTROL POWER CONNECTOR END | 1 |
| 4 | FRONT END MONITOR 'A' | 1 |
| 5 | FRONT END MONITOR 'B' | 1 |
| 6 | RECTIFIER (1) BUSING (105 LHM) | 1 |
| 7 | RECTIFIER (2) BUSING (105 LHM) | 1 |
| 8 | DC CAP DECK (1) BUS BAR (105) | 1 |
| 9 | DC CAP DECK (2) BUS BAR (105) | 1 |
| 10 | INPUT FILTER ASSEMBLY (105) | 1 |

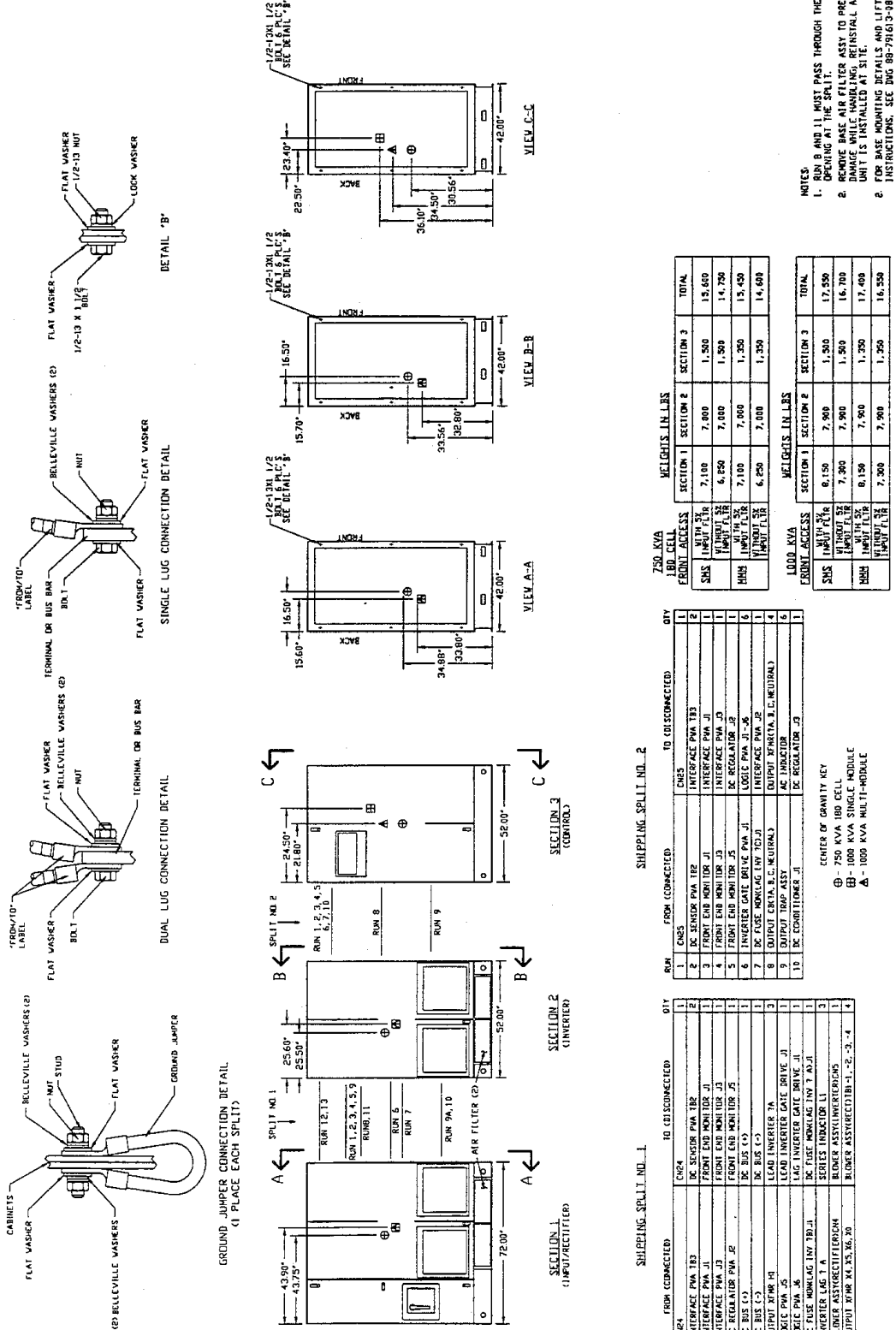
* RUN 9 IS REQUIRED FOR UPS MODULES WHICH INCLUDE OPTIONAL HARMONIC DISTORTION INPUT FILTERS.

| | | | | | |
|--------------|--|-----------|--|-----------------------------|--|
| DRAWN BY | | SHEET NO | | TITLE | |
| B FISH | | 1 OF 1 | | SHIPPING SPLIT DETAIL | |
| CHK BY | | ECN NO | | 750 KVA - 240 CELL | |
| J CAMPBELL | | | | SINGLE AND MULTI MODULE UPS | |
| DES APVL | | REF. DWG. | | SERIES 600 | |
| | | SS61208 | | | |
| DWG. NO. | | DATE | | ORDER NO. | |
| 88-791612-08 | | 06/13/95 | | | |
| REV. NO. | | 1 | | FILE NAME: SS61208.DWG | |



9650 JERONIMO RD.
IRVINE, CALIFORNIA 92718

Figure 38 Shipping Split Detail, 750 kVA (Low Link - 180 Cells) and 1000 kVA



NOTES:
 1. RUN B AND 11 MUST PASS THROUGH THE SAME OPENING AT THE SPLIT.
 2. MAKE SURE THE FILTER ASSEMBLY IS PROPERLY ASSEMBLED AND SECURED BEFORE THE UNIT IS INSTALLED AT SITE.
 3. FOR BASE MOUNTING DETAILS AND LIFTING INSTRUCTIONS, SEE DRG 88-791613-18.

750 kVA 180 CELL WEIGHTS IN LBS

| FRONT ACCESS | SECTION 1 | SECTION 2 | SECTION 3 | TOTAL |
|--------------|-----------|-----------|-----------|--------|
| SNS | 7,100 | 7,800 | 1,500 | 15,600 |
| W/TH 5/8 | 6,150 | 7,000 | 1,450 | 14,750 |
| HHS | 7,100 | 7,000 | 1,550 | 15,450 |
| W/TH 3/4 | 6,250 | 7,000 | 1,350 | 14,600 |

1000 kVA WEIGHTS IN LBS

| FRONT ACCESS | SECTION 1 | SECTION 2 | SECTION 3 | TOTAL |
|--------------|-----------|-----------|-----------|--------|
| SNS | 8,150 | 7,900 | 1,500 | 17,550 |
| W/TH 5/8 | 7,300 | 7,900 | 1,500 | 16,700 |
| HHS | 8,150 | 7,900 | 1,300 | 17,400 |
| W/TH 3/4 | 7,300 | 7,900 | 1,350 | 16,550 |


SHIPPING SPLIT NO. 2

| FROM CONNECTED | TO DISCONNECTED | QTY |
|------------------------------|----------------------------|-----|
| 1 CHMS | CHMS | 1 |
| 2 DC SENSOR PMA TB2 | INTERFACE PMA TB3 | 2 |
| 3 FRONT END MONITOR J1 | INTERFACE PMA J2 | 1 |
| 4 FRONT END MONITOR J2 | INTERFACE PMA J1 | 1 |
| 5 FRONT END MONITOR J3 | DC REGULATOR J2 | 1 |
| 6 DC FUSE MONITOR J1 | INTERFACE PMA J3 | 1 |
| 7 DC FUSE MONITOR J2 | INTERFACE PMA J4 | 1 |
| 8 DC FUSE MONITOR J3 | INTERFACE PMA J5 | 1 |
| 9 OUTPUT TRANS. B.L. NEUTRAL | OUTPUT TRANS. B.L. NEUTRAL | 1 |
| 10 DC REGULATOR J1 | DC REGULATOR J3 | 1 |

SHIPPING SPLIT NO. 1

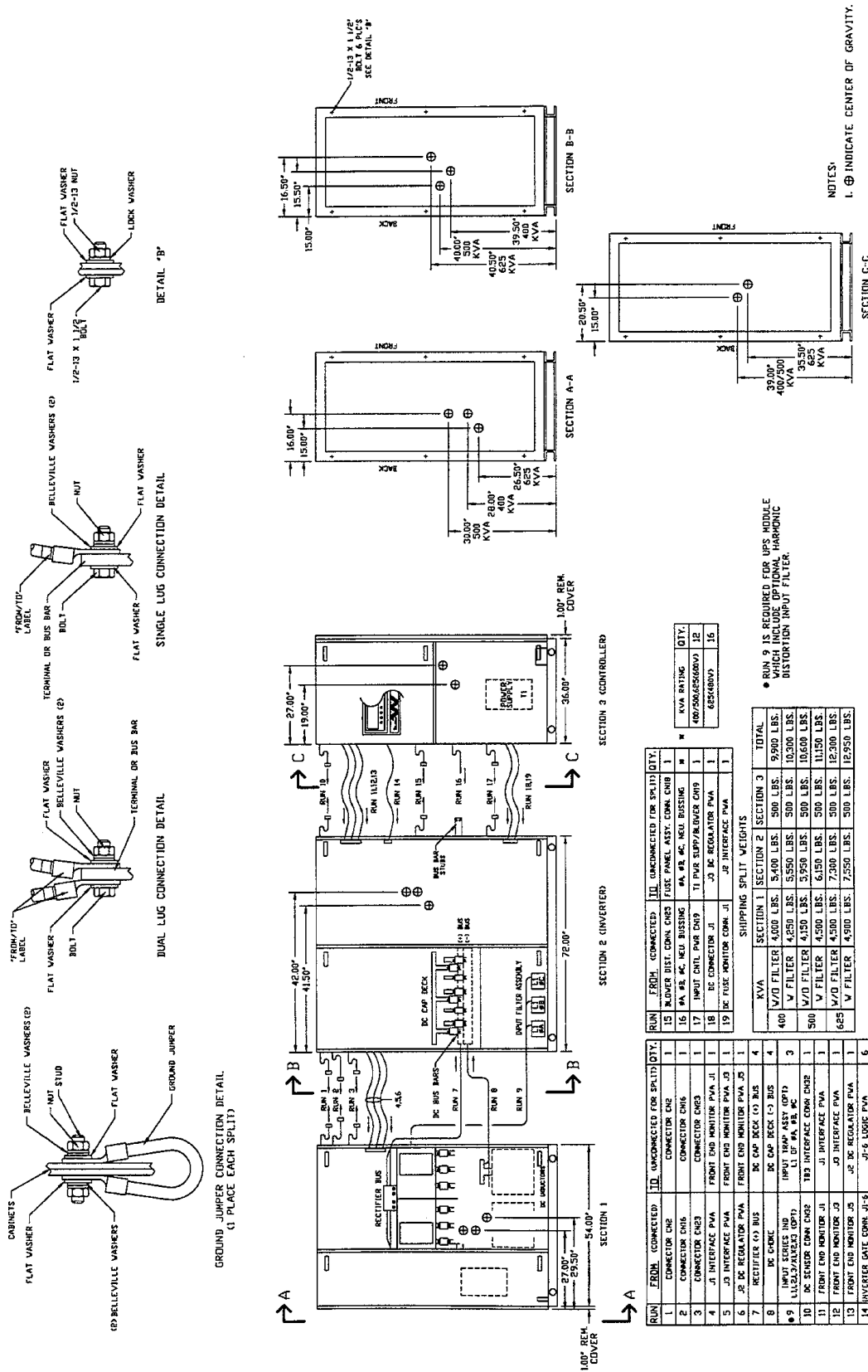
| FROM CONNECTED | TO DISCONNECTED | QTY |
|------------------------------|----------------------------|-----|
| 1 CHMS | CHMS | 1 |
| 2 DC SENSOR PMA TB2 | INTERFACE PMA TB3 | 2 |
| 3 FRONT END MONITOR J1 | INTERFACE PMA J2 | 1 |
| 4 FRONT END MONITOR J2 | INTERFACE PMA J1 | 1 |
| 5 FRONT END MONITOR J3 | DC REGULATOR J2 | 1 |
| 6 DC FUSE MONITOR J1 | INTERFACE PMA J3 | 1 |
| 7 DC FUSE MONITOR J2 | INTERFACE PMA J4 | 1 |
| 8 DC FUSE MONITOR J3 | INTERFACE PMA J5 | 1 |
| 9 OUTPUT TRANS. B.L. NEUTRAL | OUTPUT TRANS. B.L. NEUTRAL | 1 |
| 10 DC REGULATOR J1 | DC REGULATOR J3 | 1 |
| 11 INVERTER LAG 1 A | LAG INVERTER GATE DRIVE J1 | 1 |
| 12 BLOWER ASSY (RECTIFIER) | LAG INVERTER GATE DRIVE J1 | 1 |
| 13 BLOWER ASSY (INVERTER) | LAG INVERTER GATE DRIVE J1 | 1 |
| 14 BLOWER ASSY (RECTIFIER) | LAG INVERTER GATE DRIVE J1 | 1 |
| 15 BLOWER ASSY (INVERTER) | LAG INVERTER GATE DRIVE J1 | 1 |

| | | | | | |
|----------------------|--|----------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE SHIPPING SPLIT DETAIL 750 kVA - 180 CELL SINGLE AND MULTI MODULE UPS SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791612-09 | |
| DES APVL | | REF. DWG. SS61209 | | DATE 06/13/95 | |
| | | | | ORDER NO. | |


 9650 FERONIMO RD.
 IRVINE, CALIFORNIA 92718

FILE NAME: SS61209.DWG

Figure 39 Optional Shipping Split Detail, 400 to 625 kVA



NOTES:
1. ⊕ INDICATE CENTER OF GRAVITY.

| | | | | | |
|--------------|--|-----------|--|----------------------------------|--|
| DRAWN BY | | SHEET NO | | TITLE | |
| B FISH | | 1 OF 1 | | SHIPPING SPLIT DETAIL | |
| CHK BY | | ECN NO | | 400, 500 AND 625 KVA | |
| J CAMPBELL | | | | MULTI-MODULE UPS | |
| DES APVL | | REF. DWG. | | WITH OPTIONAL 2ND SHIPPING SPLIT | |
| | | SS61211 | | 480V AND 600V INPUT | |
| | | | | SERIES 600 | |
| DWG. NO. | | DATE | | ORDER NO. | |
| 88-791612-11 | | 06/13/95 | | | |
| REV. NO. | | | | 1 | |
| 1 | | | | | |



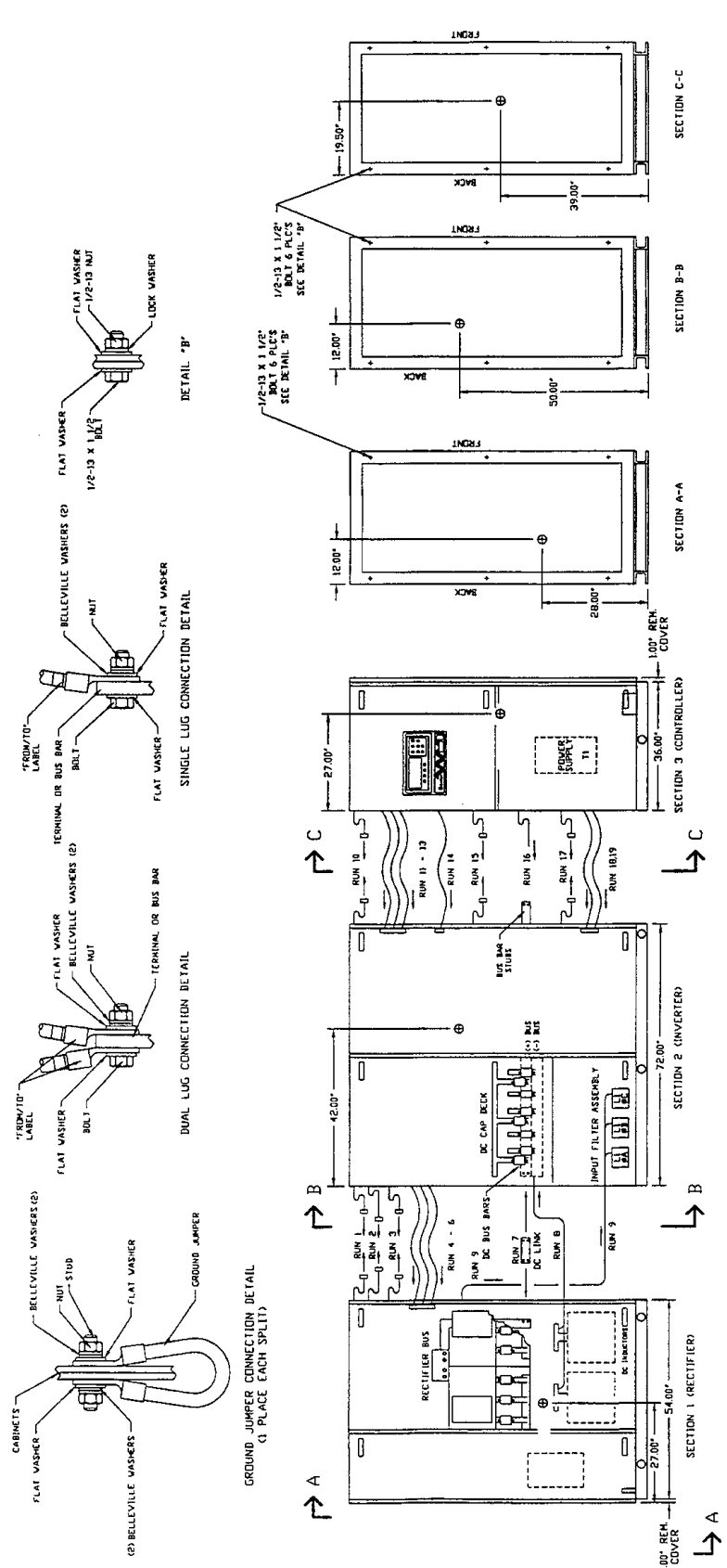
| KVA RATING | QTY. |
|-------------------|------|
| 400/500/625(600V) | 12 |
| 625(600V) | 16 |

* RUN 9 IS REQUIRED FOR UPS MODEL WHICH INCLUDE OPTIONAL HARMONIC DISTORTION INPUT FILTER.

| SHIPPING SPLIT WEIGHTS | | TOTAL | |
|------------------------|-----------------------|------------|-------------|
| KVA | SECTION 1 | SECTION 2 | SECTION 3 |
| 400 | W/O FILTER 4,000 LBS. | 5,400 LBS. | 9,900 LBS. |
| 400 | W/FILTER 4,250 LBS. | 5,950 LBS. | 10,300 LBS. |
| 500 | W/O FILTER 4,150 LBS. | 5,950 LBS. | 10,600 LBS. |
| 500 | W/FILTER 4,500 LBS. | 6,150 LBS. | 11,150 LBS. |
| 625 | W/O FILTER 4,500 LBS. | 7,300 LBS. | 12,300 LBS. |
| 625 | W/FILTER 4,900 LBS. | 7,550 LBS. | 12,950 LBS. |

| RUN | FROM | CONNECTED | UNCONNECTED FOR SPLIT | QTY. |
|-----|-------------------------|---------------------------|---------------------------|------|
| 1 | CONNECTOR CH2 | CONNECTOR CH2 | CONNECTOR CH2 | 1 |
| 2 | CONNECTOR CH3 | CONNECTOR CH3 | CONNECTOR CH3 | 1 |
| 3 | CONNECTOR CH3 | CONNECTOR CH3 | CONNECTOR CH3 | 1 |
| 4 | J1 INTERFACE PVA | FRONT END MONITOR PVA, J1 | FRONT END MONITOR PVA, J1 | 1 |
| 5 | J2 INTERFACE PVA | FRONT END MONITOR PVA, J2 | FRONT END MONITOR PVA, J2 | 1 |
| 6 | J3 DC REGULATOR PVA | FRONT END MONITOR PVA, J3 | FRONT END MONITOR PVA, J3 | 1 |
| 7 | RECTIFIER C1 BUS | DC CAP DECK C1 BUS | DC CAP DECK C1 BUS | 4 |
| 8 | DC CHOCK | DC CAP DECK C1 BUS | DC CAP DECK C1 BUS | 4 |
| 9 | INPUT SERIES IND | INPUT TERM ASSY OPT1 | INPUT TERM ASSY OPT1 | 3 |
| 10 | DC SENSOR TERM CASE | T85 INTERFACE CONN CH2 | T85 INTERFACE CONN CH2 | 1 |
| 11 | FRONT END MONITOR J1 | J1 INTERFACE PVA | J1 INTERFACE PVA | 1 |
| 12 | FRONT END MONITOR J2 | J2 INTERFACE PVA | J2 INTERFACE PVA | 1 |
| 13 | FRONT END MONITOR J3 | J3 DC REGULATOR PVA | J3 DC REGULATOR PVA | 1 |
| 14 | INVERTER GATE CONN J1-5 | J1-6 LOGIC PVA | J1-6 LOGIC PVA | 6 |

Figure 40 Optional Shipping Split Detail, 750 kVA



NOTES:
1. (C) INDICATE CENTER OF GRAVITY.

| KVA | SECTION 1 | SECTION 2 | SECTION 3 | TOTAL |
|-----|------------|------------|-----------|-------------|
| 750 | 5,725 LBS. | 7,700 LBS. | 650 LBS. | 14,075 LBS. |
| 750 | 6,000 LBS. | 7,700 LBS. | 650 LBS. | 14,350 LBS. |
| FIL | | | | |

| KVA | SECTION 1 | SECTION 2 | SECTION 3 | TOTAL |
|-----|------------|------------|-----------|-------------|
| 750 | 3,725 LBS. | 7,700 LBS. | 500 LBS. | 11,925 LBS. |
| 750 | 6,000 LBS. | 7,700 LBS. | 500 LBS. | 14,200 LBS. |
| FIL | | | | |

* RUM 9 IS REQUIRED FOR UPS MODULES HAVING DISTORTION INPUT FILTER.

| RUN | FROM | TO | CONNECTED | UNCONNECTED FOR SPLIT | QTY. |
|-----|---------------------------|-------------------------------------|-----------|-----------------------|----------------------|
| 1 | CONNECTOR CH9 | CONNECTOR CH9 | | | 1 |
| 2 | CONNECTOR CH9 | CONNECTOR CH9 | | | 1 |
| 3 | CONNECTOR CH9 | CONNECTOR CH9 | | | 1 |
| 4 | J1 INTERFACE PVA | FRONT END MONITOR PVA J1 | | | 1 |
| 5 | J1 INTERFACE PVA | FRONT END MONITOR PVA J5 | | | 1 |
| 6 | J2 REGULATOR PVA | FRONT END MONITOR PVA J5 | | | 1 |
| 7 | RECTIFIER C3 BUS | DC CAP DECK C3 BUS | | | 4 |
| 8 | DC CHARGE | DC CAP DECK C3 BUS | | | 4 |
| 9 | L1, L2, L3 / X1, X2, X3 | INPUT FILTER ASST. LI OF WA, PA, PC | | | 3 |
| 10 | DC SENSOR CONN. CH9 | DC INTERFACE CONN. CH9 | | | 1 |
| 11 | FRONT END MONITOR J1 | J1 INTERFACE PVA | | | 1 |
| 12 | FRONT END MONITOR J2 | J2 INTERFACE PVA | | | 1 |
| 13 | FRONT END MONITOR J3 | J3 INTERFACE PVA | | | 1 |
| 14 | INVERTER GATE CONN. G1-G4 | J1-G4 LOGIC PVA | | | 1 |
| 15 | BELEVERE DIST. CONN. CH9 | FUSE PANEL ASST. CONN. CH9 | | | 1 |
| 16 | PA, PB, PC, NEUT. BUSSING | PA, PB, PC, NEUT. BUSSING | | | 3 PHASE, 3 FOR NEUT. |
| 16A | PA, PB, PC, NEUT. BUSSING | MODULE V41 CONTROLLER PVA 1R2 | | | 4 |
| 16B | NEUT. BUS | PRELONG ASST. CH9 | | | 1 FOR SHS ONLY |
| 16C | NEUT. BUS | CH9 | | | 1 FOR SHS ONLY |
| 17 | INPUT CH9L PWR CONN. J1 | J1 PWR SUPP. / BUDGER CH9 | | | 1 |
| 18 | DC CONNECTOR J1 | J2 DC REGULATOR PVA | | | 1 |
| 19 | DC FUSE MONITOR CONN. J1 | J2 INTERFACE PVA | | | 1 |

| | | | |
|------------|--|-----------|--|
| DRAWN BY | | SHEET NO | |
| B FISH | | 1 OF 1 | |
| CHK BY | | ECN NO | |
| J CAMPBELL | | | |
| DES. APVL | | REF. DWG. | |
| SS61212 | | | |

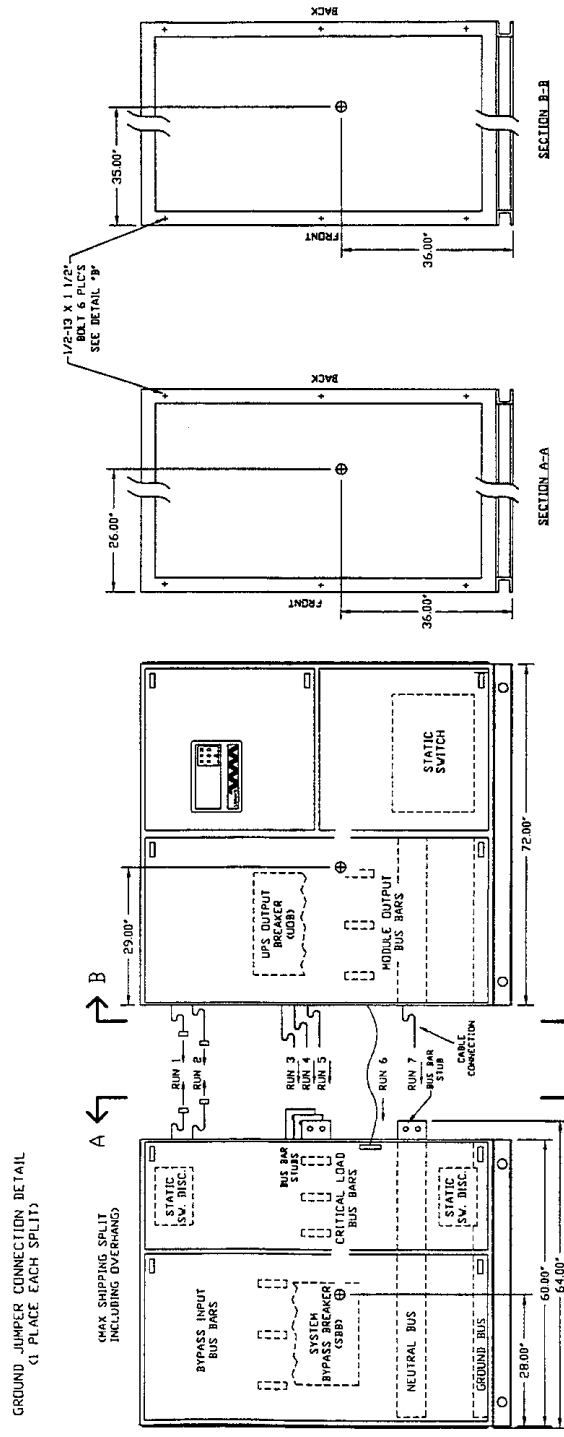
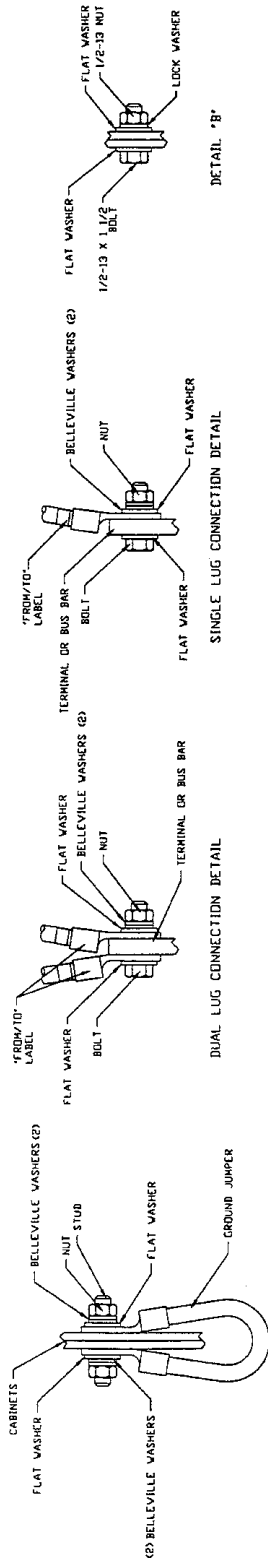
| | |
|----------------------------------|--|
| TITLE | |
| SHIPPING SPLIT DETAIL | |
| 750 KVA - 240 CELL | |
| SINGLE AND MULTI MODULE UPS | |
| WITH OPTIONAL 2ND SHIPPING SPLIT | |
| SERIES 600 | |

| | |
|--------------|-----------|
| DWG. NO. | DATE |
| 88-791612-12 | 06/13/95 |
| REV. NO. | ORDER NO. |
| 1 | |

FILE NAME: SS61212.DWG



Figure 41 Optional Shipping Split Detail, System Control Cabinet (SCCA) 4000 Amps



SHIPPING SPLIT WEIGHTS

| | | |
|-----------|-----------|-----------|
| SECTION 1 | SECTION 2 | TOTAL |
| 2,555 LBS | 2,325 LBS | 4,880 LBS |

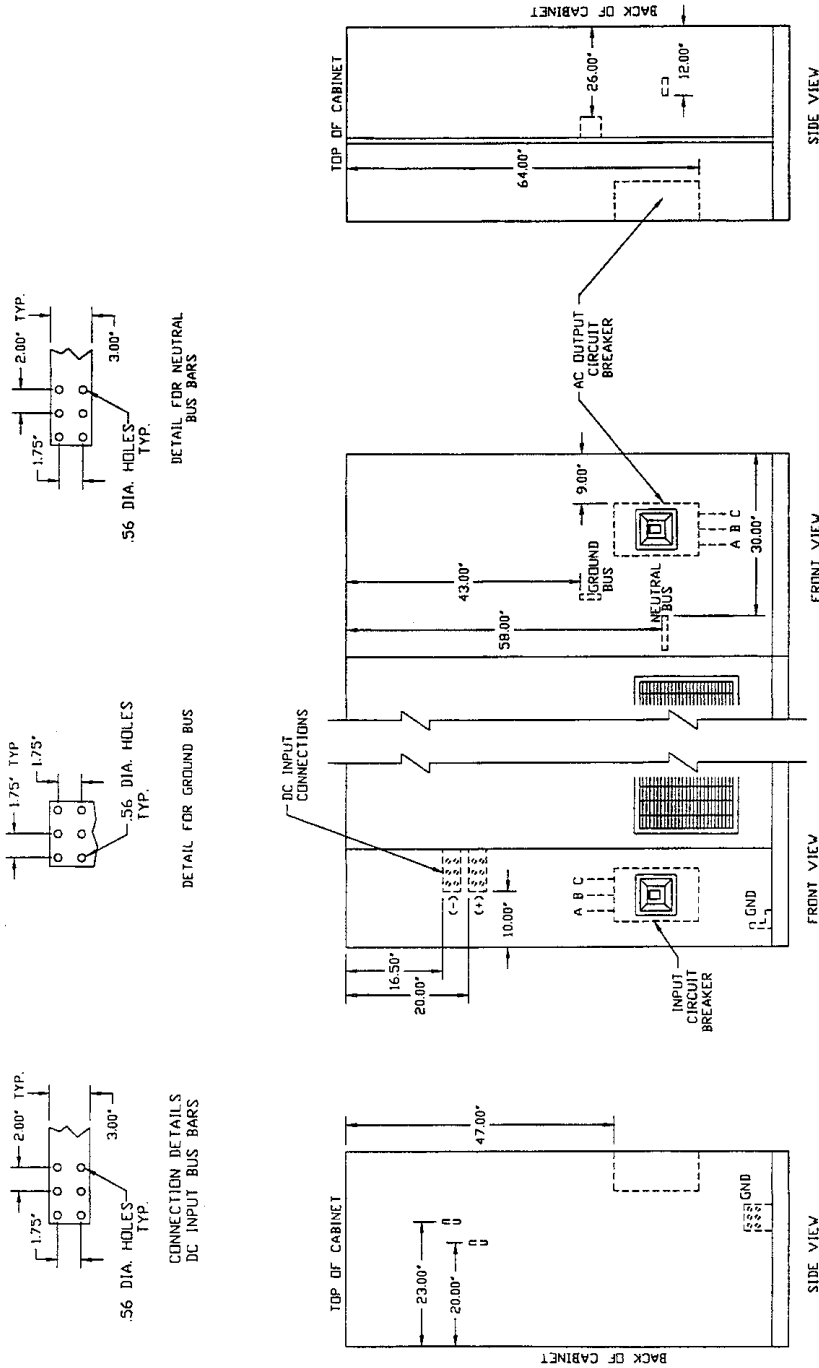
NOTES:
1. Ⓞ INDICATE CENTER OF GRAVITY.

| | | | | | |
|----------------------|--|--------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE SHIPPING SPLIT DETAIL | |
| CHK BY J CAMPBELL | | ECN NO | | 4000 AMP SYSTEM CONTROL CABINET (SCCB) SERIES 600 | |
| DES APVL SS61213 | | REF. DWG. | | DWG. NO. 88-791612-13 | |
| | | | | DATE 06/13/95 | |
| | | | | ORDER NO. | |
| | | | | 1 | |



FILE NAME: SS61213.DWG

Figure 42 Bussing Details, 338 kVA



- NOTES:
 1. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 2. ALL DIMENSIONS ARE IN INCHES.
 3. FOR OUTLINE DETAILS REFER TO DRAWING 88-791640-04.


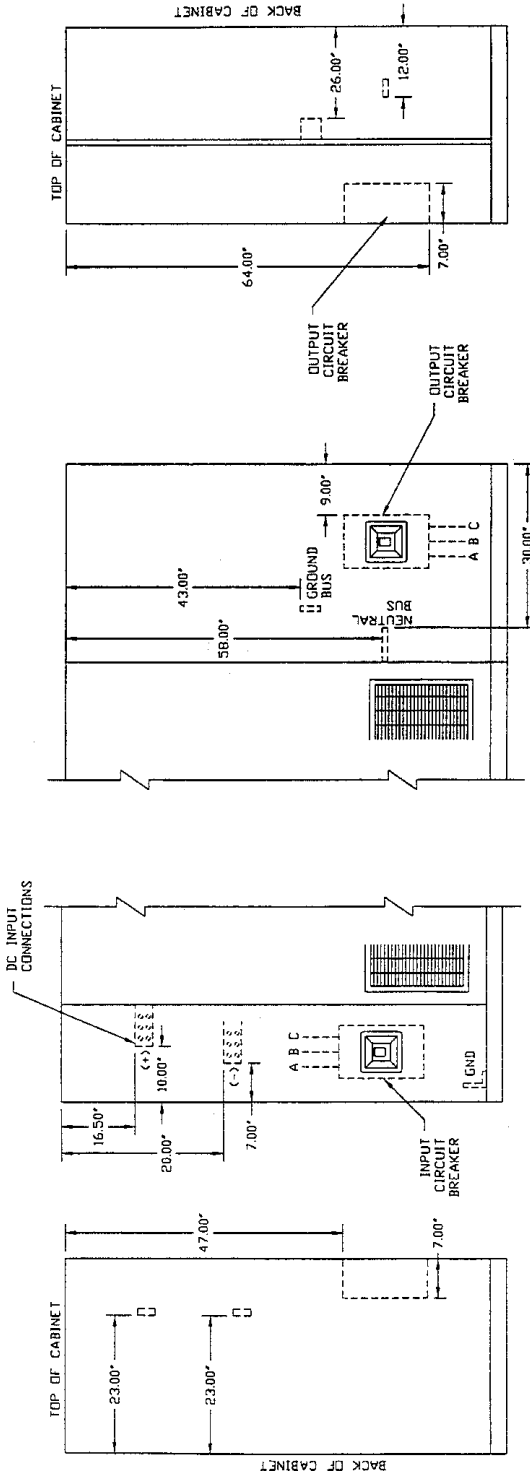
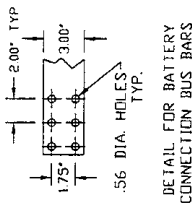
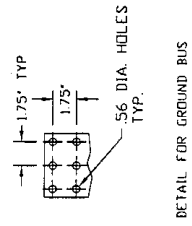
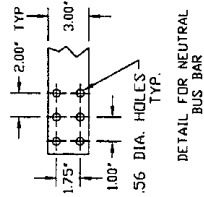
| | | | | | |
|--|--|-----------------------|--|--|--|
| DRAWN BY D. MCKAY | | SHEET NO. 1 OF 1 | | TITLE BUSSING DETAILS 338 KVA MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | |
| CHK BY J. CAMPBELL | | ECN NO. | | DWG. NO. 88-791640-94 | |
| DES. APVL | | REF. DWG. DB6-4094 | | DATE 02/07/95 | |
| | | | | ORDER NO. | |
| | | | | REV. NO. 1 | |
| FILE NAME: DB64094.DWG | | | | | |
|  9650 MERCENIO RD. IRVINE, CALIFORNIA 92718 | | | | | |

Figure 43 Bussing Details, 400 kVA

- NOTES:
1. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 2. ALL DIMENSIONS ARE IN INCHES.
 3. FOR OUTLINE DETAILS REFER TO DRAWING BB-791649-84.

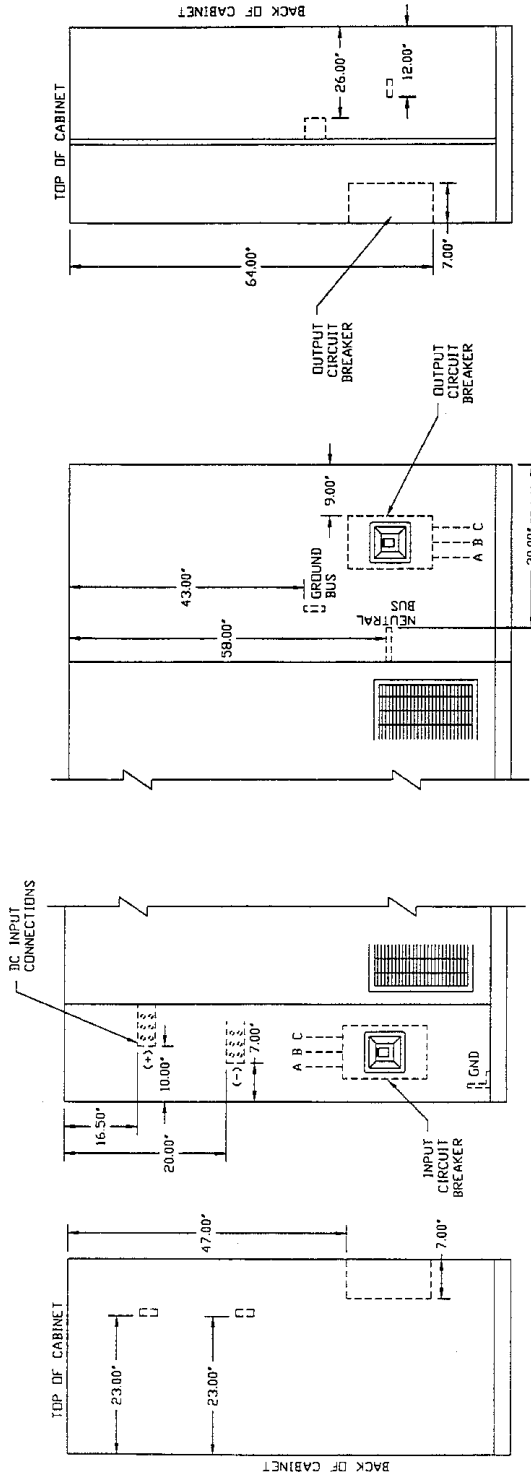
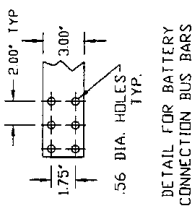
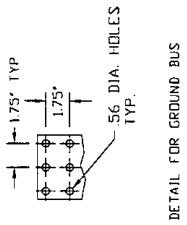
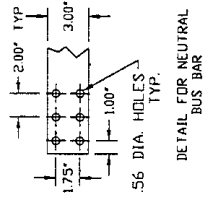


| | | | | | |
|----------------------|--|----------------------|--|--|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE BUSSING DETAILS | |
| CHK BY J CAMPBELL | | ECN NO | | 400 KVA MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | |
| DES APVL | | REF. DWG. DB64994 | | DWG. NO. 88-791649-94 | |
| | | DATE 05/24/95 | | ORDER NO. | |
| | | REV. NO. 1 | | FILE NAME: DB64994JWG | |



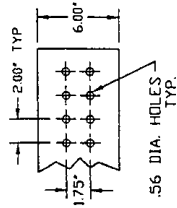
Figure 44 Bussing Details, 500 kVA

- NOTES:
1. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 2. ALL DIMENSIONS ARE IN INCHES.
 3. FOR OUTLINE DETAILS REFER TO DRAWING BB-791659-84.

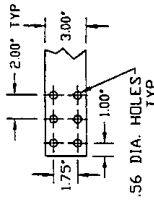


| | | | | | |
|-------------------------|--|----------------------|--|--|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE BUSsing DETAILS | |
| CHK BY J CAMPBELL | | ECN NO | | 500 KVA MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | |
| DES APVL | | REF. DWG. DB65994 | | DWG. NO. 88-791659-94 | |
| | | DATE 05/30/95 | | ORDER NO. | |
| | | REV. NO. 1 | | IRVINE, CALIFORNIA 92718 | |
| FILE NAME: DB659941.DWG | | | | | |

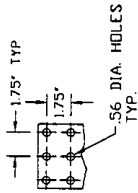
Figure 45 Bussing Details, 500 kVA, 208 VAC



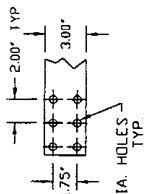
DETAIL FOR AC OUTPUT BUS BARS



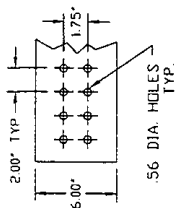
DETAIL FOR NEUTRAL BUS BAR



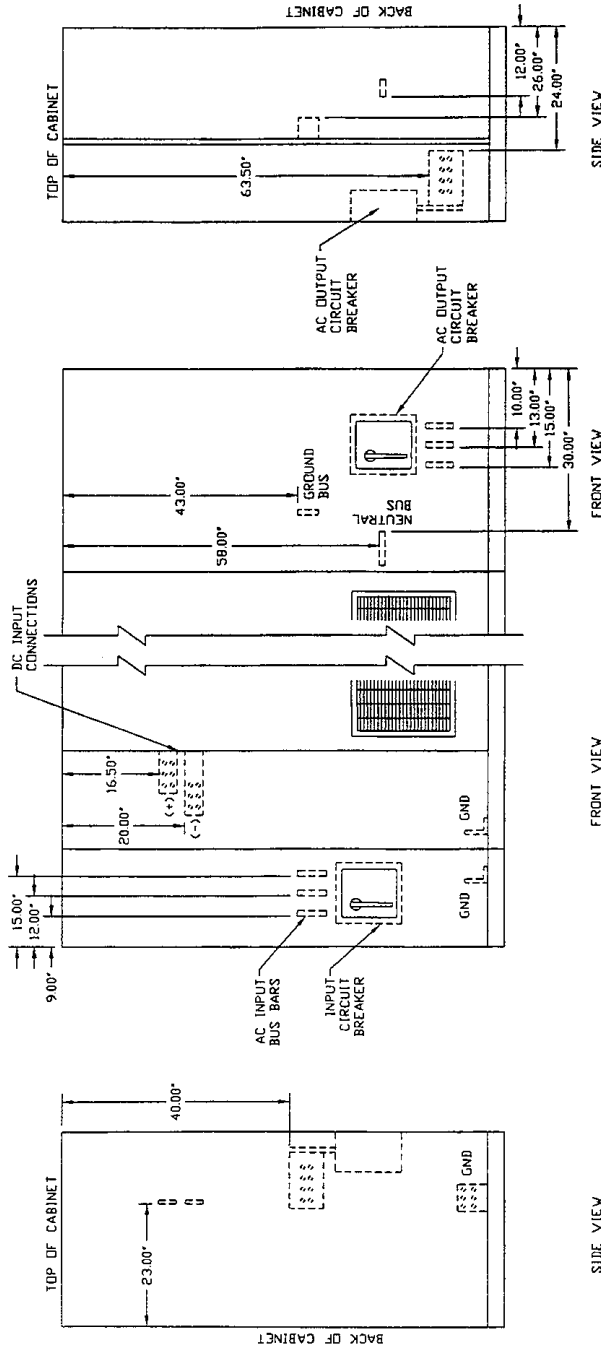
DETAIL FOR GROUND BUS



CONNECTION DETAILS DC INPUT BUS BARS



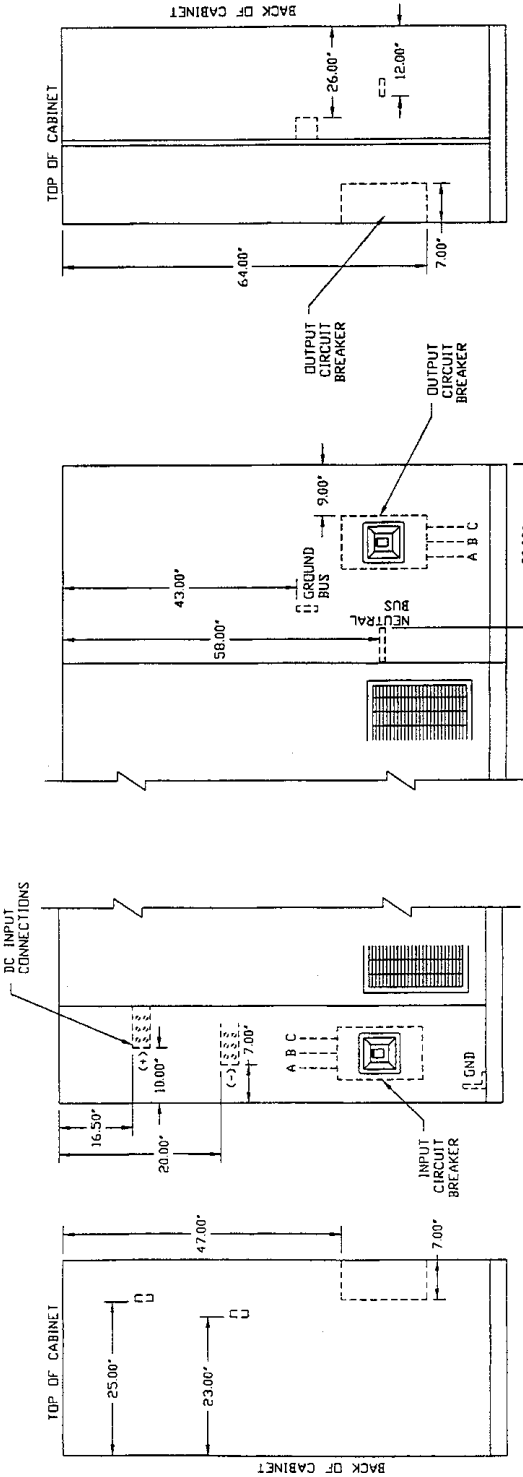
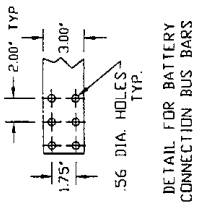
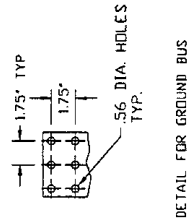
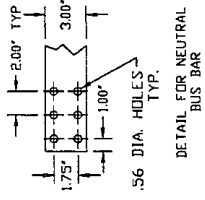
CONNECTION DETAILS AC INPUT BUS BARS



- NOTES:
1. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 2. ALL DIMENSIONS ARE IN INCHES.
 3. FOR OUTLINE DETAILS REFER TO DRAWING 88-791659-81.

| | | | | | |
|--------------------------|--|--------------------------|--|--|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE BUSSEING DETAILS | |
| CHK BY J CAMPBELL | | ECN NO | | 500 KVA MULTI-MODULE UPS | |
| DES APVL | | REF. DWG. DB65991 | | 208 V INPUT - 208 / 120 V OUTPUT SERIES 600 | |
| DWG. NO. 88-791659-91 | | DATE 05/30/95 | | ORDER NO. | |
| REV. NO. 1 | | FILE NAME DB65991.DWG | | IRVINE, CALIFORNIA 92718 | |

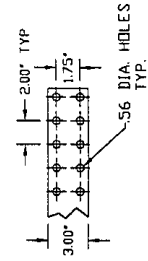
Figure 46 Bussing Details, 625 kVA



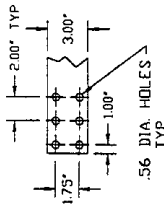
- NOTES:
1. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 2. ALL DIMENSIONS ARE IN INCHES.
 3. FOR OUTLINE DETAILS REFER TO DRAWING 88-791671-84.

| | | | | | | | | | |
|----------------------|--|----------------------|--|--|--|--------------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE BUSSING DETAILS | | DWG. NO. 88-791671-94 | | DATE 05/31/95 | |
| CHK BY J CAMPBELL | | ECN NO | | MULTI-MODULE UPS 625 KVA 480 V AND 600 V SERIES 600 | | REV. NO. 1 | | ORDER NO. | |
| DES. APVL | | REF. DWG. DBG7194 | | | | FILE NAME: DB67194.DWG | | 9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | |

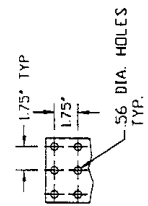
Figure 47 Bussing Details, 750 kVA (High Link - 240 Cells)



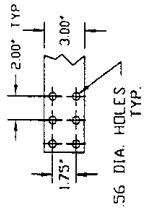
DETAIL FOR INPUT AND OUTPUT BUS BARS



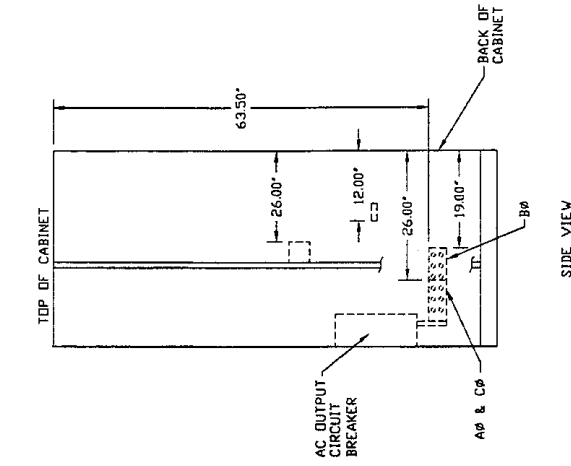
DETAIL FOR NEUTRAL BUS BARS



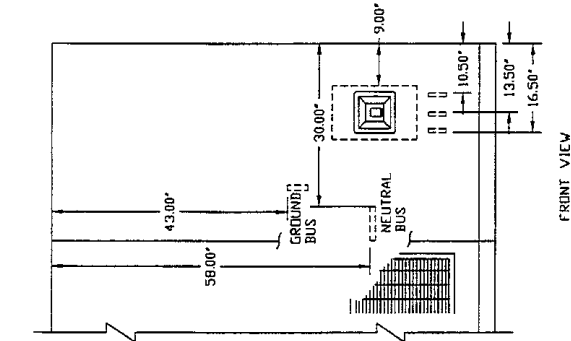
DETAIL FOR GROUND BUS



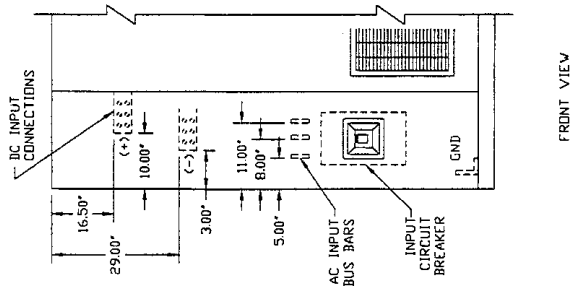
DETAIL FOR BATTERY CONNECTION BUS BARS



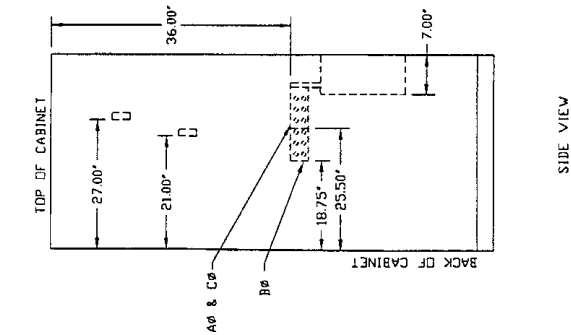
SIDE VIEW



FRONT VIEW



FRONT VIEW



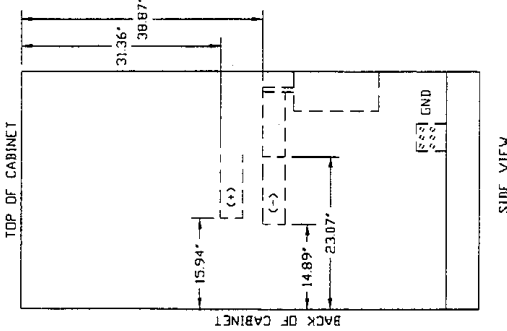
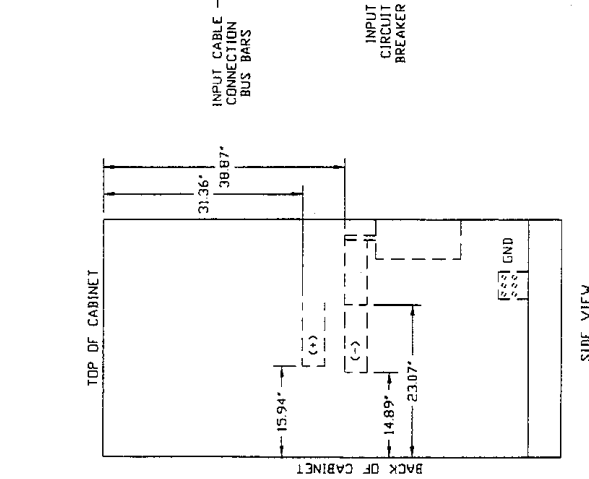
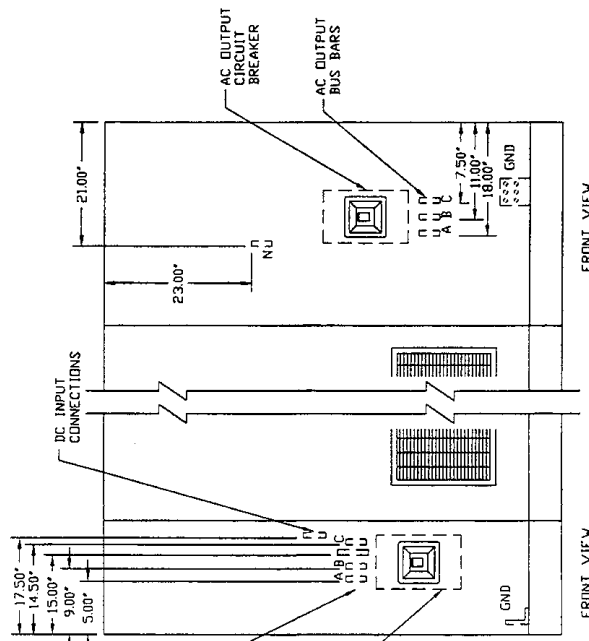
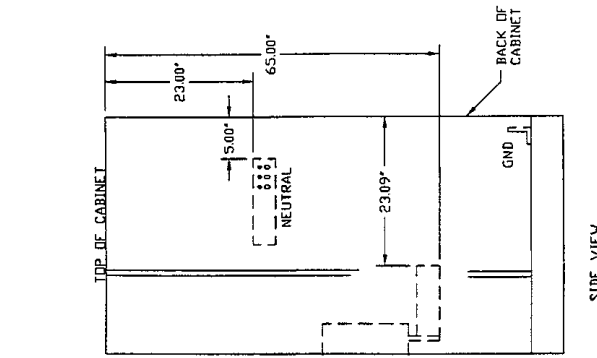
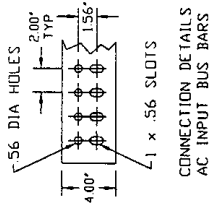
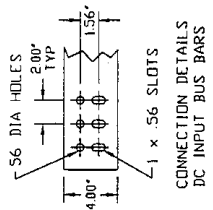
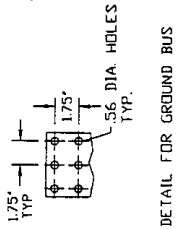
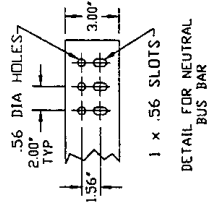
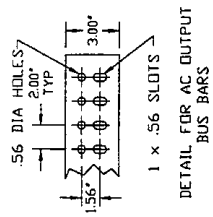
SIDE VIEW

- NOTES:
1. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 2. ALL DIMENSIONS ARE IN INCHES.
 3. FOR OUTLINE DETAILS REFER TO DRAWING 88-791675-84.

| | | | |
|----------------------|-----------------------|---|------------------|
| DRAWN BY B FISH | SHEET NO 1 OF 1 | TITLE BUSSING DETAILS 750 KVA - 240 CELL MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | |
| | | CHK BY J CAMPBELL | ECN NO |
| DES APVL DB6/7594 | REF. DWG. DB6/7594 | DWG. NO. 88-791675-94 | DATE 06/01/95 |
| | | REV. NO. 1 | ORDER NO. |

FILE NAME: DB67594.DWG
 9650 JERONIMO RD.
 IRVINE, CALIFORNIA 92718
Liebert

Figure 48 Bussing Details, 750 kVA (Low Link - 180 Cells)



- NOTES:
1. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 2. ALL DIMENSIONS ARE IN INCHES.
 3. FOR OUTLINE DETAILS REFER TO DRAWING 88-791676-24.


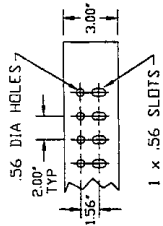
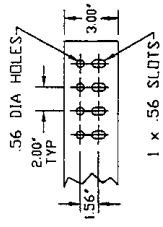
| | | | |
|--|--|----------------------|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | |
| CHK BY J CAMPBELL | | ECN NO | |
| DES APVL | | REF. DWG. DBG7644 | |
| TITLE BUSSING DETAILS 750 KVA - 180 CELL FRONT ACCESS MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | | | |
| DWG. NO. 88-791676-44 | | DATE 06/05/95 | |
| REV. NO. 1 | | ORDER NO. | |
|  9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | | | |

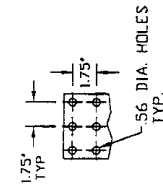
Figure 49 Bussing Details, 1000 kVA



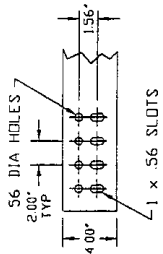
DETAIL FOR AC OUTPUT BUS BARS



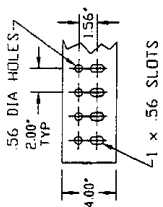
DETAIL FOR NEUTRAL BUS BAR



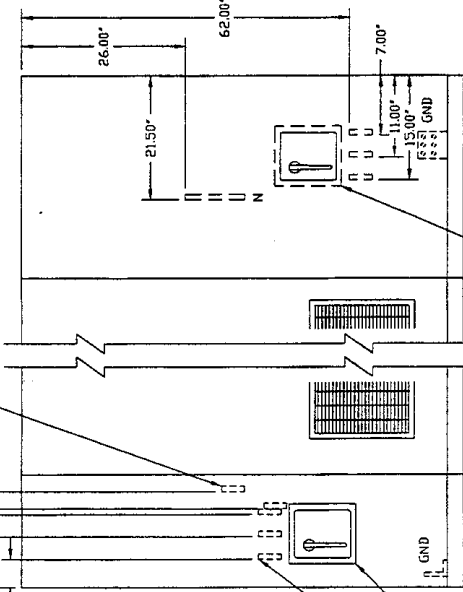
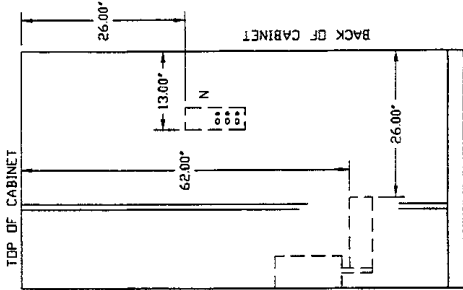
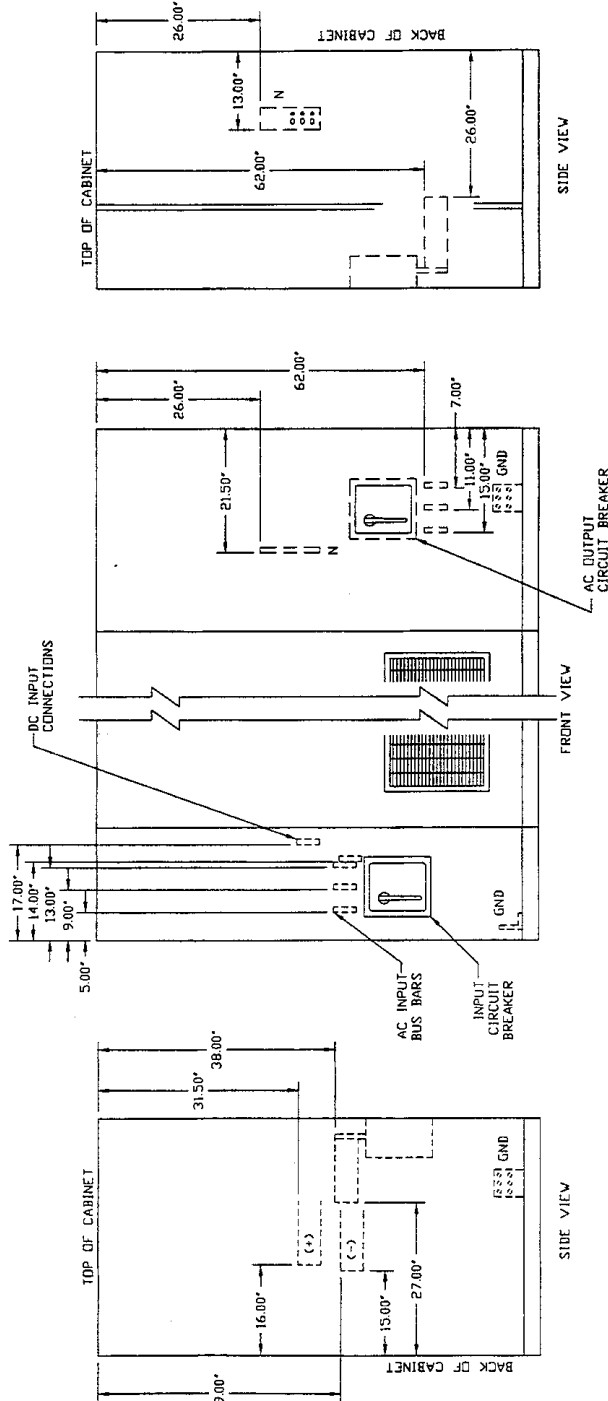
DETAIL FOR GROUND BUS



CONNECTION DETAILS DC INPUT BUS BARS



CONNECTION DETAILS AC INPUT BUS BARS

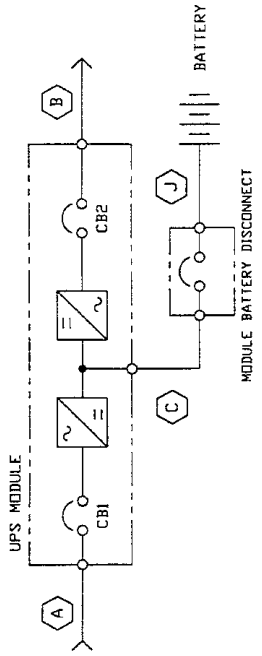


- NOTES:
1. FOR CONNECTION TO BUS BARS, LUGS TO BE PROVIDED BY OTHERS.
 2. ALL DIMENSIONS ARE IN INCHES.
 3. FOR OUTLINE DETAILS REFER TO DRAWING 88-791685-24.

| | | | |
|--|--|----------------------|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | |
| CHK BY J CAMPBELL | | ECN NO | |
| DES APVL | | REF. DWG. DB68544 | |
| TITLE BUSSING DETAILS 1000 KVA FRONT ACCESS MULTI-MODULE UPS 480 V AND 600 V SERIES 600 | | | |
| DWG. NO. 88-791685-44 | | DATE 06/07/95 | |
| REV. NO. 1 | | ORDER NO. | |
| IRVINE, CALIFORNIA 92718 FILE NAME: DB68544.DWG | | | |

Figure 50 Module One-Line Diagram, 338 kVA

- NOTES:
1. NOMINAL CURRENT IS BASED ON FULL RATED OUTPUT LOAD.
 2. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR BATTERY RECHARGE PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
 3. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR 10 MINUTE OVERLOAD RATING PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
 4. UPS OUTPUT LOAD CABLES MUST BE RUN IN SEPARATE CONDUIT FROM INPUT CABLES.
 5. POWER CABLES FROM DC LINK TO BATTERIES SHOULD BE SIZED FOR TOTAL MAXIMUM 2.0 VOLT LINE DROP AT MAXIMUM DISCHARGE CURRENT. MAXIMUM CURRENT AT END OF BATTERY DISCHARGE (300 VDC) IS DEFINED AS NONCONTINUOUS PER NEC 100.
 6. GROUNDING CONDUCTORS TO BE SIZED PER NEC 250-95, NEUTRAL CONDUCTOR IF USED SHOULD BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
 7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
 8. MODULE BATTERY DISCONNECT IS PROVIDED IN A SEPARATE ENCLOSURE.
 9. POWER AND CONTROL WIRING TO BE RUN IN SEPARATE CONDUITS.
 10. WHEN A THREE POLE MODULE BATTERY DISCONNECT IS USED, ONE POLE MAY BE USED TO CENTER TAP THE BATTERY STRING. THIS WILL REDUCE THE MAXIMUM VOLTAGE BETWEEN ANY TWO POINTS TO ONE HALF THE STRING VOLTAGE WHEN THE MODULE BATTERY DISCONNECT IS OPEN.
 11. BREAKER DESCRIPTIONS
 CB1 - SQUARE D TYPE MHL36600, 1000 AF, 600 AT, 65 KAIC.
 CB2 - SQUARE D TYPE MHL36600, 1000 AF, 600 AT, 65 KAIC.
 12. NOMINAL HEAT GENERATION - 80,131 BTU/HR.



| FEEDER | NOMINAL VOLTAGE | NOMINAL CURRENT | MAXIMUM CURRENT |
|--|-----------------|-----------------|---|
| (A) AC INPUT TO UPS 3 PHASE, 3 WIRE & GROUND. A-B-C ROTATION (SEE NOTES 1,2,4,6,7) | 480 VAC | 420 A | 525 A (W/O FILTER) 474 A (WITH FILTER) |
| (B) AC OUTPUT TO LOAD, 3 PH, 4 WIRE & GROUND. A-B-C PHASE ROTATION (SEE NOTES 1,3,4,5,7) MAXIMUM 10 MIN. @ 125% OF NOMINAL CURRENT. | 480Y/277 VAC | 380 A | 507 A |
| (C) UPS DC LINK TO MODULE BATTERY DISCONNECT. (1) POSITIVE, AND (2) NEGATIVE. (SEE NOTES 5,7,8) | 360 VDC | 406 A | 993 A AT END OF DISCHARGE |
| (J) MODULE BATTERY DISCONNECT TO SYSTEM BATTERY. (1) POSITIVE, AND (2) NEGATIVE AND (3) POSITIVE, AND (4) NEGATIVE FOR CENTER TAP (SEE NOTES 5,7,8,10) | 360 VDC | 800 A | 993 A AT END OF DISCHARGE |

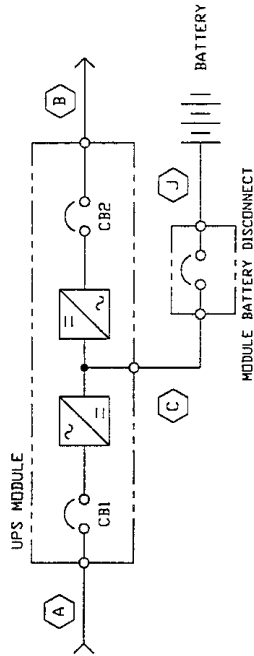
| | | | |
|---|--|----------------------|--|
| DRAWN BY D. MCKAY | | SHEET NO 1 OF 1 | |
| CHK BY J. CAMPBELL | | ECN NO | |
| DES. APVL | | REF. DWG. SL64084 | |
| ONE - LINE DIAGRAM 338 KVA / 270 KV PARALLEL MODULE UPS 480 V INPUT - 480 / 277 V OUTPUT SERIES 600 | | | |
| DWG. NO. 97-791640-84 | | DATE 02/08/95 | |
| REV. NO. 1 | | ORDER NO. | |
| Liebert 9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | | | |

FILE NAME: SL64084.DWG

Figure 51 Module One-Line Diagram, 400 kVA

NOTES:

1. NOMINAL CURRENT IS BASED ON FULL RATED OUTPUT LOAD.
2. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR BATTERY RECHARGE PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
3. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR 10 MINUTE OVERLOAD RATING PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
4. UPS OUTPUT LOAD CABLES MUST BE RUN IN SEPARATE CONDUIT FROM INPUT CABLES.
5. POWER CABLES FROM DC LINK TO BATTERIES SHOULD BE SIZED FOR TOTAL MAXIMUM 20 VOLT LINE DROP AT MAXIMUM DISCHARGE CURRENT. MAXIMUM CURRENT AT END OF BATTERY DISCHARGE (300 VDC) IS DEFINED AS NONCONTINUOUS PER NEC 100.
6. GROUNDING CONDUCTORS TO BE SIZED PER NEC 250-95. NEUTRAL CONDUCTOR (IF USED) SHOULD BE SIZED FOR FULL CAPACITY.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
8. MODULE BATTERY DISCONNECT IS PROVIDED IN A SEPARATE ENCLOSURE.
9. POWER AND CONTROL WIRING TO BE RUN IN SEPARATE CONDUITS.
10. WHEN A THREE POLE MODULE BATTERY DISCONNECT IS USED, ONE POLE MAY BE USED TO CENTER TAP THE BATTERY STRING. THIS WILL REDUCE THE MAXIMUM VOLTAGE BETWEEN ANY TWO POINTS TO ONE HALF THE STRING VOLTAGE WHEN THE MODULE BATTERY DISCONNECT IS OPEN.
11. BREAKER DESCRIPTIONS
 CBI - SQUARE D TYPE MHL36700, 1000 AF, 700 AT, 65 KAIC.
 CB2 - SQUARE D TYPE MHL36600, 1000 AF, 600 AT, 65 KAIC.
12. NOMINAL HEAT GENERATION - 94,970 BTU/HR.



| FEEEDER | NOMINAL VOLTAGE | NOMINAL CURRENT | MAXIMUM CURRENT |
|---|-----------------|-----------------|---|
| (A) AC INPUT TO UPS 3 PHASE, 3 WIRE & GROUND. A-B-C ROTATION (SEE NOTES 1,2,4,6,7) | 480 VAC | 504 A 455 A | 530 A (W/O FILTER) 568 A (WITH FILTER) |
| (B) AC OUTPUT TO LOAD, 3 PH, 4 WIRE & GROUND. A-B-C PHASE ROTATION (SEE NOTES 1,3,4,6,7) MAXIMUM 10 MIN. @ 125% OF NOMINAL CURRENT. | 480Y/277 VAC | 481 A | 601 A |
| (C) UPS DC LINK TO MODULE BATTERY DISCONNECT. (1) POSITIVE, AND (1) NEGATIVE. (SEE NOTES 5,7,B) | 360 VDC | 943 A | 1170 A AT END OF DISCHARGE |
| (J) MODULE BATTERY DISCONNECT TO SYSTEM BATTERY. (1) POSITIVE, AND (1) NEGATIVE AND (1) POSITIVE, AND (1) NEGATIVE FOR CENTER TAP (SEE NOTES 5,7,B) | 360 VDC | 943 A | 1170 A AT END OF DISCHARGE |

| | | | |
|-----------------------|----------------------|--|--------------------------|
| DRAWN BY D. MCKAY | SHEET NO 1 OF 1 | TITLE ONE - LINE DIAGRAM 400 KVA / 320 KW PARALLEL MODULE UPS | DWG. NO. 97-791648-84 |
| CHK BY J. CAMPBELL | ECN NO | 480 V INPUT - 480 / 277 V OUTPUT SERIES 600 | DATE 02/17/95 |
| DES APVL | REF. DWG. SL64884 | | ORDER NO. |
| | | | REV. NO. 1 |

Liebert

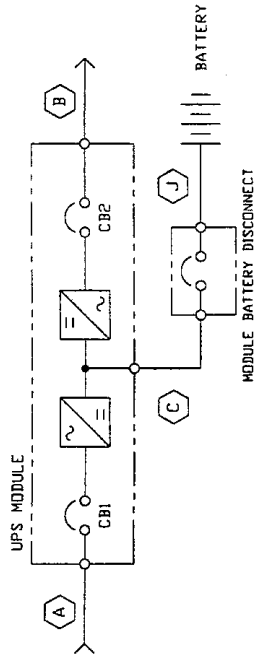
9650 JERONIMO RD.
IRVINE, CALIFORNIA 92718

FILE NAME: SL64884.DWG

Figure 52 Module One-Line Diagram, 500 kVA

NOTES:

1. NOMINAL CURRENT IS BASED ON FULL RATED OUTPUT LOAD.
2. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR BATTERY RECHARGE PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
3. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR 10 MINUTE OVERLOAD RATING PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
4. UPS OUTPUT LOAD CABLES MUST BE RUN IN SEPARATE CONDUIT FROM INPUT CABLES.
5. POWER CABLES FROM DC LINK TO BATTERIES SHOULD BE SIZED FOR TOTAL MAXIMUM 2.0 VOLT LINE DROP AT MAXIMUM DISCHARGE CURRENT. MAXIMUM CURRENT AT END OF BATTERY DISCHARGE (300 VDC) IS DEFINED AS NONCONTINUOUS PER NEC 100.
6. GROUNDING CONDUCTORS TO BE SIZED PER NEC 250-95. NEUTRAL CONDUCTOR (IF USED) SHOULD BE SIZED FOR FULL CAPACITY.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
8. MODULE BATTERY DISCONNECT IS PROVIDED IN A SEPARATE ENCLOSURE.
9. POWER AND CONTROL WIRING TO BE RUN IN SEPARATE CONDUITS.
10. WHEN A THREE POLE MODULE BATTERY DISCONNECT IS USED, ONE POLE MAY BE USED TO CENTER TAP THE BATTERY STRING. THIS WILL REDUCE THE MAXIMUM VOLTAGE BETWEEN ANY TWO POINTS TO ONE HALF THE STRING VOLTAGE WHEN THE MODULE BATTERY DISCONNECT IS OPEN.
11. BREAKER DESCRIPTIONS
 CBI - SQUARE D TYPE MHL36900, 1000 AF, 900 AT, 65 KAIC.
 CB2 - SQUARE D TYPE MHL36800, 1000 AF, 800 AT, 65 KAIC.
12. NOMINAL HEAT GENERATION - 118,713 BTU/HR.



| FEEDER | NOMINAL VOLTAGE | NOMINAL CURRENT | MAXIMUM CURRENT |
|---|-----------------|-----------------|---|
| (A) AC INPUT TO UPS, 3 PHASE, 3 WIRE & GROUND. A-B-C ROTATION (SEE NOTES 1,2,4,5,7) | 480 VAC | 530 A 562 A | 788 A (W/O FILTER) 703 A (WITH FILTER) |
| (B) AC OUTPUT TO LOAD, 3 PH, 4 WIRE & GROUND. A-B-C PHASE ROTATION (SEE NOTES 1,3,4,6,7). MAXIMUM 10 MIN. @ 125% OF NOMINAL CURRENT. | 480Y/277 VAC | 601 A | 752 A |
| (C) UPS DC LINK TO MODULE BATTERY DISCONNECT. (D) POSITIVE, AND (E) NEGATIVE. (SEE NOTES 5,7,8) | 360 VDC | 1178 A | 1463 A AT END OF DISCHARGE |
| (J) MODULE BATTERY DISCONNECT TO SYSTEM BATTERY. (D) POSITIVE, AND (E) NEGATIVE AND (F) POSITIVE, AND (G) NEGATIVE FOR CENTER TAP (SEE NOTES 5,7,8,10) | 360 VDC | 1178 A | 1463 A AT END OF DISCHARGE |

| | | | | | |
|----------------------|--|-----------------------|--|--|--|
| DRAWN BY D MCKAY | | SHEET NO 1 OF 1 | | TITLE ONE - LINE DIAGRAM 500 KVA / 400 KW PARALLEL MODULE UPS | |
| CHK BY J CAMPBELL | | ECN NO | | 480 V INPUT - 480 / 277 V OUTPUT SERIES 600 | |
| DES APVL | | REF. DWG. SL-65884 | | DWG. NO. 97-791658-84 | |
| | | | | DATE 02/21/95 | |
| | | | | ORDER NO. | |
| | | | | REV. NO. 1 | |

FILE NAME: SL65884.DWG

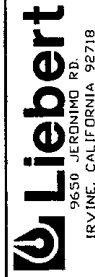
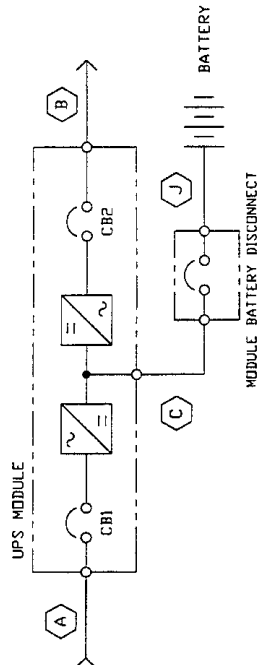


Figure 53 Module One-Line Diagram, 500 kVA, 208 VAC

NOTES:

1. NOMINAL CURRENT IS BASED ON FULL RATED OUTPUT LOAD.
2. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR BATTERY RECHARGE, PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
3. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR 10 MINUTE OVERLOAD RATING PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
4. UPS OUTPUT LOAD CABLES MUST BE RUN IN SEPARATE CONDUIT FROM INPUT CABLES.
5. POWER CABLES FROM DC LINK TO BATTERIES SHOULD BE SIZED FOR TOTAL MAXIMUM 2.0 VOLT LINE DROP AT MAXIMUM DISCHARGE CURRENT. MAXIMUM CURRENT AT END OF BATTERY DISCHARGE (300 VDC) IS DEFINED AS NONCONTINUOUS PER NEC 100.
6. GROUNDING CONDUCTORS TO BE SIZED PER NEC 250-95. NEUTRAL CONDUCTOR (IF USED) SHOULD BE SIZED FOR FULL CAPACITY.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
8. MODULE BATTERY DISCONNECT IS PROVIDED IN A SEPARATE ENCLOSURE.
9. POWER AND CONTROL WIRING TO BE RUN IN SEPARATE CONDUITS.
10. WHEN A THREE-POLE MODULE BATTERY DISCONNECT IS USED, ONE POLE MAY BE USED TO CENTER TAP THE BATTERY STRING. THIS WILL REDUCE THE MAXIMUM VOLTAGE BETWEEN ANY TWO POINTS TO ONE HALF THE STRING VOLTAGE WHEN THE MODULE BATTERY DISCONNECT IS OPEN.
11. BREAKER DESCRIPTIONS:
 CB1 - SQUARE D TYPE PHF2036, 2000 AF, 2000 AT, 125 KAIC.
 CB2 - SQUARE D TYPE PHF2036, 2000 AF, 1800 AT, 125 KAIC.
12. NOMINAL HEAT GENERATION - 126,822 BTU/HR.



| FEEEDER | NOMINAL VOLTAGE | NOMINAL CURRENT | MAXIMUM CURRENT |
|--|-----------------|------------------|---|
| (A) AC INPUT TO UPS, 3 PHASE, 3 WIRE & GROUND. A-B-C ROTATION (SEE NOTES 1,2,4,6,7) | 208 VAC | 1462 A 1333 A | 1827 A (W/O FILTER) 1667 A (WITH FILTER) |
| (B) AC OUTPUT TO LOAD, 3 PH, 4 WIRE & GROUND. A-B-C PHASE ROTATION (SEE NOTES 1,3,4,6,7). MAXIMUM 10 MIN. @ 125% OF NOMINAL CURRENT. | 208Y/120 VAC | 1388 A | 1735 A |
| (C) UPS DC LINK TO MODULE BATTERY DISCONNECT. (D) POSITIVE, AND (E) NEGATIVE. (SEE NOTES 5,7,8) | 360 VDC | 1185 A | 1470 A AT END OF DISCHARGE |
| (J) MODULE BATTERY DISCONNECT TO SYSTEM BATTERY. (D) POSITIVE, AND (E) NEGATIVE AND (F) POSITIVE, AND (G) NEGATIVE FOR CENTER TAP (SEE NOTES 5,7,8) | 360 VDC | 1185 A | 1470 A AT END OF DISCHARGE |

| | | | |
|----------------------|--------------------|--|------------------|
| DRAWN BY D MCKAY | SHEET NO 1 OF 1 | TITLE ONE - LINE DIAGRAM 500 KVA / 400 KW PARALLEL MODULE UPS 208 V INPUT - 208 / 120 V OUTPUT SERIES 600 | |
| CHK BY J CAMPBELL | ECN NO | DWG. NO. 97-791658-81 | DATE 02/21/95 |
| DES APVL SL65881 | REF. DWG. | REV. NO. 1 | ORDER NO. |

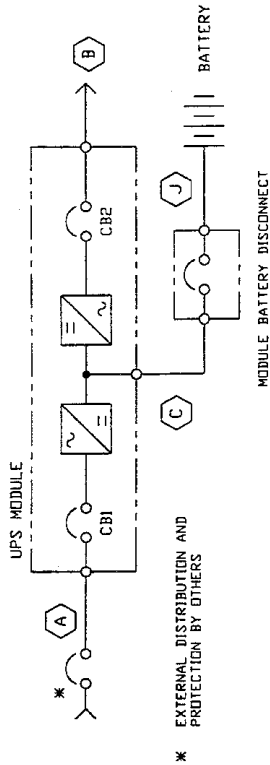
Liebert
9650 FERDINAND RD.
IRVINE, CALIFORNIA 92718

FILE NAME: SL65881.DWG

Figure 54 Module One-Line Diagram, 625 kVA

NOTES:

1. NOMINAL CURRENT IS BASED ON FULL RATED OUTPUT LOAD.
2. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR BATTERY RECHARGE PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
3. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR 10 MINUTE OVERLOAD RATING PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
4. UPS OUTPUT LOAD CABLES MUST BE RUN IN SEPARATE CONDUIT FROM INPUT CABLES.
5. POWER CABLES FROM DC LINK TO BATTERIES SHOULD BE SIZED FOR TOTAL MAXIMUM 2.0 VOLT LINE DROP AT MAXIMUM DISCHARGE CURRENT. MAXIMUM CURRENT AT END OF BATTERY DISCHARGE (300 VDC) IS DEFINED AS NONCONTINUOUS PER NEC 100.
6. GROUNDING CONDUCTORS TO BE SIZED PER NEC 250-95 NEUTRAL CONDUCTOR (IF USED) SHOULD BE SIZED FOR FULL CAPACITY.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
8. MODULE BATTERY DISCONNECT IS PROVIDED IN A SEPARATE ENCLOSURE.
9. POWER AND CONTROL WIRING TO BE RUN IN SEPARATE CONDUITS.
10. WHEN A THREE POLE MODULE BATTERY DISCONNECT IS USED, ONE POLE MAY BE USED TO CENTER TAP THE BATTERY STRING. THIS WILL REDUCE THE MAXIMUM VOLTAGE BETWEEN ANY TWO POINTS TO ONE HALF THE STRING VOLTAGE WHEN THE MODULE BATTERY DISCONNECT IS OPEN.
11. BREAKER DESCRIPTIONS
 CBI -- SQUARE D TYPE MHL361000, 1000 AF, 1000 AT, 65 KAIC.
 CB2 -- SQUARE D TYPE MHL361000, 1000 AF, 1000 AT, 65 KAIC.
12. NOMINAL HEAT GENERATION - 148,391 BTU/HR.



| FEEDER | NOMINAL VOLTAGE | NOMINAL CURRENT | MAXIMUM CURRENT |
|--------|-----------------|-----------------|---|
| A | 480 VAC | 778 A 711 A | 973 A (W/O FILTER) 888 A (WITH FILTER) |
| B | 480Y/277 VAC | 752 A | 940 A |
| C | 360 VDC | 1473 A | 1828 A AT END OF DISCHARGE |
| J | 360 VDC | 1473 A | 1828 A AT END OF DISCHARGE |

| | | |
|------------|-----------|----------------------------------|
| DRAWN BY | SHEET NO | TITLE |
| D MCKAY | 1 OF 1 | ONE - LINE DIAGRAM |
| CHK BY | ECN NO | 625 KVA / 500 KW |
| J CAMPBELL | | PARALLEL MODULE UPS |
| DES APVL | REF. DWG. | 480 V INPUT - 480 / 277 V OUTPUT |
| | SL67084 | SERIES 600 |

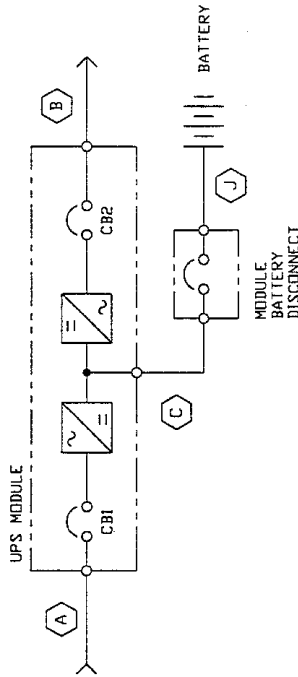
| | | |
|--------------|-----------|--|
| DWG. NO. | DATE | Liibert IRVINE, CALIFORNIA 92718 |
| 97-791670-84 | 02/21/95 | |
| REV. NO. | ORDER NO. | |
| 1 | | |

FILE NAME SL67084.DWG

Figure 55 Module One-Line Diagram, 750 kVA (High Link - 240 Cells)

NOTES:

1. NOMINAL CURRENT IS BASED ON FULL RATED OUTPUT LOAD.
2. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR BATTERY RECHARGE PLUS NOMINAL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
3. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR 10 MINUTE OVERLOAD RATING PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
4. UPS OUTPUT LEAD CABLES MUST BE RUN IN SEPARATE CONDUIT FROM INPUT CABLES.
5. POWER CABLES FROM DC LINK TO BATTERIES SHOULD BE SIZED FOR TOTAL MAXIMUM 20 VOLT LINE DROP AT MAXIMUM DISCHARGE CURRENT. MAXIMUM CURRENT AT END OF BATTERY DISCHARGE (400 VDC) IS DEFINED AS NONCONTINUOUS PER NEC 100.
6. GROUNDING CONDUCTORS TO BE SIZED PER NEC 250-95. NEUTRAL CONDUCTOR MUST BE SIZED FOR FULL CAPACITY OR PER NEC 220-22.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
8. MODULE BATTERY DISCONNECT IS PROVIDED IN A SEPARATE ENCLOSURE.
9. POWER AND CONTROL WIRING TO BE RUN IN SEPARATE CONDUITS.
10. WHEN A THREE POLE MODULE BATTERY DISCONNECT IS USED, ONE POLE MAY BE USED TO CENTER TAP THE BATTERY STRING. THIS WILL REDUCE THE MAXIMUM VOLTAGE BETWEEN ANY TWO POINTS TO ONE HALF THE STRING VOLTAGE WHEN THE MODULE BATTERY DISCONNECT IS OPEN.
11. BREAKER DESCRIPTIONS
 CBI - SQUARE D TYPE MHL361200, 1200 AF, 1200 AT, 65 KAIC.
 CB2 - SQUARE D TYPE MHL361200, 1200 AF, 1200 AT, 65 KAIC.
12. NOMINAL HEAT GENERATION - 178,070 BTU/HR.



| FEEDER | NOMINAL VOLTAGE | NOMINAL CURRENT | MAXIMUM CURRENT |
|--|-----------------|-----------------|---|
| (A) AC INPUT TO UPS 3 PHASE, 3 WIRE & GROUND. A-B-C ROTATION (SEE NOTES 1,2,4,6,7) | 480 VAC | 934 A 853 A | 1167 A (W/O FILTER) 1066 A (WITH FILTER) |
| (B) AC OUTPUT TO SYSTEM CONTROL CABINET, 3 PH. 4 WIRE & GROUND. A-B-C PHASE ROTATION (SEE NOTES 1,3,4,6,7). MAXIMUM 10 MIN. @ 125% OF NOMINAL CURRENT. | 480Y/277 VAC | 902 A | 1128 A |
| (C) UPS DC LINK TO MODULE BATTERY DISCONNECT. (1) POSITIVE, AND (1) NEGATIVE. (SEE NOTES 5,7,8) | 480 VDC | 1326 A | 1644 A AT END OF DISCHARGE |
| (J) MODULE BATTERY DISCONNECT TO SYSTEM BATTERY. (1) POSITIVE, AND (1) NEGATIVE AND (1) POSITIVE, AND (1) NEGATIVE FOR CENTER TAP (SEE NOTES 5,7,8,10) | 480 VDC | 1326 A | 1644 A AT END OF DISCHARGE |

| | | | |
|----------------------|----------------------|--|------------------|
| DRAWN BY D MCKAY | SHEET NO 1 OF 1 | TITLE ONE - LINE DIAGRAM 750 KVA / 600 KW 240 CELLS PARALLEL MODULE UPS | |
| CHK BY J CAMPBELL | ECN NO | DWG. NO. 97-791675-84 | DATE 03/01/95 |
| DES APVL | REF. DWG. SL67584 | REV. NO. 1 | ORDER NO. |

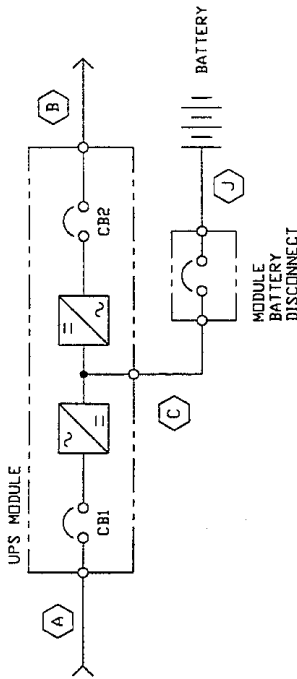


FILE NAME: SL67584.DWG

Figure 56 Module One-Line Diagram, 750 kVA (Low Link - 180 Cells)

NOTES:

1. NOMINAL CURRENT IS BASED ON FULL RATED OUTPUT LOAD.
2. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR BATTERY RECHARGE PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
3. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR 10 MINUTE OVERLOAD RATING PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
4. UPS OUTPUT LOAD CABLES MUST BE RUN IN SEPARATE CONDUIT FROM INPUT CABLES.
5. POWER CABLES FROM DC LINK TO BATTERIES SHOULD BE SIZED FOR TOTAL MAXIMUM 20 VOLT LINE DROP AT MAXIMUM DISCHARGE CURRENT. MAXIMUM CURRENT AT END OF BATTERY DISCHARGE (300 VDC) IS DEFINED AS NONCONTINUOUS PER NEC 100.
6. GROUNDING CONDUCTORS TO BE SIZED PER NEC 250-95. NEUTRAL CONDUCTOR MUST BE SIZED FOR FULL CAPACITY OR PER NEC 250-22.
7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
8. MODULE BATTERY DISCONNECT IS PROVIDED IN A SEPARATE ENCLOSURE.
9. POWER AND CONTROL WIRING TO BE RUN IN SEPARATE CONDUITS.
10. WHEN A THREE POLE MODULE BATTERY DISCONNECT IS USED, ONE POLE MAY BE USED TO CENTER TAP THE BATTERY STRING. THIS WILL REDUCE THE MAXIMUM VOLTAGE BETWEEN ANY TWO POINTS TO ONE HALF THE STRING VOLTAGE WHEN THE MODULE BATTERY DISCONNECT IS OPEN.
11. BREAKER DESCRIPTIONS
 CBI - SQUARE D TYPE MHL361200, 1200 AF, 1200 AT, 65 KAIC.
 CB2 - SQUARE D TYPE MHL361200, 1200 AF, 1200 AT, 65 KAIC.
12. NOMINAL HEAT GENERATION - 178,070 BTU/HR



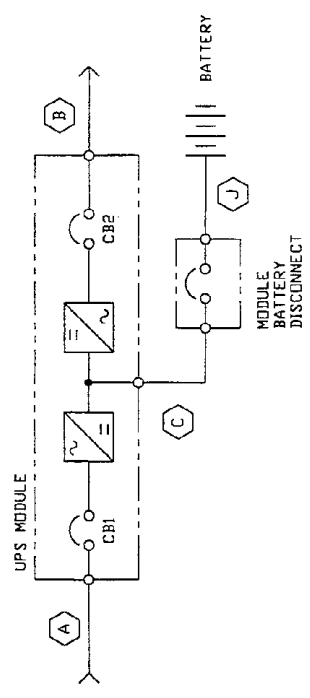
| FEEDER | NOMINAL VOLTAGE | NOMINAL CURRENT | MAXIMUM CURRENT |
|--|-----------------|-----------------|---|
| (A) AC INPUT TO UPS 3 PHASE, 3 WIRE & GROUND. A-B-C ROTATION (SEE NOTES 1.2,4,6,7) | 480 VAC | 934 A 853 A | 1167 A (W/O FILTER) 1066 A (WITH FILTER) |
| (B) AC OUTPUT TO SYSTEM CONTROL CABINET, 3 PH. 4 WIRE & GROUND. A-B-C PHASE ROTATION (SEE NOTES 1.3,4,6,7) MAXIMUM TO MIN. @ 125% OF NOMINAL CURRENT. | 480Y/277 VAC | 902 A | 1128 A |
| (C) UPS DC LINK TO MODULE BATTERY DISCONNECT. (1) POSITIVE, AND (1) NEGATIVE. (SEE NOTES 5,7,B) | 360 VDC | 1767 A | 2194 A AT END OF DISCHARGE |
| (J) MODULE BATTERY DISCONNECT TO SYSTEM BATTERY. (1) POSITIVE, AND (1) NEGATIVE AND (1) POSITIVE, AND (1) NEGATIVE FOR CENTER TAP (SEE NOTES 5,7,B,10) | 360 VDC | 1767 A | 2194 A AT END OF DISCHARGE |

| | | | |
|-----------------------------|-----------------------------|---|-------------------------|
| DRAWN BY B FISH | SHEET NO 1 OF 1 | TITLE ONE - LINE DIAGRAM 750 KVA / 600 KW 180 CELLS PARALLEL MODULE UPS 480 V INPUT - 480 / 277 V OUTPUT SERIES 600 | |
| CHK BY J CAMPBELL | ECN NO | DWG. NO. 97-791676-24 | DATE 06/06/95 |
| DES APVL | REF. DWG. SL67624 | REV. NO. 1 | ORDER NO. |
| | | FILE NAME: SL67624.DWG | |

Liebert
9650 JEROME RD.
IRVINE, CALIFORNIA 92718

Figure 57 Module One-Line Diagram, 1000 kVA

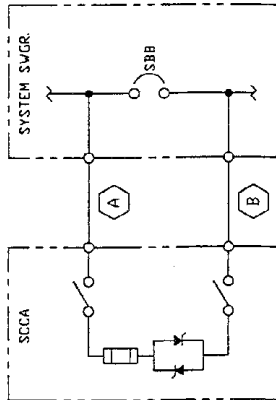
- NOTES:
1. NOMINAL CURRENT IS BASED ON FULL RATED OUTPUT LOAD.
 2. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR BATTERY RECHARGE PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100
 3. MAXIMUM CURRENT IS COMBINATION OF SHORT DURATION LOAD CURRENT (NONCONTINUOUS LOAD) FOR 10 MINUTE OVERLOAD RATING PLUS NOMINAL FULL LOAD CURRENT (CONTINUOUS LOAD) PER NEC 100.
 4. UPS OUTPUT LOAD CABLES MUST BE RUN IN SEPARATE CONDUIT FROM INPUT CABLES.
 5. POWER CABLES FROM DC LINK TO BATTERIES SHOULD BE SIZED FOR TOTAL MAXIMUM 20 VOLT LINE DROP AT MAXIMUM DISCHARGE CURRENT. MAXIMUM CURRENT AT END OF BATTERY DISCHARGE (400 VDC) IS DEFINED AS NONCONTINUOUS PER NEC 100.
 6. GROUNDING CONDUCTORS TO BE SIZED PER NEC 250-95. NEUTRAL CONDUCTOR MUST BE SIZED FOR FULL CAPACITY OR PER NEC 250-22.
 7. ALL WIRING IS TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.
 8. MODULE BATTERY DISCONNECT IS PROVIDED IN A SEPARATE ENCLOSURE.
 9. POWER AND CONTROL WIRING TO BE RUN IN SEPARATE CONDUITS.
 10. WHEN A THREE POLE MODULE BATTERY DISCONNECT IS USED, ONE POLE MAY BE USED TO CENTER TAP THE BATTERY STRING. THIS WILL REDUCE THE MAXIMUM VOLTAGE BETWEEN ANY TWO POINTS TO ONE HALF THE STRING VOLTAGE WHEN THE MODULE BATTERY DISCONNECT IS OPEN.
 11. BREAKER DESCRIPTIONS
 CB1 - SQUARE D TYPE PHF2036, 2000 AF, 1600 AT, 100 KAIC.
 CB2 - SQUARE D TYPE PHF2036, 2000 AF, 1600 AT, 100 KAIC.
 12. NOMINAL HEAT GENERATION - 205.5/4 BTU/HR



| FEEDER | NOMINAL VOLTAGE | NOMINAL CURRENT | MAXIMUM CURRENT |
|---|-----------------|------------------|---|
| (A) AC INPUT TO UPS 3 PHASE, 3 WIRE & GROUND. A-B-C ROTATION (SEE NOTES 1,2,4,6,7) | 480 VAC | 1217 A 1113 A | 1522 A (W/O FILTER) 1351 A (WITH FILTER) |
| (B) AC OUTPUT TO SYSTEM CONTROL CABINET, 3 PH. 4 WIRE & GROUND. A-B-C PHASE ROTATION (SEE NOTES 1,3,4,5,7) MAXIMUM 10 MIN. @ 125% OF NOMINAL CURRENT. | 480Y/277 VAC | 1203 A | 1503 A |
| (C) UPS DC LINK TO MODULE BATTERY DISCONNECT. (1) POSITIVE, AND (2) NEGATIVE. (SEE NOTES 5,7,8) | 480 VDC | 1749 A | 2169 A AT END OF DISCHARGE |
| (J) MODULE BATTERY DISCONNECT TO SYSTEM BATTERY. (1) POSITIVE, AND (2) NEGATIVE AND (3) NEGATIVE FOR CENTER TAP (SEE NOTES 5,7,8) | 480 VDC | 1749 A | 2169 A AT END OF DISCHARGE |

| | | | | | |
|---|--|----------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE ONE - LINE DIAGRAM 1000 KVA / 800 KW PARALLEL MODULE UPS 480 V INPUT - 480 / 277 V OUTPUT SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 97-791686-24 | |
| DES APVL | | REF. DWG. SL68624 | | DATE 06/08/95 | |
| | | | | ORDER NO. | |
| | | | | REV. NO. 1 | |
| | | | | FILE NAME: SL68624.DWG | |
| 9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | | | | | |

Figure 58 One-Line Diagram, System Control Cabinet (SCCA)



NOTES:

1. THE CABLING DISTANCE BETWEEN THE SCCA AND THE SYSTEM SWITCHGEAR MUST NOT EXCEED 25 FT PER NEC 240-21 EXCEPTION #3
2. SCCA RATING IS BASED ON THE NOMINAL FULL LOAD CURRENT RATING OF THE BYPASS BREAKER (SBB). THE SCCA RATING IS TO BE USED IN VOLTAGE DROP CALCULATIONS. VOLTAGE DROP MUST NOT EXCEED 1% OF NOMINAL VOLTAGE.
3. POWER AND CONTROL WIRING TO BE RUN IN SEPARATE CONDUITS.
4. GROUNDING CONDUCTORS TO BE SIZED FOR FULL CAPACITY PER NEC 240-94.
5. ALL WIRING TO BE IN ACCORDANCE WITH NATIONAL AND LOCAL ELECTRICAL CODES.

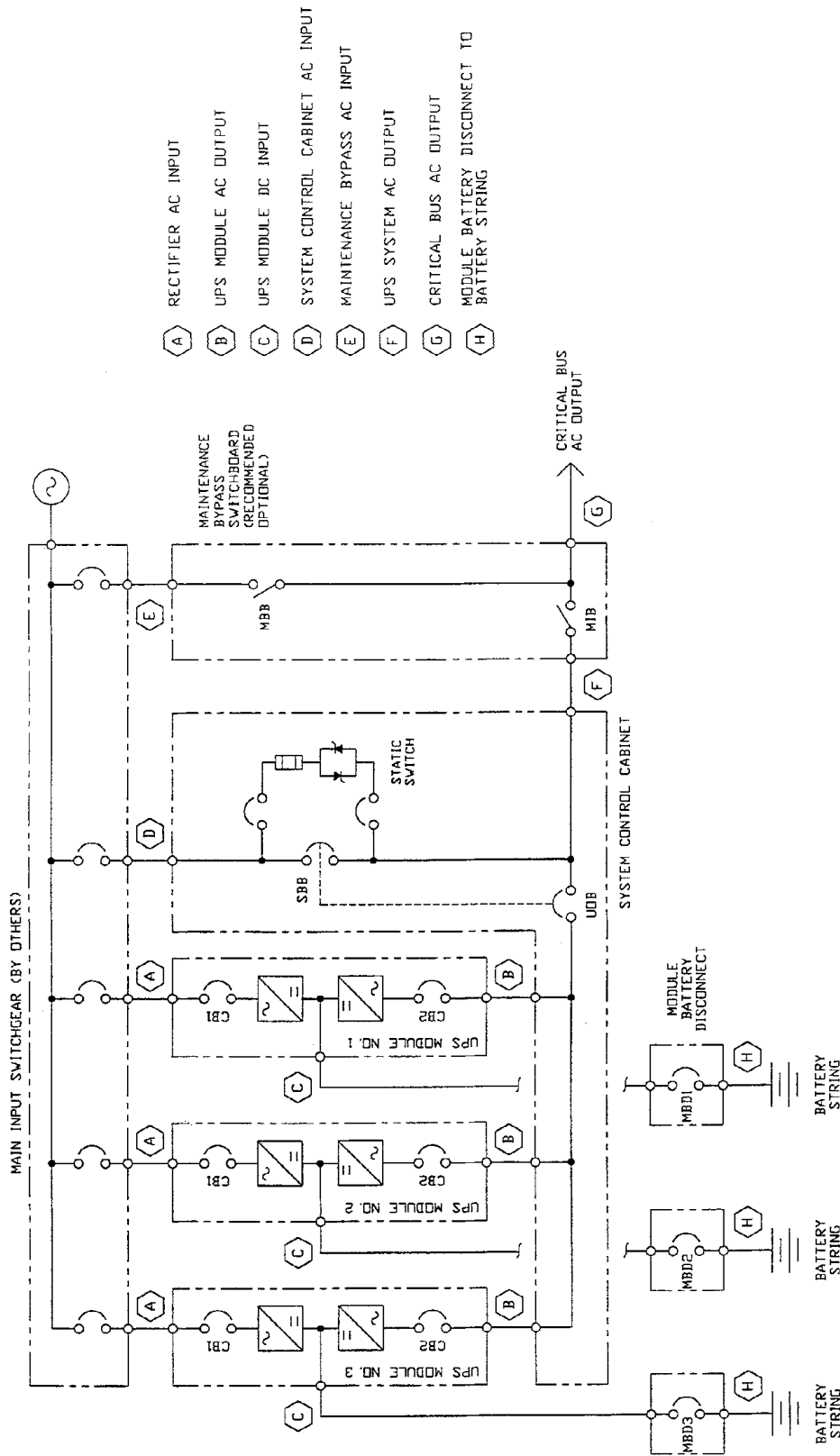
| SCCA RATINGS |
|--------------|
| 1600A |
| 2000A |
| 2500A |
| 3000A |
| 4000A |

- A** AC INPUT TO SYSTEM CONTROL CABINET.
3 PHASE, 3 WIRE, & GROUND
A-B-C ROTATION
2000A, 2500A, 3000A, 4000A SCCA 480Y/277V
OR 208Y/120V
- B** AC OUTPUT FROM SYSTEM CONTROL CABINET.
3 PHASE, 3 WIRE, & GROUND
A-B-C ROTATION
2000A, 2500A, 3000A, 4000A SCCA
480Y/277V OR 208Y/120V

| | | | | | |
|--------------------------|--|----------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE ONE-LINE DIAGRAM SYSTEM CONTROL CABINET | |
| CHK BY J CAMPBELL | | ECN NO | | 1600 - 4000 AMP STAND ALONE CONFIGURATION (SCCA) | |
| DES APVL | | REF. DWG. SL61431 | | SERIES 600 | |
| DWG. NO. 97-791614-31 | | DATE 06/09/95 | | IRVINE, CALIFORNIA 92718 | |
| REV. NO. 1 | | ORDER NO. | | Liebert | |

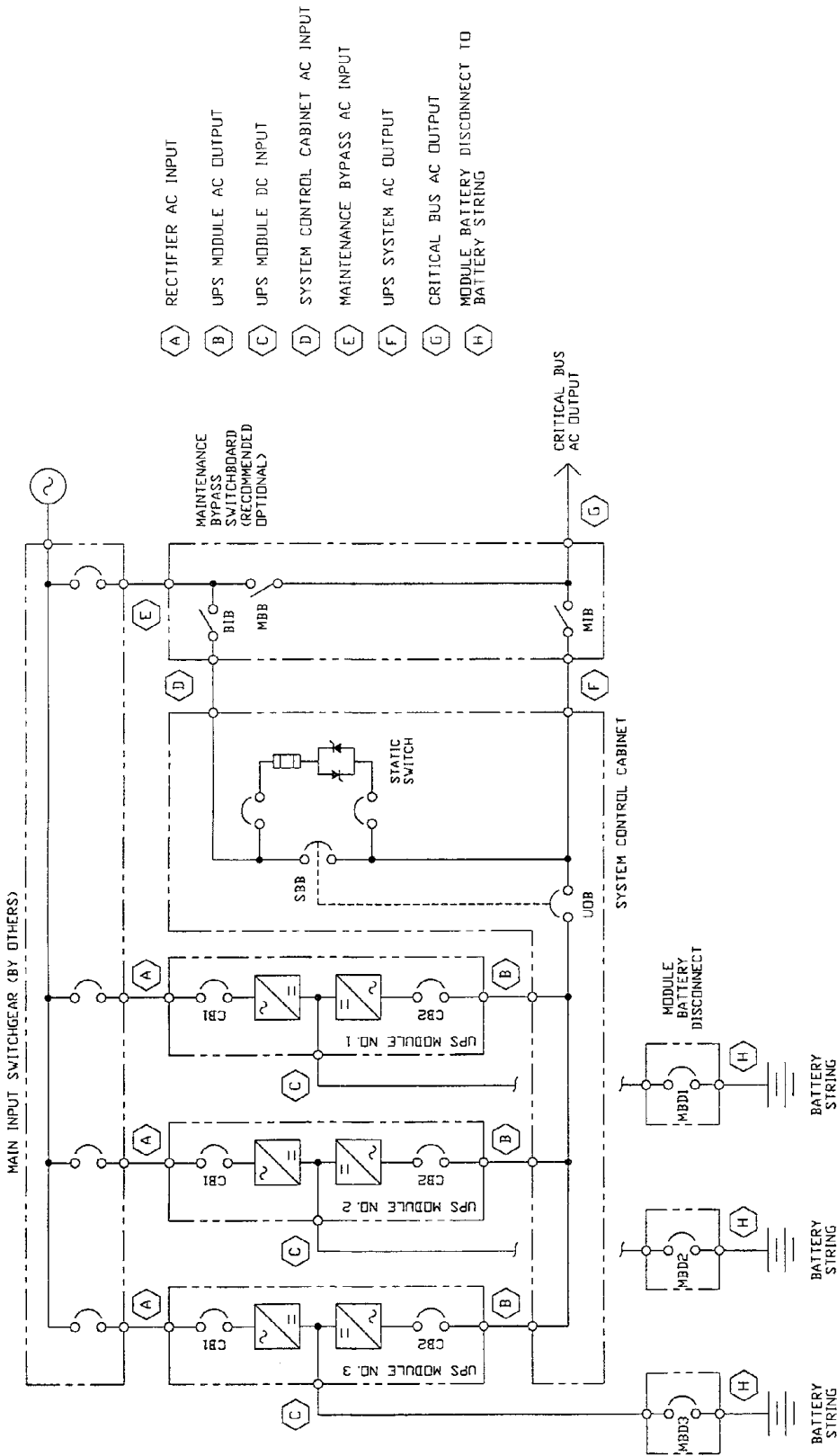
FILE NAME: SL61431.DWG

Figure 59 System One-Line Diagram, Three Modules with Two Breaker Maintenance Bypass



| | | | | | |
|----------------------|--|--------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE ONE-LINE DIAGRAM THREE MODULE PARALLEL SYSTEM SCCB WITH TWO BREAKER MAINTENANCE BYPASS SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 97-791614-38 | |
| DES APVL | | REF. DWG. | | REV. NO. I | |
| | | SL6143B | | DATE 06/09/95 | |
| | | | | ORDER NO. | |
| | | | | FILE NAME: SL6143B.DWG | |
| | | | | 9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | |

Figure 60 System One-Line Diagram, Three Modules with Three Breaker Maintenance Bypass



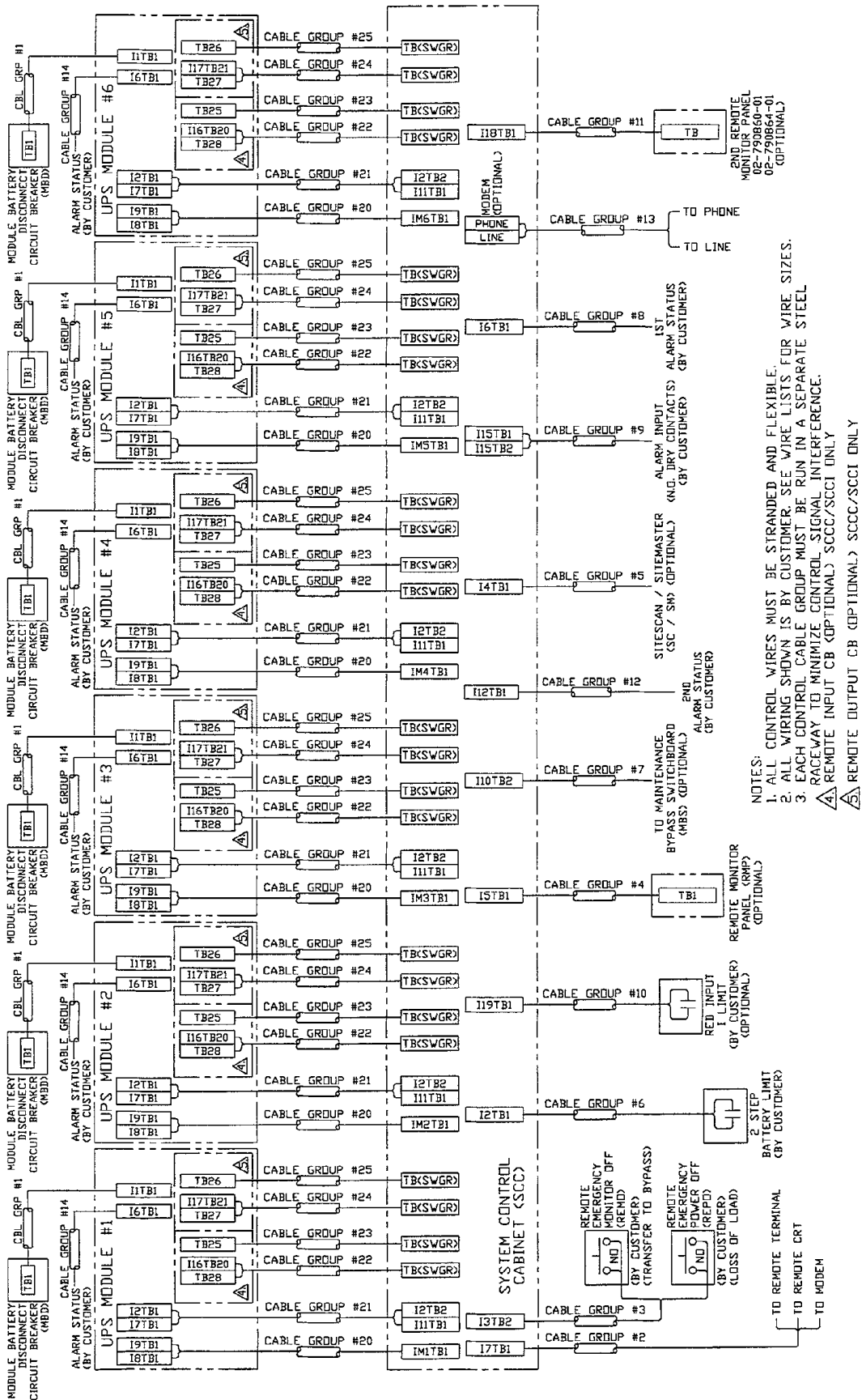
- (A) RECTIFIER AC INPUT
- (B) UPS MODULE AC OUTPUT
- (C) UPS MODULE DC INPUT
- (D) SYSTEM CONTROL CABINET AC INPUT
- (E) MAINTENANCE BYPASS AC INPUT
- (F) UPS SYSTEM AC OUTPUT
- (G) CRITICAL BUS AC OUTPUT
- (H) MODULE BATTERY DISCONNECT TO BATTERY STRING

| | | | | | |
|----------------------|--|----------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE ONE-LINE DIAGRAM THREE MODULE PARALLEL SYSTEM SCCB WITH THREE BREAKER MAINTENANCE BYPASS SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 97-791614-43 | |
| DES APVL | | REF. DWG. SL61443 | | DATE 06/09/95 | |
| | | | | ORDER NO. | |
| | | | | 1 | |



FILE NAME: S61443.DWG

Figure 61 Control Wiring Interconnect Diagram

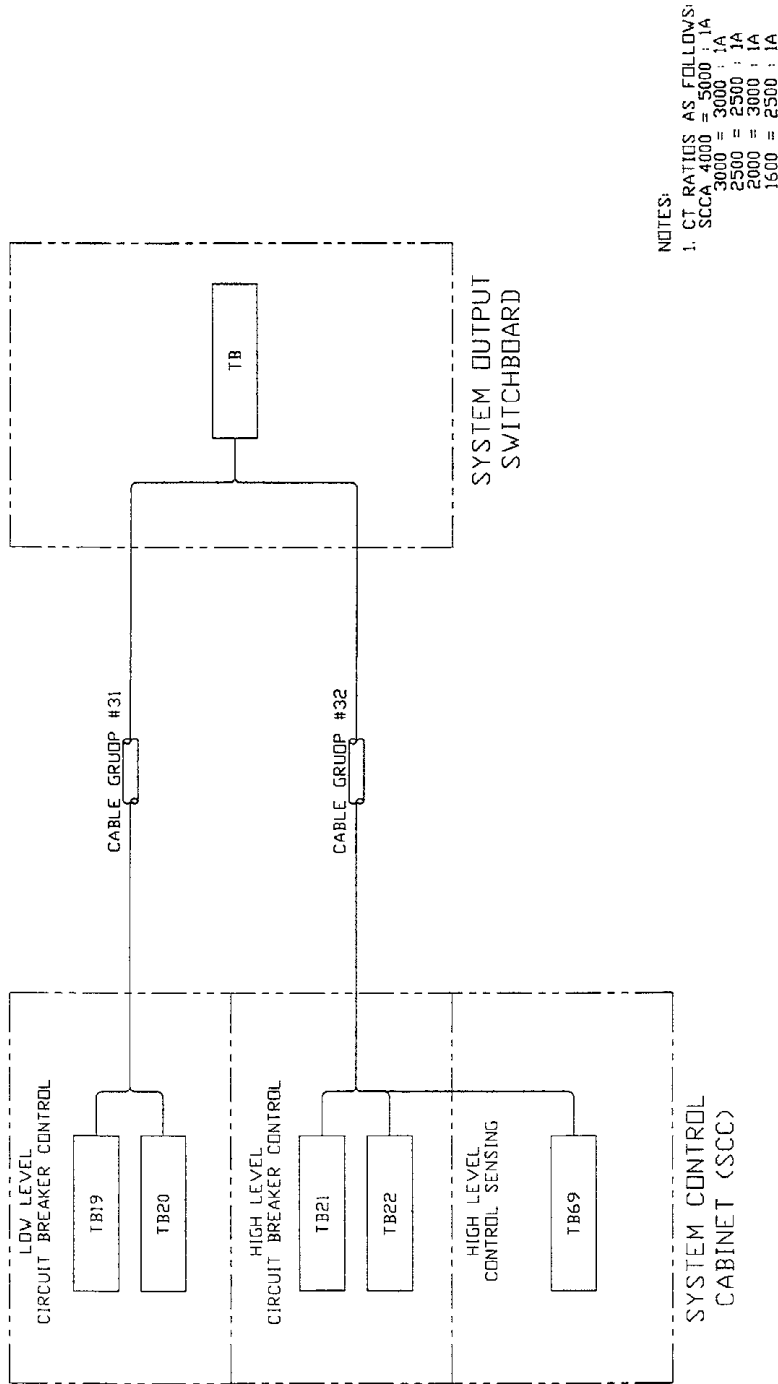


NOTES:
 1. ALL CONTROL WIRES MUST BE STRANDED AND FLEXIBLE.
 2. ALL WIRING SHOWN IS BY CUSTOMER. SEE WIRE LISTS FOR WIRE SIZES.
 3. EACH CONTROL CABLE GROUP MUST BE RUN IN A SEPARATE STEEL RACEWAY TO MINIMIZE CONTROL SIGNAL INTERFERENCE.
 ▲ REMOTE INPUT CB (OPTIONAL) SCC/SCCI ONLY
 ▲ REMOTE OUTPUT CB (OPTIONAL) SCC/SCCI ONLY

| | | | |
|---|--|-------------------------|--|
| DRAWN BY T HECKMAN | | SHEET NO 1 OF 1 | |
| CHK BY J CAMPBELL | | ECN NO | |
| DES APVL WD61915 | | REF. DWG. | |
| TITLE CONTROL WIRE LIST INTERCONNECT DIAGRAM MULTI-MODULE SYSTEM SERIES 600 | | DATE 01/08/96 | |
| DWG. NO. 96-791619-15 | | ORDER NO. | |
| REV. NO. 2 | | FILE NAME: V061915R.DWG | |



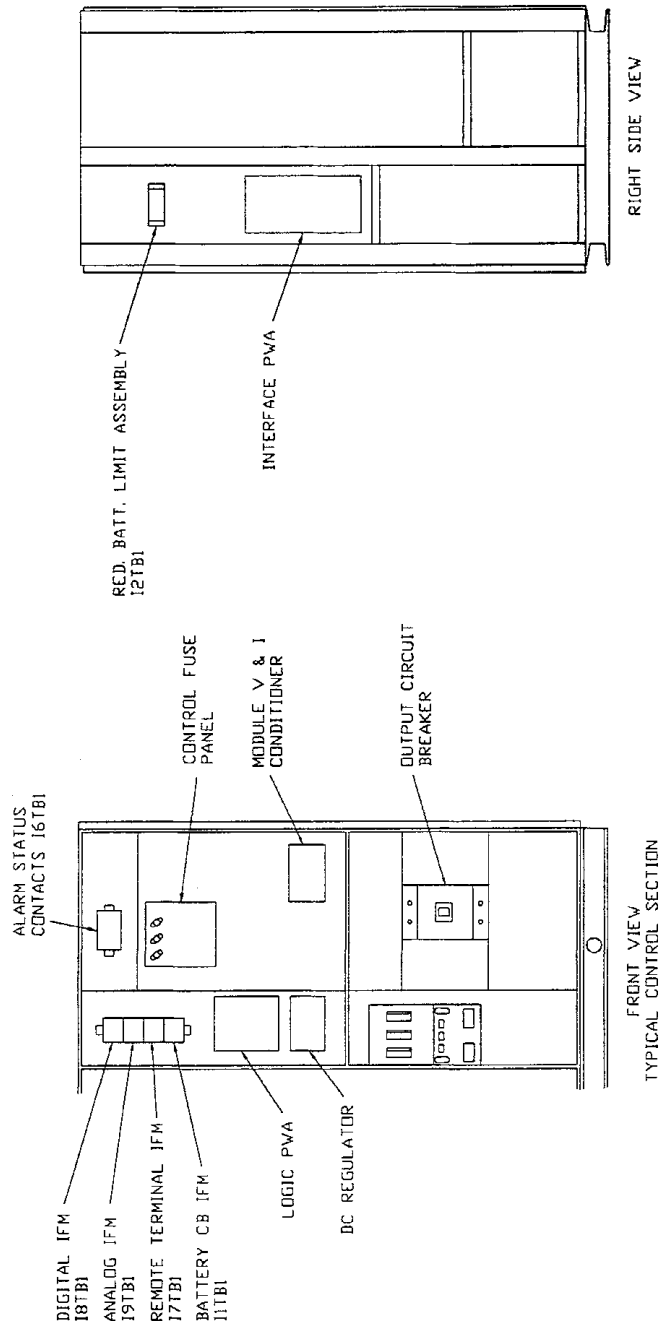
Figure 62 Control Wiring Interconnect Diagram, SCCA and Switchgear



- NOTES:
- CT RATIOS AS FOLLOWS:
 SCCA 4000 = 5000 : 1A
 3000 = 3000 : 1A
 2500 = 2500 : 1A
 2000 = 3000 : 1A
 1500 = 2500 : 1A

| | | | | | | | | | |
|----------------------|--|----------------------|--|--|--|---|--|--------------------------|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE CONTROL WIRING DIAGRAM SYSTEM CONTROL CABINET (SCCA) TO SYSTEM SWITCHGEAR INTERCONNECT DIAGRAM (STAND ALONE CONFIGURATION) SERIES 600 | | DWG. NO. 96-791619-45 | | DATE 08/16/95 | |
| CHK BY J CAMPBELL | | ECN NO | | REV. NO. 1 | | ORDER NO. | | FILE NAME: V08191619.DWG | |
| DES APVL | | REF. DWG. WD61945 | | Liebert | | 9650 JERONIMO RD. IRVINE, CALIFORNIA 92718 | | | |

Figure 63 Control Connection Location Diagram, Module




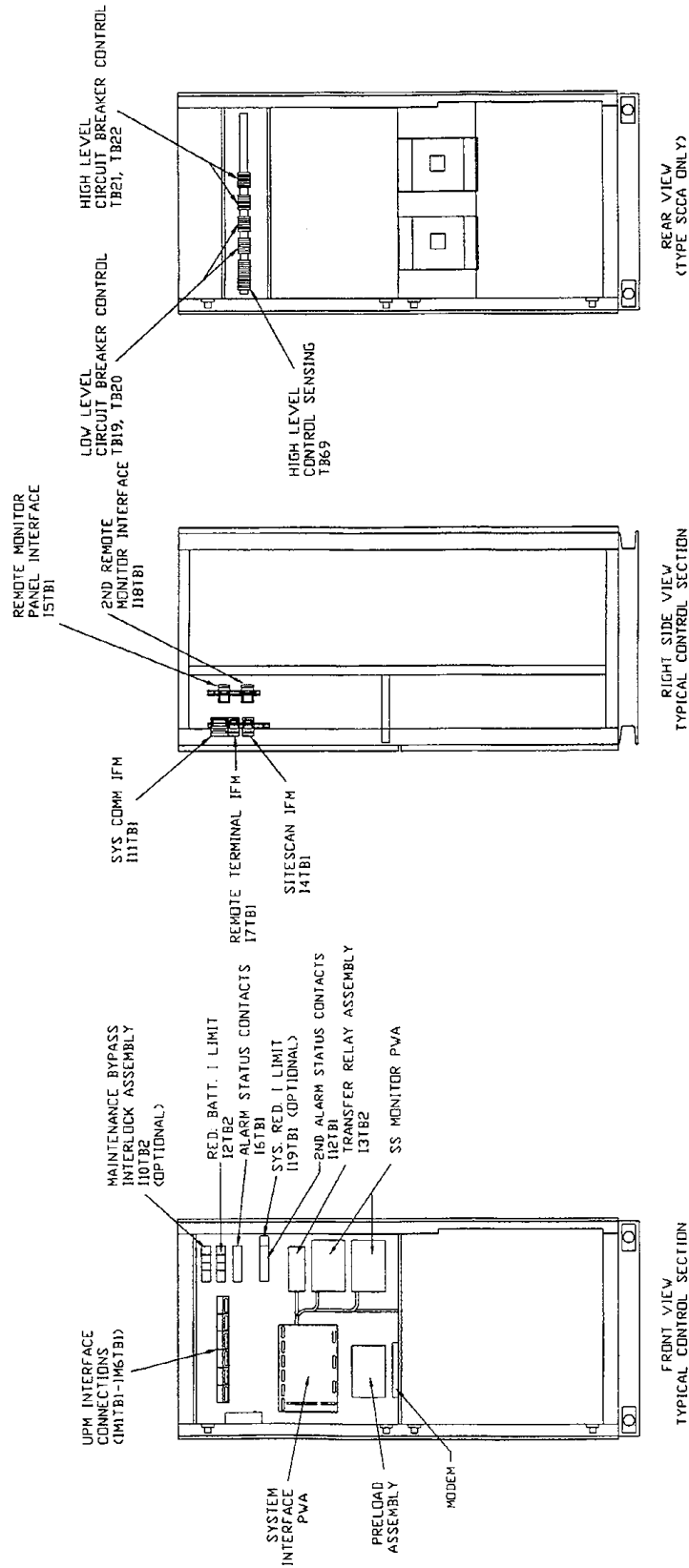
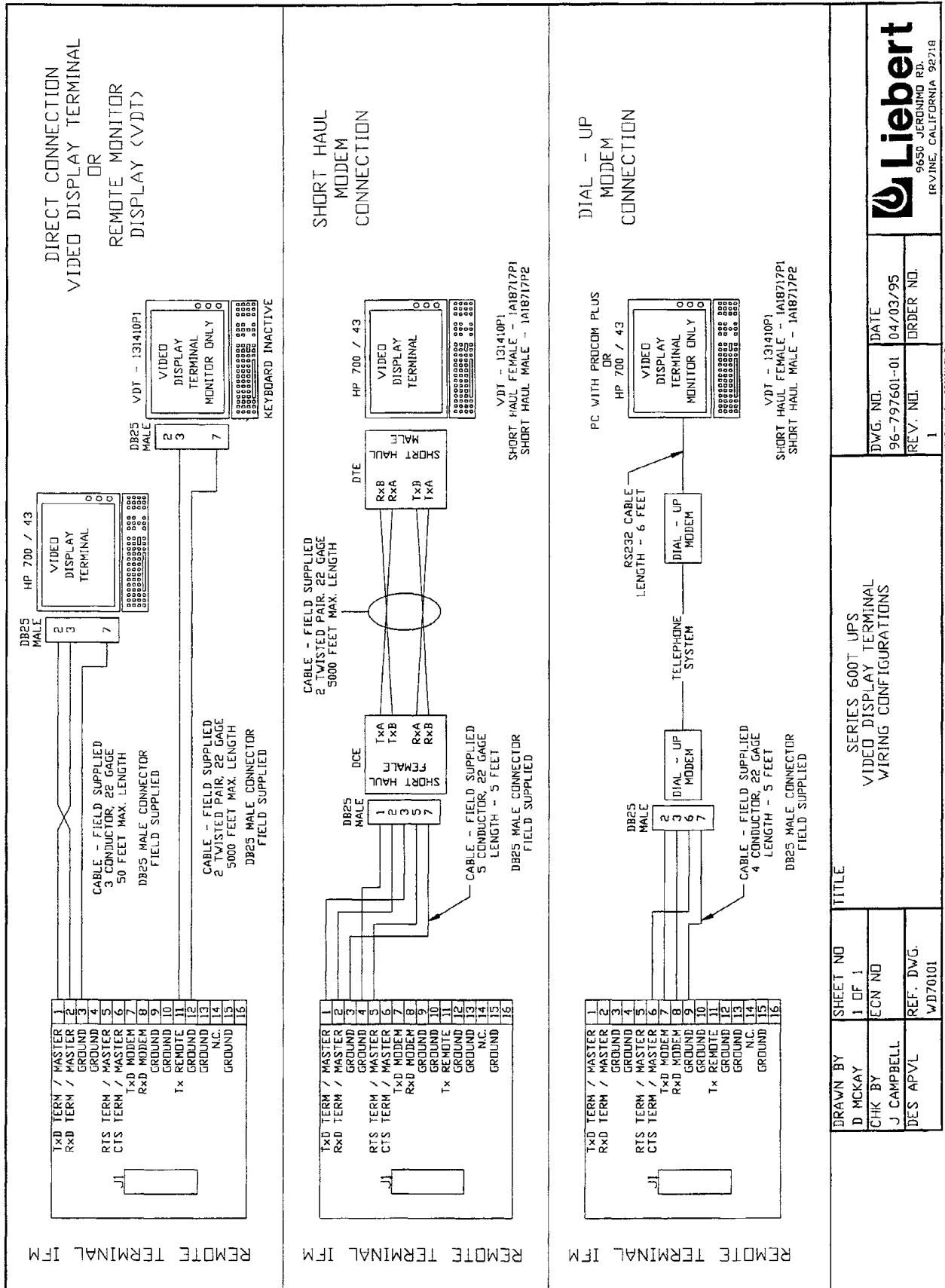
| | | | | | |
|----------------------|--|----------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE CONTROL CONNECTION LOCATION DIAGRAM 338 (HI-LINK) 750 KVA MULTI-MODULE SYSTEM SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 96-791619-17 | |
| DES APVL | | REF. DWG. CC61917 | | DATE 08/16/95 | |
| | | | | ORDER NO. | |
| | | | | REV. NO. 1 | |
| | | | | FILE NAME: CCG61917.DWG | |
| | | | |  Liebert 9650 JEROME RD. IRVINE, CALIFORNIA 92718 | |

Figure 64 Control Connection Location Diagram, System Control Cabinet



| | | | | | |
|----------------------|--|----------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE CONTROL CONNECTION LOCATION DIAGRAM SYSTEM CONTROL CABINET SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DATE 08/16/95 | |
| DES' APVL CC61918 | | REF. DWG. CC61918 | | REV. NO. 1 | |
| | | | | ORDER NO. | |
| | | | | DWG. NO. 96-791619-18 | |
| | | | | IRVINE, CALIFORNIA 92718 | |
| | | | | 9650 JERONIMO RD. | |
| | | | | Liebert | |
| | | | | FILE NAME: C69181.DWG | |

Figure 65 Video Display Terminal Wiring



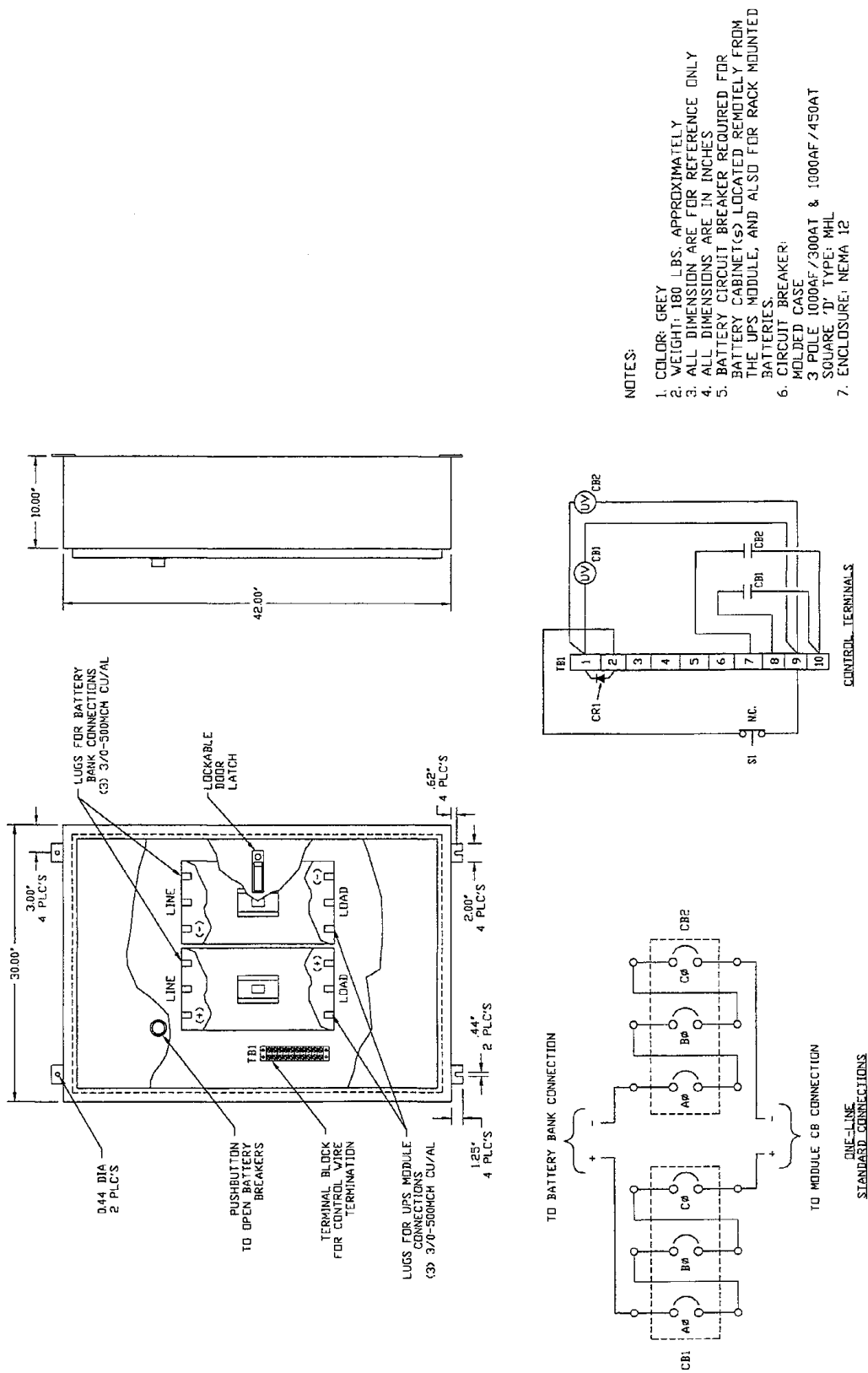
| | |
|--------------|-----------|
| DWG. NO. | DATE |
| 96-797601-01 | 04/03/95 |
| REV. NO. | ORDER NO. |
| 1 | |

SERIES 600T UPS
 VIDEO DISPLAY TERMINAL
 WIRING CONFIGURATIONS

| | | |
|-------------|-----------|-------|
| DRAWN BY | SHEET NO | TITLE |
| D. MCKAY | 1 OF 1 | |
| CHK BY | ECN NO | |
| J. CAMPBELL | | |
| DES. APVL | REF. DWG. | |
| | VD70101 | |

FILE NAME: VD70101.DWG

Figure 66 Battery Circuit Breaker



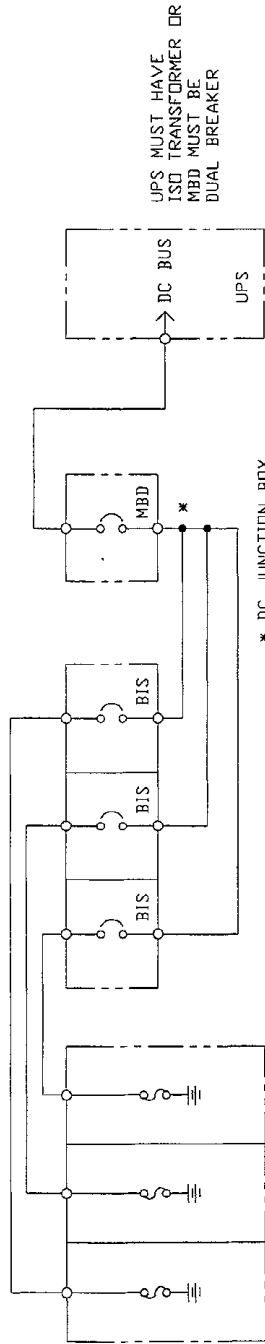
- NOTES:
1. COLOR: GREY
 2. WEIGHT: 180 LBS. APPROXIMATELY
 3. ALL DIMENSIONS ARE FOR REFERENCE ONLY
 4. ALL DIMENSIONS ARE IN INCHES
 5. BATTERY CIRCUIT BREAKER REQUIRED FOR THE UPS MODULE(S) LOCATED REMOTELY FROM BATTERIES.
 6. CIRCUIT BREAKER: MOLDED CASE 3 POLE 1000AF/300AT & 1000AF/450AT SQUARE 'D' TYPE: MHL
 7. ENCLOSURE: NEMA 12

| | | | | | |
|-----------------------|--|----------------------|--|--|--|
| DRAWN BY B. FISH | | SHEET NO 1 OF 1 | | TITLE INSTALLATION DRAWING 1000 AF, 300 AT, AND 1000 AF, 450 AT BATTERY CIRCUIT BREAKER SERIES 600 | |
| CHK BY J. CAMPBELL | | ECN NO | | DWG. NO. 88-791616-04 | |
| DES. APVL | | REF. DWG. ING1604 | | DATE 06/14/95 | |
| | | | | ORDER NO. | |
| | | | | REV. NO. 1 | |

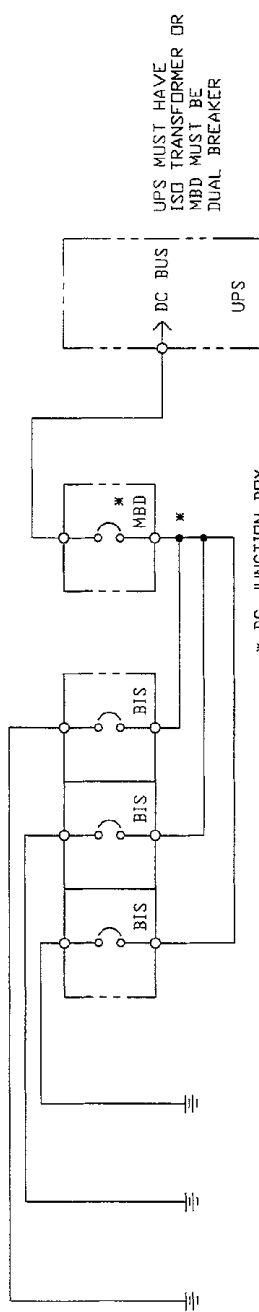
FILE NAME: ING1604.DWG



Figure 67 Parallel Battery Configurations



VENDOR (NON-LIEBERT) BATTERY CABINETS IN TYPICAL PARALLEL STRING CONFIGURATION




RACK MOUNTED BATTERIES IN TYPICAL PARALLEL STRING CONFIGURATION

NOTES:

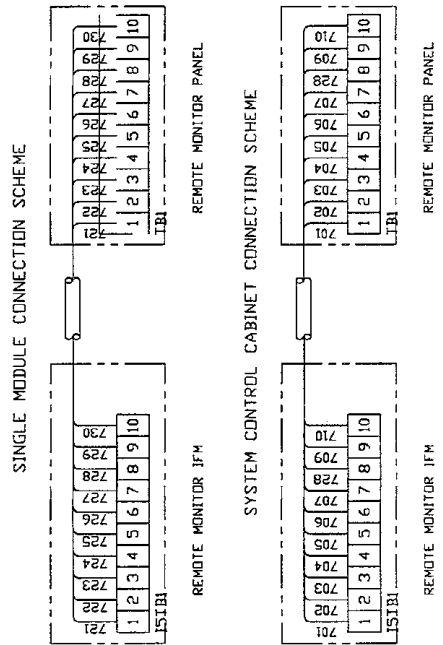
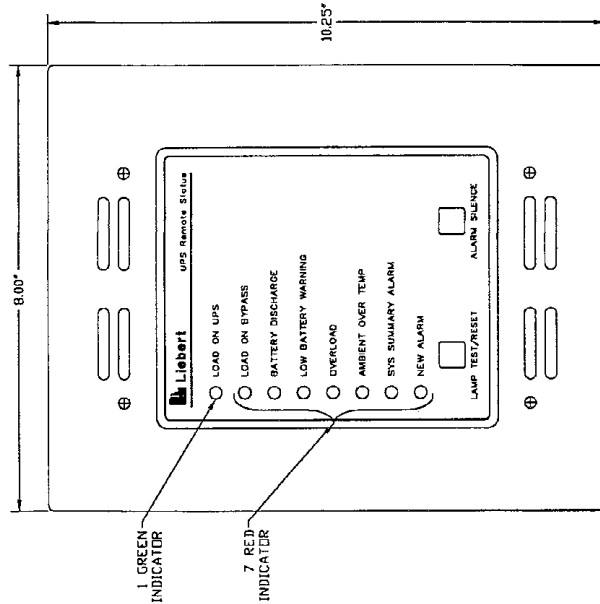
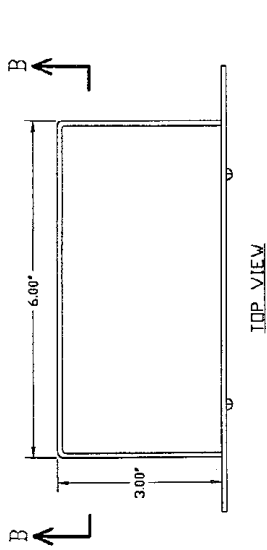
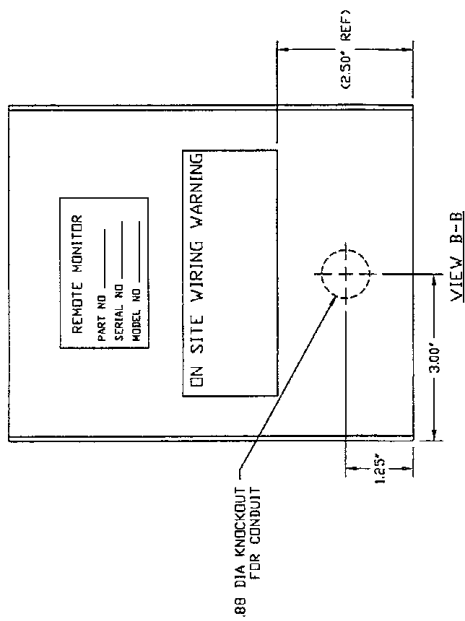
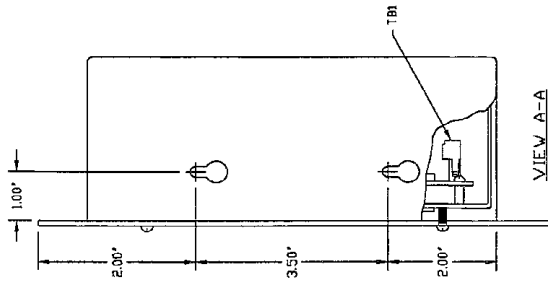
1. A DISCONNECT MEANS (per UL1778) SUCH AS A BATTERY DISCONNECT OR BATTERY ISOLATION SWITCH SHOULD BE PROVIDED FOR EACH PARALLEL STRING OF BATTERIES.

MBD = MODULE BATTERY DISCONNECT
BIS = BATTERY ISOLATION SWITCH

| | | | |
|------------------------|--------------------|---|------------------|
| DRAWN BY T. HECKMAN | SHEET NO 1 OF 1 | TITLE PARALLEL BATTERY CONFIGURATIONS | |
| CHK BY J. CAMPBELL | ECN NO | DWG. NO. 88-791616-11 | DATE 01/08/96 |
| DES. DWG. IN61611 | REF. DWG. | REV. NO. 1 | ORDER NO. |
| | |  9650 HERMINO RD. IRVINE, CALIFORNIA 92718 | |

FILE NAME: IN61611.DWG

Figure 68 Remote Status Panel



- NOTES:
1. COLOR: IBM OFF-WHITE
 2. APPROXIMATE WEIGHT: 5 LBS.
 3. NEMA 1 TYPE ENCLOSURE.
 4. ALL DIMENSIONS ARE IN INCHES.

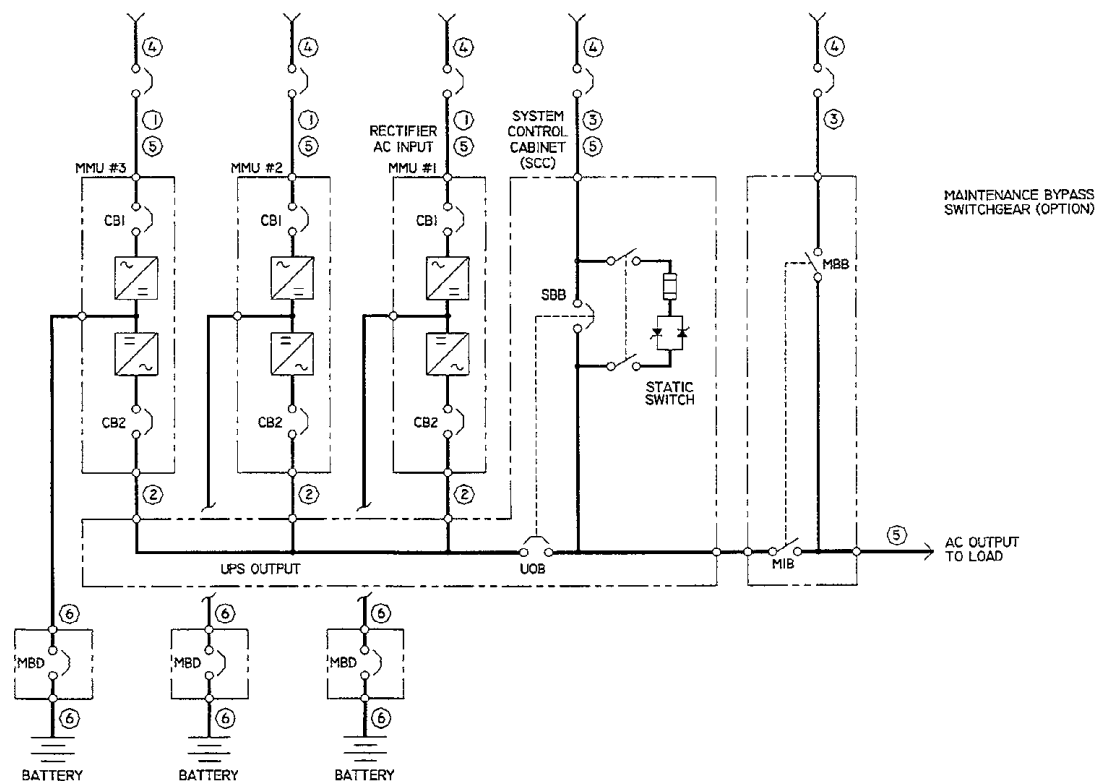
| | | | | | |
|----------------------|--|--------------------|--|---|--|
| DRAWN BY B FISH | | SHEET NO 1 OF 1 | | TITLE REMOTE STATUS PANEL FLUSH MOUNT SERIES 600 | |
| CHK BY J CAMPBELL | | ECN NO | | DWG. NO. 88-791617-02 | |
| DES APVL IN61702 | | REF. DWG. | | ORDER NO. | |
| | | DATE 05/22/95 | | REV. NO. 1 | |



FILE NAME: IN61702.DWG

10.0 APPENDIX A - SERIES 600 UPS SITE PLANNING DATA

338-1000 kVA Multi-Module Units



10.1 Notes

1. Nominal rectifier AC input current (considered continuous) is based on full rated output load. Maximum current includes nominal input current and maximum battery recharge current (considered noncontinuous). Continuous and noncontinuous current limit are defined in NEC 100. Maximum input current is controlled by current limit setting which is adjustable. Values shown are for maximum setting of 125%. Standard factory setting is 115%.
2. Nominal AC output current (considered continuous) is based on full rated output load. Maximum current includes nominal output current and overload for 10 minutes.
3. Bypass AC input current (considered continuous) is based on full rated output load.
4. Feeder protection (by others in external equipment) for rectifier AC input and bypass AC input is recommended to be provided by separate overcurrent protection devices.
5. UPS output load cables must be run in separate conduit from input cables.
6. Power cable from module DC bus to battery should be sized for a total maximum 2.0 volt line drop (measured at the module) at maximum discharge current.
7. Grounding conductors to be sized per NEC 250-95. A neutral conductor is required from each MMU output to the SCC. Neutral conductors to be sized for full capacity per NEC 310-16, Note 10 for systems with 4-wire loads and half capacity for systems with 3-wire loads.
8. Rectifier AC Input: 3-phase, 3-wire, plus ground.
MMU Output to System Control Cabinet: 3-phase, 4-wire, plus ground.
Bypass AC Input and AC Output to Load: 3-phase, 3 or 4-wire, plus ground.
Module DC Input from Battery: 2-wire, (positive and negative).
9. All wiring is to be in accordance with National and Local Electrical Codes.
10. Minimum clearance is 2 feet above UPS.
11. Top or bottom cable entry through removable access plates. Cut plate to suit conduit size.
12. Control wiring and power cables must be run in separate conduits. Control wiring must be stranded conductors.
13. UPS module will be shipped in sections. Reconnect shipping splits according to drawings supplied with the equipment.

Table 4 338-1000 kVA Multi-Module Unit, 480 Volt - Standard Module

| UPS Rating | | * Rectifier AC Input Current | | Inverter AC Output Current | | Required Battery Disconnect Rating | Maximum Battery Current at End of Discharge | % Efficiency at Full Load | Maximum Heat Dissipation BTU/hr. | Dimensions Inches | Approx. Weight Lb. | Floor Loading Lbs./ Sq.Ft. |
|--------------------------|-----|------------------------------|------|----------------------------|------|------------------------------------|---|---------------------------|----------------------------------|-------------------|--------------------|----------------------------|
| kVA | kW | Nom | Max | Nom | Max | Amperes | Amperes | | Full Load | (WxDxH) | (Un-packed) | (Distributed Loading) |
| 338 | 270 | 420 | 525 | 406 | 507 | 1000 | 993 | 92 | 80131 | 128x38x78 | 8300 | 246 |
| 400 | 320 | 504 | 630 | 481 | 601 | 1200 | 1170 | 92 | 94970 | 164x38x78 | 9900 | 229 |
| 400 | 360 | 560 | 700 | 481 | 601 | 1200 | 1316 | 92 | 106842 | 164x38x78 | 9900 | 229 |
| 500 | 400 | 630 | 788 | 601 | 752 | 1600 | 1463 | 92 | 118713 | 164x38x78 | 10600 | 245 |
| 500 | 450 | 700 | 875 | 601 | 752 | 1600 | 1646 | 92 | 133552 | 164x38x78 | 10600 | 245 |
| 625 | 500 | 778 | 973 | 752 | 940 | 2000 | 1828 | 92 | 148391 | 164x41x78 | 12300 | 263 |
| 750 ^{HL} | 600 | 934 | 1167 | 902 | 1128 | 1600 | 1644 | 92 | 178070 | 164x41x78 | 13925 | 298 |
| 750 ^{LL} | 600 | 934 | 1167 | 902 | 1128 | 2000 | 2194 | 92 | 178070 | 177x44x82 | 14600 | 270 |
| 1000 | 800 | 1217 | 1522 | 1203 | 1504 | 2500 | 2169 | 93 | 205514 | 177x44x82 | 16555 | 306 |
| 1000 | 900 | 1369 | 1712 | 1203 | 1504 | 2500 | 2440 | 93 | 231203 | 177x44x82 | 16555 | 306 |
| Applicable Notes: | | 1,4,5,7,8,9,11,12 | | 2,5,7,8,9,11,12 | | 6 | 6,8,9,11,12 | — | — | 13 | 13 | — |

For explanation of notes, see referenced numbers in **10.1 - Notes**

* Nominal Input Power Factor 0.85 lagging at full load; 9% Maximum Total Input Harmonic Current Distortion (THD) at full load.

HL - 750 kVA module with 240 battery cells

LL - 750 kVA module with 180 battery cells

Table 5 338-1000 kVA Multi-Module Unit, 480 Volt - Standard Module With Optional Low Distortion Input Filter

| UPS Rating | | * Rectifier AC Input Current | | Inverter AC Output Current | | Required Battery Disconnect Rating | Maximum Battery Current at End of Discharge | % Efficiency at Full Load | Maximum Heat Dissipation BTU/hr. | Dimensions Inches | Approx. Weight Lb. | Floor Loading Lbs./ Sq.Ft. |
|--------------------------|-----|------------------------------|------|----------------------------|------|------------------------------------|---|---------------------------|----------------------------------|-------------------|--------------------|----------------------------|
| kVA | kW | Nom | Max | Nom | Max | Amperes | Amperes | | Full Load | (WxDxH) | (Un-packed) | (Distributed Loading) |
| 338 | 270 | 380 | 474 | 406 | 507 | 1000 | 993 | 92 | 80131 | 128x38x78 | 8700 | 258 |
| 400 | 320 | 455 | 568 | 481 | 601 | 1200 | 1170 | 92 | 94970 | 164x38x78 | 10300 | 238 |
| 400 | 360 | 512 | 639 | 481 | 601 | 1200 | 1316 | 92 | 106842 | 164x38x78 | 10300 | 238 |
| 500 | 400 | 562 | 703 | 601 | 752 | 1600 | 1463 | 92 | 118713 | 164x38x78 | 11150 | 258 |
| 500 | 450 | 633 | 791 | 601 | 752 | 1600 | 1646 | 92 | 133552 | 164x38x78 | 11150 | 258 |
| 625 | 500 | 711 | 888 | 752 | 940 | 2000 | 1828 | 92 | 148391 | 164x41x78 | 12950 | 277 |
| 750 ^{HL} | 600 | 853 | 1066 | 902 | 1128 | 1600 | 1644 | 92 | 178070 | 164x41x78 | 14200 | 304 |
| 750 ^{LL} | 600 | 853 | 1066 | 902 | 1128 | 2000 | 2194 | 92 | 178070 | 177x44x82 | 15450 | 286 |
| 1000 | 800 | 1125 | 1406 | 1203 | 1504 | 2500 | 2169 | 93 | 205514 | 177x44x82 | 17400 | 322 |
| 1000 | 900 | 1265 | 1582 | 1203 | 1504 | 2500 | 2440 | 93 | 231203 | 177x44x82 | 17400 | 322 |
| Applicable Notes: | | 1,4,5,7,8,9,11,12 | | 2,5,7,8,9,11,12 | | 6 | 6,8,9,11,12 | — | — | 13 | 13 | — |

For explanation of notes, see referenced numbers in **10.1 - Notes**

* Nominal Input Power Factor 0.92 lagging at full load; 4% Maximum Total Input Harmonic Current Distortion (THD) at full load.

HL - 750 kVA module with 240 battery cells

LL - 750 kVA module with 180 battery cells

Table 6 338-500 kVA Multi-Module Unit, 208 Volt - Standard Module

| UPS Rating | | * Rectifier AC Input Current | | Inverter AC Output Current | | Required Battery Disconnect Rating | Maximum Battery Current at End of Discharge | % Efficiency at Full Load | Maximum Heat Dissipation BTU/hr. | Dimensions Inches | Approx. Weight Lb. | Floor Loading Lb./ Sq.Ft. |
|--------------------------|-----|------------------------------|------|----------------------------|------|------------------------------------|---|---------------------------|----------------------------------|-------------------|--------------------|---------------------------|
| kVA | kW | Nom | Max | Nom | Max | Amperes | Amperes | | Full Load | (WxDxH) | (Un-packed) | (Distributed Loading) |
| 338 | 270 | 980 | 1226 | 937 | 1171 | 1000 | 998 | 92 | 91138 | 128x38x78 | 8600 | 255 |
| 400 | 320 | 1170 | 1462 | 1110 | 1388 | 1200 | 1176 | 92 | 101457 | 218x38x78 | 10250 | 214 |
| 400 | 360 | 1300 | 1625 | 1110 | 1388 | 1200 | 1323 | 92 | 114140 | 218x38x78 | 10250 | 214 |
| 500 | 400 | 1462 | 1827 | 1388 | 1735 | 1600 | 1470 | 92 | 126822 | 218x38x78 | 10950 | 228 |
| 500 | 450 | 1625 | 2031 | 1388 | 1735 | 1600 | 1654 | 92 | 142675 | 218x38x78 | 10950 | 228 |
| Applicable Notes: | | 1,4,5,7,8,9,11,12 | | 2,5,7,8,9,11,12 | | 6 | 6,8,9,11,12 | — | — | 13 | 13 | — |

For explanation of notes, see referenced numbers in **10.1 - Notes**

* Nominal Input Power Factor 0.85 lagging at full load; 9% Maximum Total Input Harmonic Current Distortion (THD) at full load.

Table 7 338-500 kVA Multi-Module Unit, 208 Volt - Standard Module With Optional Low Distortion Input Filter

| UPS Rating | | * Rectifier AC Input Current | | Inverter AC Output Current | | Required Battery Disconnect Rating | Maximum Battery Current at End of Discharge | % Efficiency at Full Load | Maximum Heat Dissipation BTU/hr. | Dimensions Inches | Approx. Weight Lb. | Floor Loading Lb./ Sq.Ft. |
|--------------------------|-----|------------------------------|------|----------------------------|------|------------------------------------|---|---------------------------|----------------------------------|-------------------|--------------------|---------------------------|
| kVA | kW | Nom | Max | Nom | Max | Amperes | Amperes | | Full Load | (WxDxH) | (Un-packed) | (Distributed Loading) |
| 338 | 270 | 895 | 1119 | 937 | 1171 | 1000 | 998 | 92 | 91138 | 128x38x78 | 9100 | 270 |
| 400 | 320 | 1055 | 1319 | 1110 | 1388 | 1200 | 1176 | 92 | 101457 | 218x38x78 | 10750 | 224 |
| 400 | 360 | 1187 | 1484 | 1110 | 1388 | 1200 | 1323 | 92 | 114140 | 218x38x78 | 10750 | 224 |
| 500 | 400 | 1333 | 1667 | 1388 | 1735 | 1600 | 1470 | 92 | 126822 | 218x38x78 | 11650 | 243 |
| 500 | 450 | 1500 | 1875 | 1388 | 1735 | 1600 | 1654 | 92 | 142675 | 218x38x78 | 11650 | 243 |
| Applicable Notes: | | 1,4,5,7,8,9,11,12 | | 2,5,7,8,9,11,12 | | 6 | 6,8,9,11,12 | — | — | 13 | 13 | — |

For explanation of notes, see referenced numbers in **10.1 - Notes**

* Nominal Input Power Factor 0.92 lagging at full load; 4% Maximum Total Input Harmonic Current Distortion (THD) at full load.

Table 8 338-1000 kVA Multi-Module Unit, 600 Volt - Standard Module

| UPS Rating | | * Rectifier AC Input Current | | Inverter AC Output Current | | Required Battery Disconnect Rating | Maximum Battery Current at End of Discharge | % Efficiency at Full Load | Maximum Heat Dissipation BTU/hr. | Dimensions Inches | Approx. Weight Lb. | Floor Loading Lb./Sq.Ft. |
|--------------------------|-----|------------------------------|------|----------------------------|------|------------------------------------|---|---------------------------|----------------------------------|-------------------|--------------------|--------------------------|
| kVA | kW | Nom | Max | Nom | Max | Amperes | Amperes | | Full Load | (WxDxH) | (Un-packed) | (Distributed Loading) |
| 338 | 270 | 336 | 420 | 325 | 406 | 1000 | 993 | 92 | 80131 | 128x38x78 | 8300 | 246 |
| 400 | 320 | 403 | 504 | 385 | 481 | 1200 | 1170 | 92 | 94970 | 164x38x78 | 9900 | 229 |
| 400 | 360 | 448 | 560 | 385 | 481 | 1200 | 1316 | 92 | 106842 | 164x38x78 | 9900 | 229 |
| 500 | 400 | 504 | 630 | 481 | 601 | 1600 | 1463 | 92 | 118713 | 164x38x78 | 10600 | 245 |
| 500 | 450 | 567 | 709 | 481 | 601 | 1600 | 1646 | 92 | 133552 | 164x38x78 | 10600 | 245 |
| 625 | 500 | 630 | 788 | 601 | 752 | 2000 | 1828 | 92 | 148391 | 164x41x78 | 12300 | 263 |
| 750 ^{HL} | 600 | 747 | 934 | 722 | 902 | 1600 | 1644 | 92 | 178070 | 164x41x78 | 13925 | 298 |
| 750 ^{LL} | 600 | 747 | 934 | 722 | 902 | 2000 | 2194 | 92 | 178070 | 177x44x82 | 14600 | 270 |
| 1000 | 800 | 974 | 1217 | 962 | 1203 | 2500 | 2169 | 93 | 205514 | 177x44x82 | 16555 | 306 |
| 1000 | 900 | 1096 | 1369 | 962 | 1203 | 2500 | 2440 | 93 | 231203 | 177x44x82 | 16555 | 306 |
| Applicable Notes: | | 1,4,5,7,8,9,11,12 | | 2,5,7,8,9,11,12 | | 6 | 6,8,9,11,12 | — | — | 13 | 13 | — |

For explanation of notes, see referenced numbers in **10.1 - Notes**

* Nominal Input Power Factor 0.85 lagging at full load; 9% Maximum Total Input Harmonic Current Distortion (THD) at full load.

HL - 750 kVA module with 240 battery cells

LL - 750 kVA module with 180 battery cells

Table 9 338-1000 kVA Multi-Module Unit, 600 Volt - Standard Module With Optional Low Distortion Input Filter

| UPS Rating | | * Rectifier AC Input Current | | Inverter AC Output Current | | Required Battery Disconnect Rating | Maximum Battery Current at End of Discharge | % Efficiency at Full Load | Maximum Heat Dissipation BTU/hr. | Dimensions Inches | Approx. Weight Lb. | Floor Loading Lb./Sq.Ft. |
|--------------------------|-----|------------------------------|------|----------------------------|------|------------------------------------|---|---------------------------|----------------------------------|-------------------|--------------------|--------------------------|
| kVA | kW | Nom | Max | Nom | Max | Amperes | Amperes | | Full Load | (WxDxH) | (Un-packed) | (Distributed Loading) |
| 338 | 270 | 307 | 384 | 325 | 406 | 1000 | 993 | 92 | 80131 | 128x38x78 | 8700 | 258 |
| 400 | 320 | 360 | 450 | 385 | 481 | 1200 | 1170 | 92 | 94970 | 164x38x78 | 10300 | 238 |
| 400 | 360 | 405 | 506 | 385 | 481 | 1200 | 1316 | 92 | 106842 | 164x38x78 | 10300 | 238 |
| 500 | 400 | 460 | 575 | 481 | 601 | 1600 | 1463 | 92 | 118713 | 164x38x78 | 11150 | 258 |
| 500 | 450 | 517 | 647 | 481 | 601 | 1600 | 1646 | 92 | 133552 | 164x38x78 | 11150 | 258 |
| 625 | 500 | 575 | 718 | 601 | 752 | 2000 | 1828 | 92 | 148391 | 164x41x78 | 12950 | 277 |
| 750 ^{HL} | 600 | 682 | 853 | 722 | 902 | 1600 | 1644 | 92 | 178070 | 164x41x78 | 14200 | 304 |
| 750 ^{LL} | 600 | 682 | 853 | 722 | 902 | 2000 | 2194 | 92 | 178070 | 177x44x82 | 15450 | 286 |
| 1000 | 800 | 890 | 1113 | 962 | 1203 | 2500 | 2169 | 93 | 205514 | 177x44x82 | 17400 | 322 |
| 1000 | 900 | 1012 | 1265 | 962 | 1203 | 2500 | 2440 | 93 | 231203 | 177x44x82 | 17400 | 322 |
| Applicable Notes: | | 1,4,5,7,8,9,11,12 | | 2,5,7,8,9,11,12 | | 6 | 6,8,9,11,12 | — | — | 13 | 13 | — |

For explanation of notes, see referenced numbers in **10.1 - Notes**

* Nominal Input Power Factor 0.92 lagging at full load; 4% Maximum Total Input Harmonic Current Distortion (THD) at full load.

HL - 750 kVA module with 240 battery cells

LL - 750 kVA module with 180 battery cells



Series 600™ UPS

Multi-Module Three Phase

338 kVA to 1000 kVA; 60 Hz

Technical Support

| | |
|--------------------|---|
| U.S.A. | 1-800-222-5877 |
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With more than 500,000 installations around the globe, Liebert is the world leader in computer protection systems. Since its founding in 1965, Liebert has developed a complete range of support and protection systems for sensitive electronics:

- Environmental systems: close-control air conditioning from 1.5 to 60 tons.
- Power conditioning and UPS with power ranges from 250 VA to more than 1000 kVA.
- Integrated systems that provide both environmental and power protection in a single, flexible package.
- Monitoring and control — on-site or remote — from systems of any size or location

Service and support, through more than 100 service centers around the world, and a 24-hour Customer Response Center.

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