S/N:_____

OPERATING AND SERVICE INSTRUCTIONS

SLRd SERIES BATTERY CHARGER

SINGLE PHASE INPUT

Delivering quality

ALCAD

IMPORTANT SAFETY INSTRUCTIONS

READ AND FOLLOW ALL SAFETY INSTRUCTIONS

1. Before using the battery charger, read all instructions and cautionary markings on: A) battery charger, B) battery, C) equipment connected to charger battery.

2. This manual contains important safety and operating instructions, and therefore should be filed for easy access.

3. Do not touch any uninsulated parts of the battery charger, especially the input and output connections, as there is the possibility of electrical shock.

4. During normal operation, batteries may produce explosive gas. NEVER smoke, use an open flame, or create arcs in the vicinity of the charger or battery to prevent fire or explosion.

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

6. Proper disposal of batteries is required. Refer to your local codes for disposal requirements.

7. Maintain at least 4.00” (100mm) clearance from all obstructions on all ventilation openings and 6.00” (150mm) for the top of the battery charger.

8. Keep area in front of battery charger clear to allow full opening of door.

9. Connect or disconnect the battery only when the battery charger is off to prevent arcing or burning.

10. De-energize all AC and DC inputs to the battery charger before servicing.

11. Do not operate battery charger if it has been damaged in any way. Refer to qualified service personnel.

12. Do not disassemble battery charger: only qualified service personnel should attempt repairs. Incorrect reassembly may result in explosion, electrical shock, or fire.

13. Do not install the battery charger outdoors, or in wet or damp locations unless specifically ordered for that environment.

14. Remove all jewellery, watches, rings, etc. before proceeding with installation.

SAVE THESE INSTRUCTIONS

CONTENTS

CHARGER SPECIFICATIONS

MODEL NO.:_____ CABINET TYPE_____

SERIAL NO.:_____

INPUT VOLTAGE:_____ VAC FREQ.: 60 Hz PHASE: 1

FLOAT VOLTAGE:_____ VDC

EQUALIZE VOLTAGE:_____ VDC

BATTERY TYPE:_____

NUMBER OF CELLS:_____

CHARGER OPTION LIST

	DESCRIPTION
	Eliminator Filter
	28 Day Automatic Equalizer Timer
	AC Voltmeter
	Relay Card with 8 Individual Relays for Standard Alarms
	Battery Temperature Compensation
	Burn-in Testing
	19" Relay-rack Mounting Brackets (Wall Mount Cabinet Only)
	23" Relay-rack Mounting Brackets (Wall Mount Cabinet Only)
	Drip Cap
	Factory Acceptance / Witness Testing
	Disable Ground Fault Alarms (For Grounded Systems)
	0-99 Hour Automatic Highrate Timer On DC Current Limit
	0-99 Hour Automatic Highrate Timer On AC Failure
	On-Site Commissioning
	Export Packing
	Load Sharing
	Production Test Data
	Certified Production Test Data
	Extended Warranty

Note:

X = Item Supplied

1. INTRODUCTION

SLRd Battery Charger is microprocessor based, SCR controlled to provide a suitable highly stable DC power source for charging vented and valve regulated nickel cadmium, lead calcium, lead selenium and lead antimony batteries.

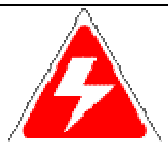
The included features are:

- constant voltage charging
- current limit control
- highrate control
- slow start
- minimum maintenance

This manual explains how to use and maintain the battery charger. Please read this manual carefully before using the system. No one involved in the manufacture or distribution of this battery charger will be liable for damage due to its improper use, neglect, or alteration.

The equipment has two methods of access:

Operators interact with the system with the door closed.
Maintenance personnel interact with the system with the door open.



IMPORTANT RECOMMENDATIONS:

ANY OPERATION ON THE EQUIPMENT SHOULD BE CARRIED OUT BY QUALIFIED PERSONNEL, AWARE OF SPECIFIC ELECTRICAL HAZARDS AND PRECAUTIONS TO BE TAKEN.

LETHAL VOLTAGES EXIST PERMANENTLY ACROSS BATTERY TERMINALS.

DO NOT MAKE ASSUMPTIONS AS TO THE PRESENCE OR ABSENCE OF A VOLTAGE: CHECK USING A VOLTMETER.

1.1. SPECIFICATIONS

The following specifications and descriptions listed apply to all standard SLRd chargers.

Input Ratings

VOLTAGE: 120, 208, 240 VAC
TOLERANCE: ±10% of input voltage
FREQUENCY: 60 Hz ±6%
PHASE: Single

Output Ratings

VOLTAGE:	NOMINAL	MAXIMUM
	24 VDC	32.0 VDC
	48 VDC	63.0 VDC
	120 VDC	156.0 VDC

DC VOLTAGE RANGE:		
	FLOAT	85% to 130% of nominal DC
	HIGHRATE	85% to 130% of nominal DC

CURRENT LIMIT: Set to 100% of rated DC current
Adjustable 20% to 100% of rated DC current

OUTPUT RIPPLE: (standard charger) maximum 30mV RMS for 24 and 48VDC / 150mV RMS for 120VDC when connected to a battery with Ah capacity four times higher than charger current rating. Eliminator filter chargers (optional) will further reduce the output ripple voltage.

1.2. CONTROLS

Accessible by front-mounted push-buttons

1.3. INDICATORS

Digital Display
- Digital voltmeter and ammeter, 1% accuracy
- Back-lit two-line LCD panel
- System OK LED (green)
- Fault LED (red)

1.4. PROTECTION

AC input breaker: two-pole, 10,000 AIC(*)
DC output breaker: two-pole, 5,000 AIC (*)
(*) CSA listed
Soft start
Reverse battery protection
Automatic current limiting
Blocking Diode (ensures DC voltage does not flow back into the charger)

2. INSTALLATION

2.1. RECEIVING THE EQUIPMENT

Upon receipt of the equipment, visually inspect the equipment for shipping damage.
Ensure the cabinet has not been dented or marred.
Confirm all internal components and wiring are secure.

Check the contents of the package against the delivery slip before disposing of the package. If damage or partial loss is found, file a claim with the carrier without delay and take any necessary steps to protect your rights.
If any items require an inspection by a manufacturer's representative or need to be returned to the manufacturer, contact your Sales Representative for further instructions.
Any items to be returned require a Return Material Authorization (RMA) number before the manufacturer can accept them.

If the equipment is not to be installed immediately, store it in a ventilated, dry room, away from rain, splashes of water, and chemicals, complying with the environmental requirements defined in section 2.6.

2.2. HANDLING

The equipment must be handled with care. Labels on the outside of the package show the top and bottom.
The SLRd Battery Chargers and the batteries are delivered on pallets for easy handling using a pallet truck.
The lifting capacity of the handling equipment used must always be greater than the weight of the cabinets (specified on the packages).

ATTENTION:
Only transport the floor mounted cabinets in an **upright position!**
Never **tilt** or **cant**, always observe the centre of gravity!
Always keep the battery cells in a vertical position.
Never lift a battery cell by its connections.
Do not put or drop objects on the battery.

2.3. INSTALLING AND SECURING THE BATTERY CHARGER

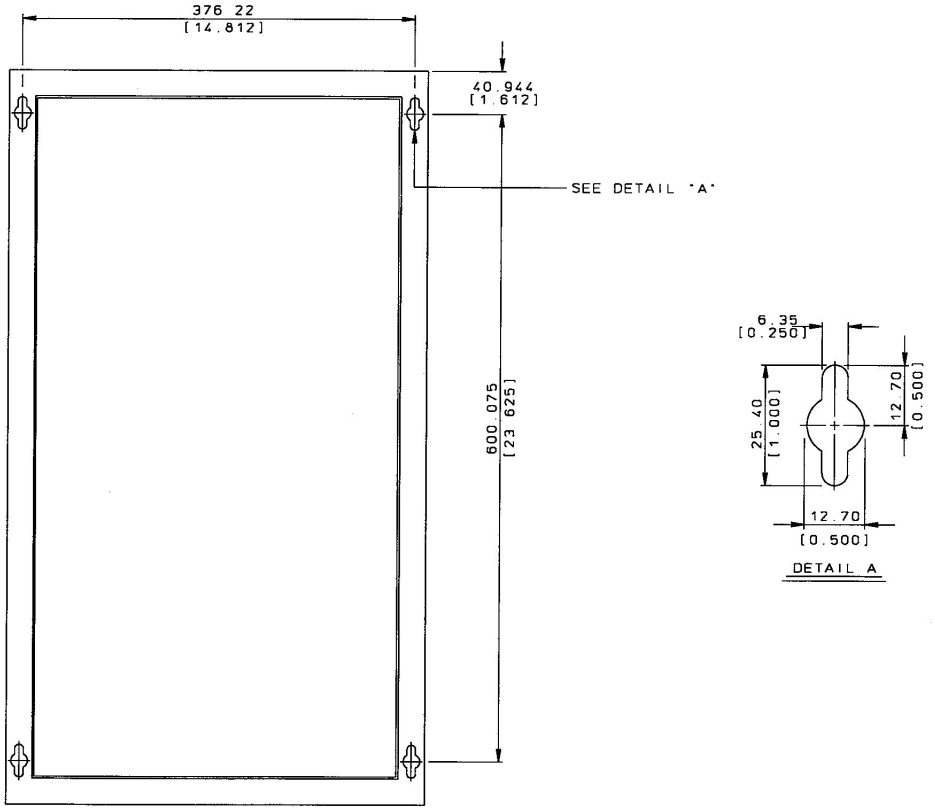
Select an installation site with the following characteristics:

- Ambient temperature and relative humidity as specified in Section 2.6.
- Ambient air free from dust, conductive contaminants and corrosive gases.
- A wall or floor surface sufficiently flat so that the cabinet will not be distorted when secured.
- A wall or floor surface sufficiently strong to carry the weight of the equipment.
- Provide 10 inches (254 mm) clearance on sides for wall mounted cabinets.
- Provide 2 inches (51 mm) clearance on top for wall mounted cabinets.
- Provide 3 inches (76 mm) clearance on sides/rear for floor mounted cabinets.
- Provide 2 inches (51 mm) clearance on top for floor mounted cabinets.
- Provide sufficient clearance so that the door can be opened.

Wall Mounted Cabinet

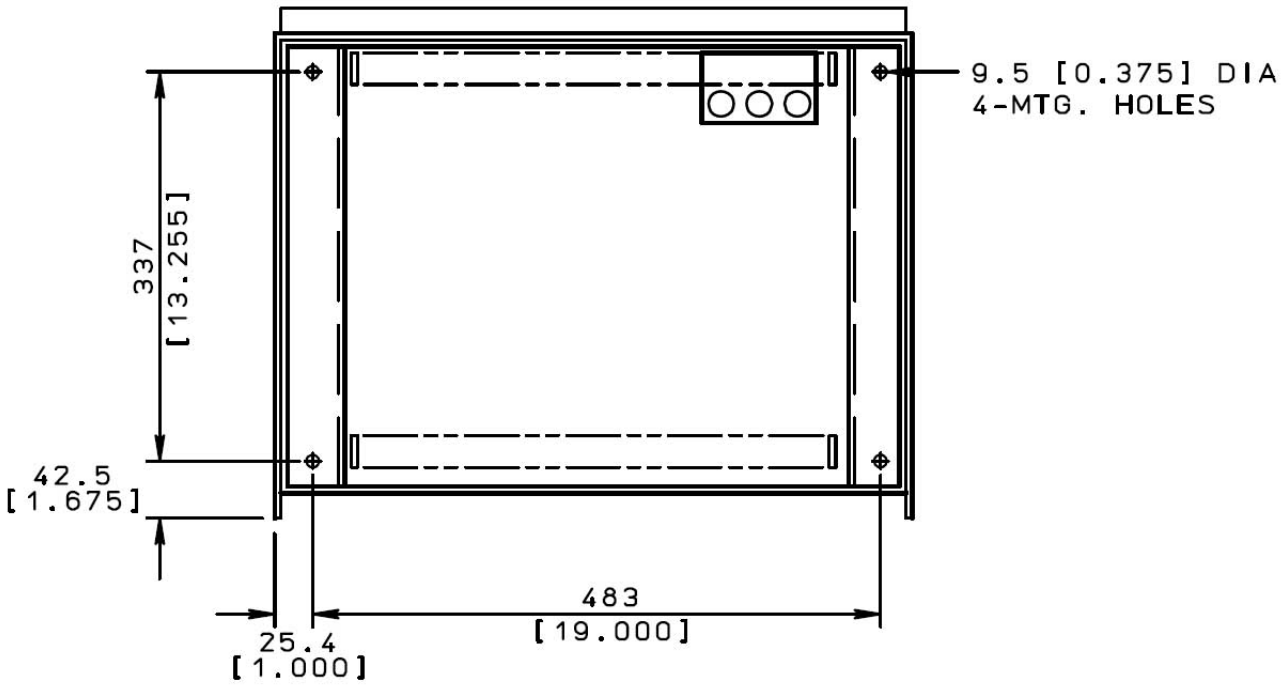
The recommended mounting hardware:

- ¼ inch lag bolts, quantity 4 (not supplied).



The recommended mounting hardware:

- ¼ inch lag bolts, quantity 4 (not supplied).



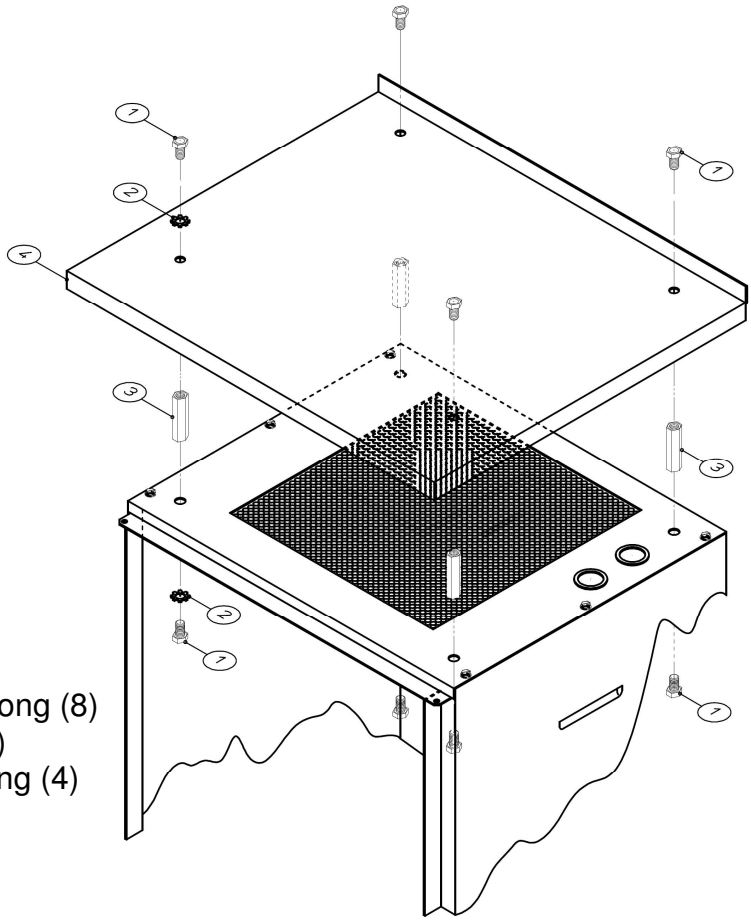
2.4. INSTALLING THE DRIP CAP (IF ORDERED)

THE DRIP CAP MUST BE INSTALLED BEFORE ANY ELECTRICAL CONNECTIONS ARE MADE

On the cabinet top there are four 0.343" diameter knock outs that must be removed only when installing a drip cap. When removing these knockouts, ensure that they do not fall into the cabinet, otherwise damage to the equipment may occur. Use the hardware supplied, as shown.

Wall Mounted Cabinet

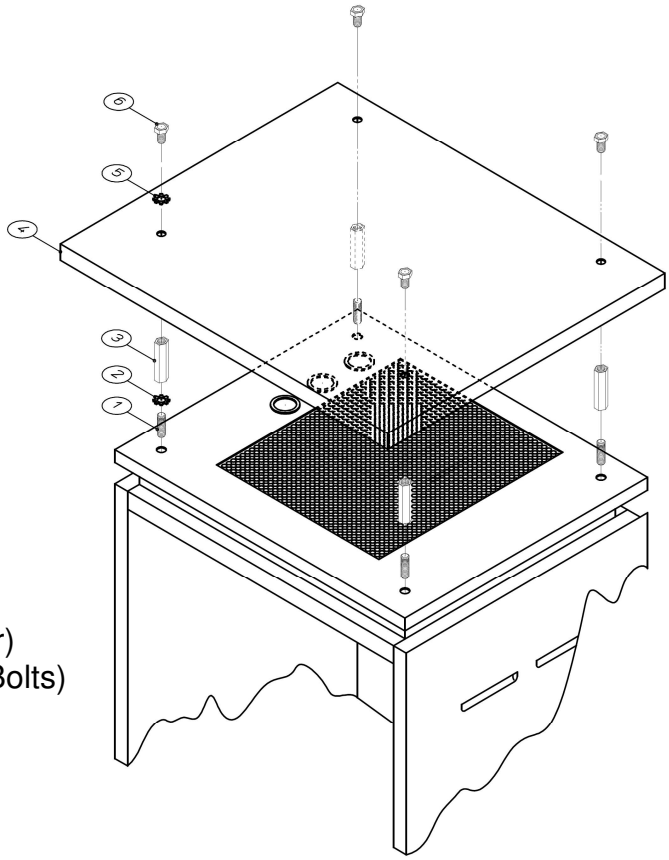
Do not use rack mounting brackets with this option.



Parts:

1. Hex Head Bolt 5/16”-18 x 3/4” Long (8)
2. External Tooth Washer 5/16” (2)
3. Spacer Nut 5/16”-18 x 1 3/4” Long (4)
4. Drip Cap (1)

Floor Mounted Cabinet



Parts:

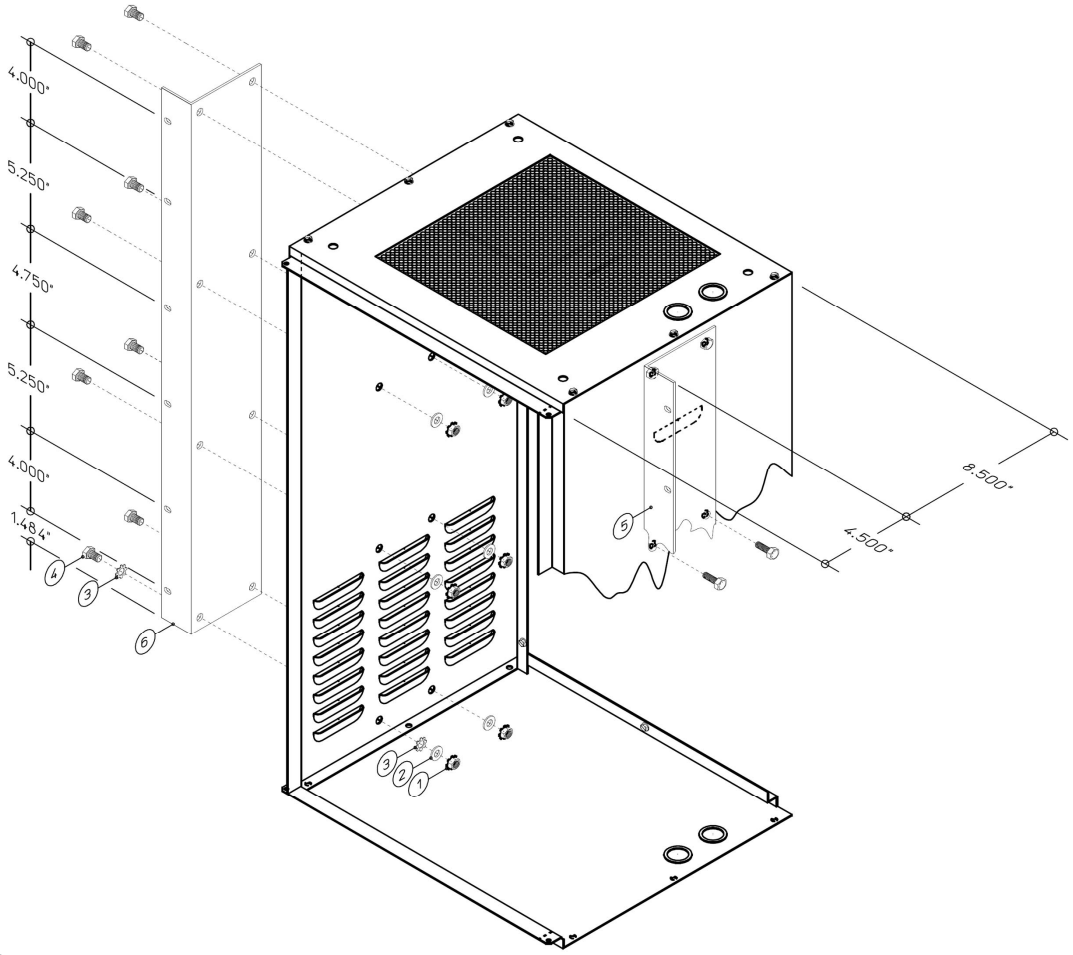
1. Threaded Rod 5/16”-18 x 2” Long (4)
2. External Tooth Washer 5/16” (1)
3. Spacer Nut 5/16”-18 x 1 3/4” Long (4)
4. Drip Cap (1)
5. External Tooth Washer 5/16” (Reuse 1 Washer)
6. Hex Head Bolt 5/16”-18 x 1/2” Long (Reuse 4 Bolts)

2.5. INSTALLING THE RELAY MOUNTING BRACKETS (IF ORDERED)

Wall Mounted Cabinets Only

THE RACK MOUNTING BRACKETS MUST BE INSTALLED BEFORE ANY ELECTRICAL CONNECTIONS ARE MADE

On each of the two cabinet sides there are eight 0.343" diameter knockouts that must be removed only when installing Relay Rack Mounting Brackets. When removing these knockouts ensure that they do not fall into the cabinet, otherwise damage to the equipment may occur. Note that the left side is a mirror image of the right side. Use the hardware supplies, as shown. Ensure there is 10 inches (254mm) above the cabinet for proper ventilation for this option.



Parts:

1. Kept Nut 5/16"-18 (16)
2. Flat Washer 5/16" (16)
3. External Tooth Washer 5/16" (4)
4. Hex Head Bolt 5/16"-18 x 3/4" Long (16)
5. Rack Mounting Bracket – Right (1)
6. Rack Mounting Bracket – Left (1)

Do not use the drip cap with this option.

2.6. ENVIRONMENTAL REQUIREMENT (EXCLUDING THE BATTERY)

Temperature

Storage: -13°F to 158°F (-25°C to 70°C)
Operating: 32°F to 104°F (0°C to + 40°C)
For operation between 104°F (40°C) and 131°F (55°C), derate the output current by 2.0% per 1.8°F (1°C).

Relative Humidity

Up to 95% (non-condensing)

Altitude

≤ 3280 ft (1000m)
For operation between 3,280 ft (1000m) and 13,120 ft (4000m), derate the output current by 7% per 3,280 ft (1000m).

2.7. BATTERY CHARGER INPUT CONNECTIONS

ANY OPERATION ON THE EQUIPMENT SHOULD BE CARRIED OUT BY QUALIFIED PERSONNEL AWARE OF SPECIFIC ELECTRICAL HAZARDS AND PRECAUTIONS TO BE TAKEN

Ensure that the electrical data on the Battery Charger Rating Plate matches the installation.
External circuit breakers/fuses and wire sizing must conform to local and national codes.
AC Input Voltage must be maintained to within ±10% of the Rating Plate to maintain all the battery charger's operating parameters.
AC Input Terminal Designations

- TB1-1 - Line 1 connection
- TB1-2 - Neutral connection for 120VAC – Line 2 connection for 208 or 240VAC
- TB1-GND - Ground connection for AC input (cabinet must be grounded)
  Refer to Charger Specifications and schematic for option connections (if supplied).

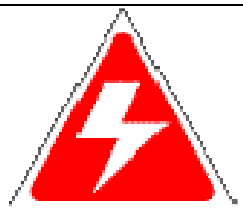
  Always make the connections with power off and the circuit-breaker devices in the "**open**" position:

- Input and output circuit breakers should be open.
- External battery protective device or disconnecting switch should be open.
- All external power sources including mains, load, and battery protection devices should be switched open.

2.8. INSTALLING THE BATTERY

Refer to installation procedures recommended by the battery manufacturer.

2.9. BATTERY CONNECTION



IMPORTANT RECOMMENDATIONS

REFER TO THE BATTERY MANUAL

Allow no flame or sparks in the battery room. Never smoke in the battery room.
Never disconnect a battery being charged.
To handle the electrolyte, use gloves and safety goggles.
The electrolyte contained in a battery is dangerous to the skin and clothing.
Before doing work on a battery, make sure that there is an accessible supply of water nearby. If electrolyte is splashed, wash immediately with water.
Use tools with insulated handles.
Remove any shipping plugs from the batteries. Always use maintenance accessories (especially electrolyte handling tools) suited to the batteries.
Typically, Lead-acid batteries must be stored in a charged condition for no more than three months at an ambient temperature of 32°F (0°C) to 86°F (30°C).

Reminder

Battery cells must be connected in series, with the (+) pole of each cell connected to the (-) pole of the next cell.

Battery on stand

- Position the battery cells and connect them in series.
- Check that no cells are reversed.
- Check that the connections are tight.
- Battery negative (-) to battery charger terminal TB1-4 DC Negative (-). (through fused/non-fused disconnect switch if applicable)
- Battery positive (+) to battery charger terminal TB1-3 DC Positive (+). (through fused/non-fused disconnect switch if applicable)
- Battery rack/cabinet Ground to battery charger Ground connection for DC output.

2.10. CONNECTING THE LOAD

Load connections should be made directly to the battery bank. SLRd battery charger schematic and typical internal layouts are located in the diagram section.

- Connect the load (+) to the load (+) terminal of the battery.
- Connect the load (-) to the load (-) terminal of the battery.

2.11. CONNECTING THE ALARM REMOTE RELAYS

Refer to the Combined Alarm and Status Monitor section for details.

3. COMMISSIONING

3.1. PRELIMINARY CHECKS

ALL CIRCUIT OPENING DEVICES IN THE "OPEN" POSITION:

Check that the input voltage and frequency are compatible with the charger input (see Section 2.7).
Check that all connections are tight.
Check the polarities and that the battery cells are correctly connected in series.

3.2. SWITCHING ON

- Leave the DC output breaker device open.
- Close the input circuit breaker device.

The battery charger starts and the display shows:

```
Sps  -   GCAU
   Vx.y.z/a.b
```

Vx . y . z / a . b : internal software versions of the two micro controllers

After a few seconds, the display shows approximately zero volts and no load current (DC output circuit breaker open).

```
DC:   2.0V  0.5A
Alarms:       x
```

- To check that the battery polarities are correct, take a voltage reading using a DC voltmeter across Terminals TB1-3 (+) and TB1-4 (-).

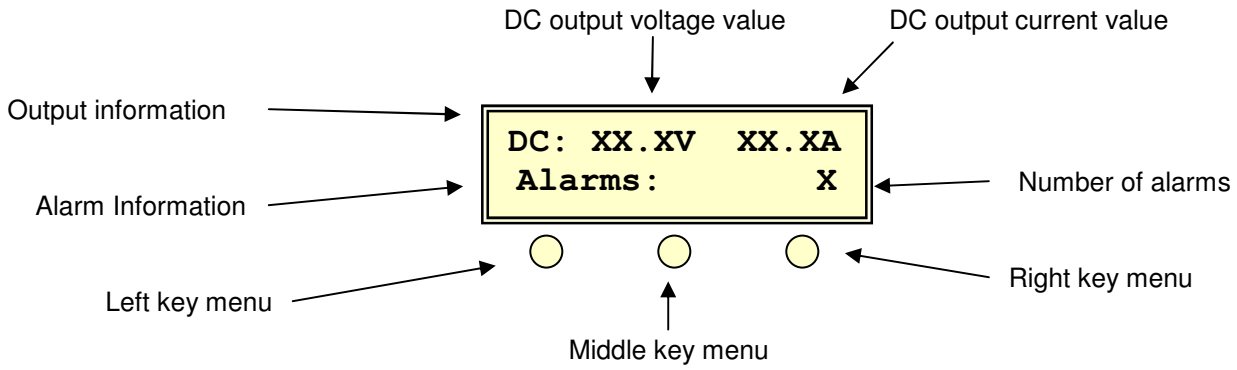
The voltage reading should be positive and approximately the nominal DC voltage (depends on state of battery).
If the voltage is not positive (+) check the battery cables for correct polarity.
Confirm Floating and Highrate voltages are correct for the battery being used before closing DC breaker.(Refer to Operating Instructions – Setup menu).

If polarity and voltages settings are correct, close DC output breaker. The battery charger current may reach current limit depending on battery state of charge. Highrate mode may be activated depending on highrate options.

4. OPERATING INSTRUCTIONS

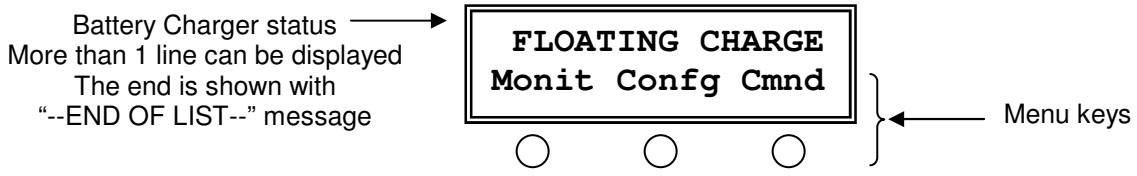
The following section explains the basic operator menu structure of your system. It allows you to access all necessary functions in order to operate your system.

4.1. DEFAULT MENU



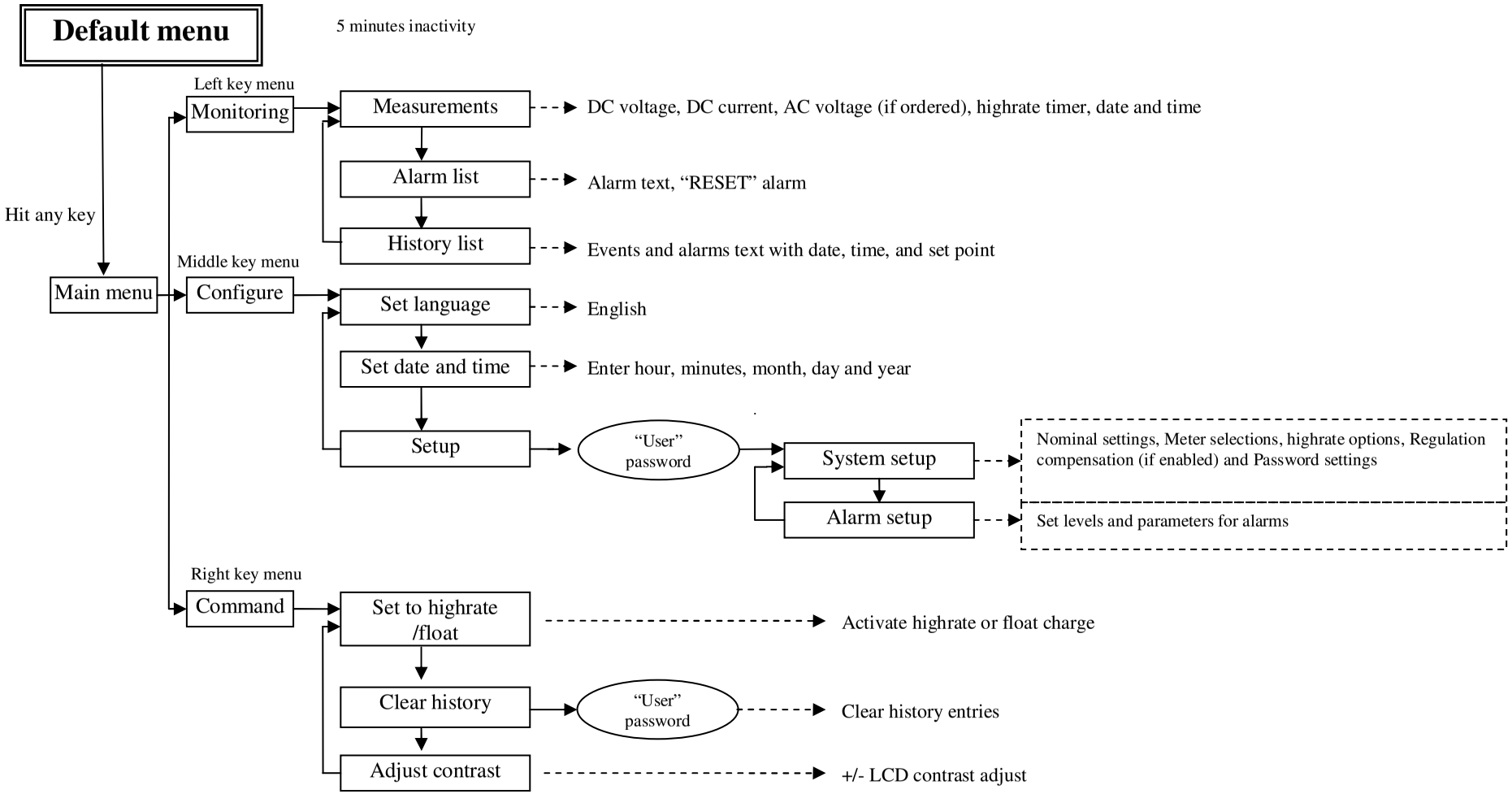
Hit any key to go to main menu

4.2. MAIN MENU



The different Battery Charger statuses are:
- FLOATING CHARGE
- HIGHRATE CHARGE
- CHARGER OFF
- 'Alarm' (Refer to Combined Alarm and Status monitoring)

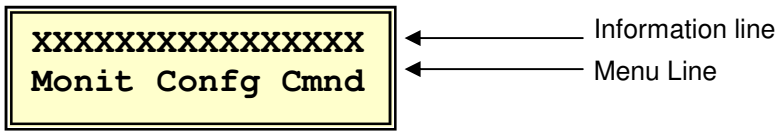
- Menu overview -



4.3. MENU STRUCTURE

The Menu Structure is based on consistency in operation. Consistency means that the functions are grouped logically and will provide ease of use for the operator.

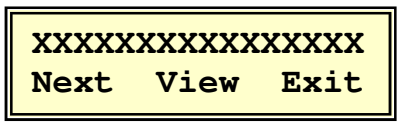
The LCD Display has 2 lines by 16 characters. The top line is always used to indicate information while the bottom line is used for the menu structure indication.



There are three major menu groups under which all functions are located.

These groups are defined as:

- **Monitoring** Displaying analogue measurements and alarms
- **Configuration** Configuring the system
- **Commands** Manually activated functions (Highrate/Float, clear history & contrast.)



The menu indication uses basic menu controls with the following functions:

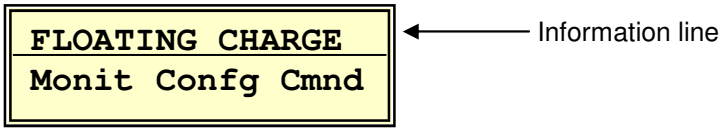
- **Next** One step forward in the menu
- **Back** One step back in the menu
- **View** Display a selection
- **Enter** Acknowledge an entry
- **Exit** Return to previous level menu
- **Reset** Acknowledges or clears alarm condition
- **Cancel** One step back in the menu without entering changes
- **Change** Enter password updating menus
- → ↓ ↑ Performs data entry functions
- **Yes, No** Enables or disables menu function

The following sections will clearly explain how you can access the various functions.

4.4. STATUS INDICATION DISPLAY

As explained in the previous chapter the top line of the display will indicate information about the status of the system. If more than one message is active, the messages are displayed in sequence. Each message is displayed for 1 second before the next message is displayed.

The following messages are displayed:
- Alarm texts of the active alarms
- Charge status messages
- Events



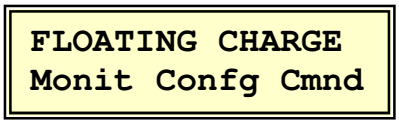
The messages are dynamic meaning they are updated continuously. If the alarm texts (LCD) are Latching you must go into the **Monit** menu to clear the text from the display. Refer to section 4.5.2 for details.

4.5. MONITORING FUNCTION

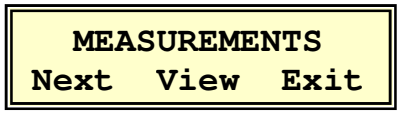
4.5.1. How To Display The Measurements

You will find the measurements menus under the **Monit** menu. The Monitoring function will display all relative meter indications on the top line of the LCD.

Follow the instructions below.

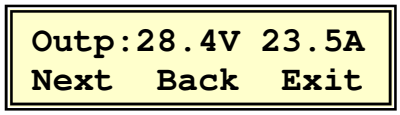


From the default menu, press any key and then select '**Monit**'.



Select '**View**'.

The top line will display the battery voltage and charge current. Display resolution is 1 decimal for measurements up to 99.9 and no decimals for 100 and above.



The '**Next**' key can be used to scroll through all available measurements.

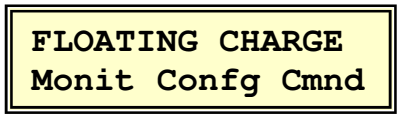
In order of appearance the following measurements can be displayed:

- Output voltage and current (at output terminals)
- Load voltage (battery charger output with DC breaker closed)
- AC input voltage (if ordered)
- Remaining Highrate charge time
- Date and Time

4.5.2. How To Display The Alarm List

You will find the Alarm list indication under the Monitoring function. This Alarm List indication will display all active alarms on the top line of the LCD.

Follow the instructions below.



From the default menu, press any key and then select '**Monit**'.

MEASUREMENTS Next View Exit

Select **'Next'.**

Alarm List: XX Next View Exit

Select **'View'**.

The display indication XX shows you how many alarms are in the alarm list. The list shows Active alarms and Non-acknowledged (Reset) alarms based on the alarm configuration. If a "LCD Latch" function (default) is selected for an alarm, it will remain in the alarm list even when the alarm condition has disappeared. In this case, a manual alarm reset has to be given to clear it from the alarm list.

LOW DC VOLTAGE Next Back Reset

The alarm is presented in clear text on the top line. Pressing **'Next'** will show you the next alarm in the list and pressing **'Back'** will show you the previous alarm in the list.
If an alarm has not been acknowledged the text **'Reset'** will flash. If the alarm is acknowledged and the alarm option "LCD latch" was activated (see Alarm Setup for details), the alarm will be removed from the list provided the condition of the alarm has been cleared.

4.5.3. How To Read The History List (Alarm & Event Memory)

The GCAU in your system is equipped with an Alarm and Event list. The GCAU card stores the alarm and events, in order of appearance, in a non-volatile memory (permanent storage). Events in this context mean indicating if the system has been switched to Highrate, Float, Entering the setup mode, Clearing the history etc.
The memory is based on a FIFO mechanism (**F**irst **I**n **F**irst **O**ut) and if the memory is full, the oldest event or alarm will be removed from the list.
The alarm and events are time/date stamped using an RTC (Real Time Clock).

Follow the instructions below.

FLOATING CHARGE Monit Confg Cmnd

From the default menu, press any key and then select **'Monit'.**

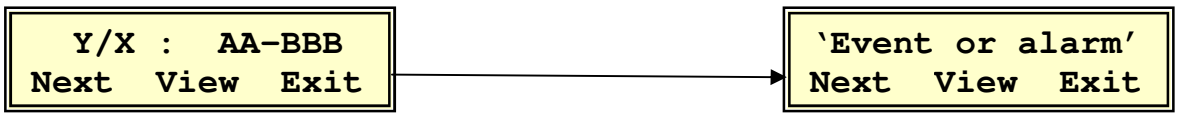
MEASUREMENTS Next View Exit

Select **'Next'** until the top line shows text below.

HISTORY LIST x Next View Exit

Select **'View'** → | SOFTWARE VERSION
Vx.y.z/a.b |

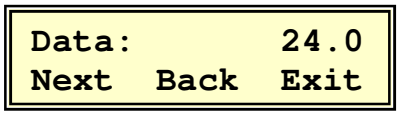
The display will show the internal software version of the GCAU card for reference. This message is displayed for two seconds. After two seconds the display will show:



Appears for 2 seconds
Y = # of this alarm
X = total # of alarms
AA-BBB = Alarm designation

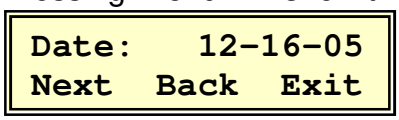
Top line shows event or alarm text.

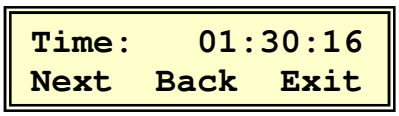
Select '**View**'



Top line shows set point (alarm level) if applicable

Pressing '**Next**' will show the date and time of the Alarm/Event:





4.6. COMMAND FUNCTIONS

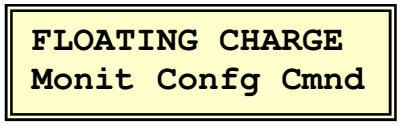
Your system has several specific command functions. All these commands are accessible through the Command function '**Cmnd**'.

The different command functions are:

- Manual Highrate Charge (if in float)
- Manual Floating Charge (if in highrate)
- Clear History List
- Set Display Contrast

4.6.1. How To Activate Manual Highrate Charge

The Manual Highrate charge is a command function and is located under the Command ('**Cmnd**') key. Follow the instructions below.



From the default menu, press any key and then select '**Cmnd**'.

Press '**Next**' until the following indication is displayed:

The highrate charge can be switched on by pressing the "Yes" key.

To stop the highrate charge, the user can manually put the Battery Charger in floating charge mode via the command menu (see section 4.6.2) or wait for the timer to time out. (Battery Charger switches automatically into floating charge mode once time expires)

The remaining highrate charge time can be read on the LCD display via the measurements menu. See section 4.5.1.

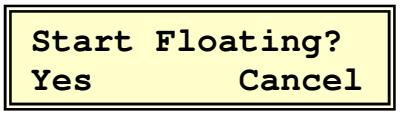
4.6.2. How To Activate Manual Floating Charge

When in highrate, you can manually switch the Battery Charger into the floating charge mode. Follow the instructions below.

From the default menu, press any key and then select '**Cmnd**'.

Press '**Next**' until the following indication is displayed:

Press '**Enter**'.



Floating charge can be switched on by hitting the '**Yes**' key.

4.6.3. How To Clear The Event & Alarm History List

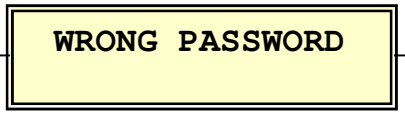
If required, the event and alarm history list of your system can be cleared from the front panel. A password is required to clear the list.

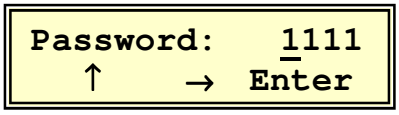
Follow the instructions below.

From the default menu, press any key and then select '**Cmnd**'.

Select '**Next**' until the following menu is displayed.

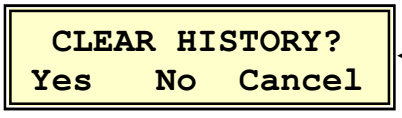
Press '**Enter**'.





With the right pointing arrow '→' the digit position can be selected and with the arrow up '↑' a number/letter between 0 and 9 and A to Z can be set. If all four digits are set, press '**Enter**'.

If the password is correct, the display switches to the Clear History Yes/No selection. If the password is incorrect, a message '**WRONG PASSWORD**' is displayed for two seconds and the menu jumps one position back in the menu tree.



Correct password

Clear the History list by pressing the '**Yes**' key. Pressing '**No**' will cause a jump two menus back.

4.6.4. How To Adjust The Display Contrast

The display contrast can be adjusted in two ways:

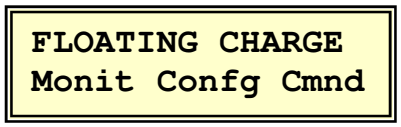
- From the default menu directly
- Using the Command function.

Adjusting the Contrast from the Default Menu

To compensate for ambient light conditions, the contrast can be adjusted directly from the default menu. If the left button from the default menu is held, the contrast will be decreased. If the right button from the default menu is held, the contrast will be increased. The default menu is displayed after 5 minutes of inactivity.

Adjusting the Contrast using the Command Function

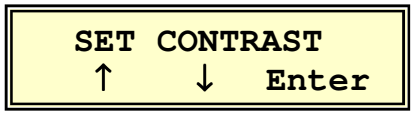
To adjust the display contrast using the Command function, follow the instructions below:



From the default menu, press any key and then select '**Cmnd**'.

Select '**Next**' until the following menu is displayed.

Press '**Enter**'.



Use the arrow keys to adjust the contrast.

4.7. CONFIGURATION FUNCTIONS

4.7.1. Language Menu

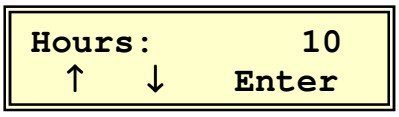
The standard language for SLRd is English. Consult your sales representative for availability of other languages.

4.7.2. How To Set Date & Time

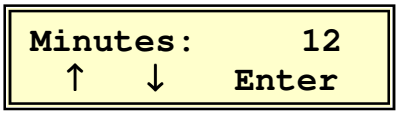
From the default menu, press any key and then select '**Confg**'.

Select '**Next**' until the following menu is displayed.

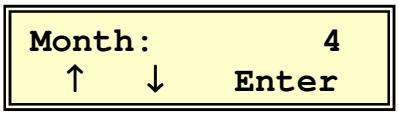
Select '**Enter**'.



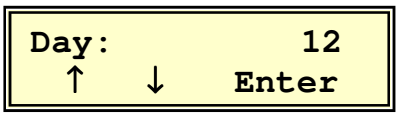
Use the up/down arrows to select your hours. Hit **'Enter'** key to go to next menu.



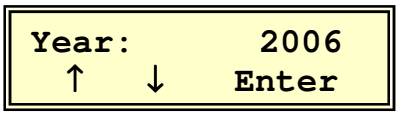
Use the up/down arrows to select your minutes. Hit **'Enter'** key to go to next menu.



Use the up/down arrows to select your month. Hit **'Enter'** key to go to next menu.



Use the up/down arrows to select your day. Hit **'Enter'** key to go to next menu.



Use the up/down arrows to select your year. Hit **'Enter'** key to come back to the **'SET DATE & TIME'** menu.

4.7.3. Setup

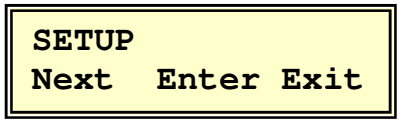
The setup menu is accessible with a password and it allows the modification of the system configuration. The default password is 1111. Any modification of your system configuration is your responsibility. You risk damage to your battery or equipment if the modification is done by non-specialized staff.

4.7.4. How To Change The Password

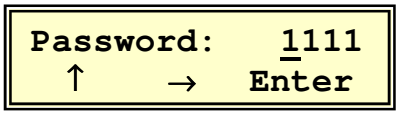
Enter the Password setting as follows:

From the default menu, press any key and then select '**Confg**'.

Select '**Next**' until the following menu is displayed.



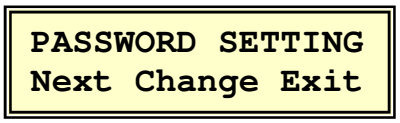
Select '**Enter**'.



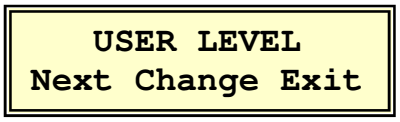
With arrow keys, select the password and hit **'Enter'** key. If 1111 is defaulted (as shipped), go directly to **'Enter'.**

Enter the system setup by hitting **'Enter'** key.

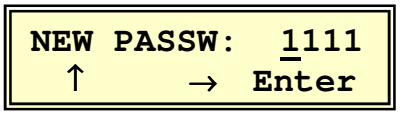
Select **'Next'** until the menu below is displayed.



Select **'Change'** to enter the password setting menu.

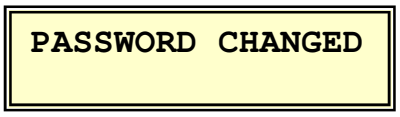


Select **'Change'.**

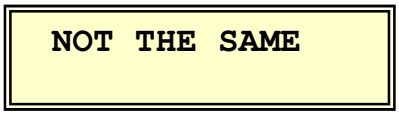


With arrow keys, enter the new password and hit **'Enter'** key.

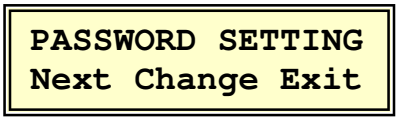
With arrow keys, confirm the new password and hit **'Enter'** key.



or



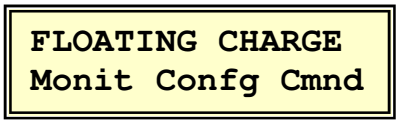
In the second case, you must start again.



With the password, you will find in this setup menu:

- Nominal settings: to select floating, highrate voltages and limit current.
- High rate options
- Regulation compensation: to implement the temperature compensation (option) and droop for parallel load sharing operation (option).
- Password setting: to change password.

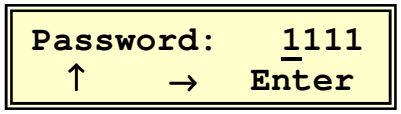
4.7.5. How To Set Floating, Highrate Voltages & Output Current



From the default menu, press any key and then select **'Confg'**.

Select **'Next'** until the following menu is displayed.

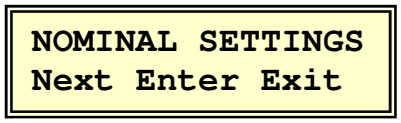
Select **'Enter'**.



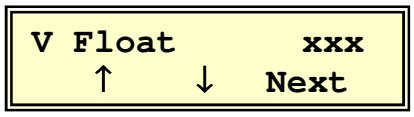
With arrow keys, select the password and hit **'Enter'** key. If 1111 is defaulted (as shipped), go directly to **'Enter'.**

Enter the system setup by hitting **'Enter'** key.

Select **'Next'** until the menu below is displayed.

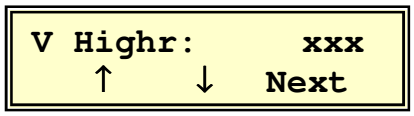


Enter the nominal settings setup by hitting **'Enter'** key.



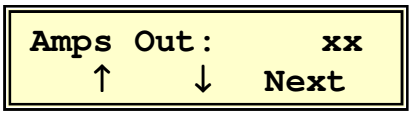
Use the up/down arrows to select your voltage. Hit 'Next' key to go to next menu. (Refer to Charger Modes section for value selection if required)

Select '**Next**' until the following menu is displayed.



Use the up/down arrows to select your voltage. Hit 'Next' key to go to next menu. (Refer to Charger Modes section for value selection if required)

Select '**Next**' until the following menu is displayed.



Changing the battery charger current limit is not normally required. Should circumstances require this, adjustment is limited to the maximum current rating. Output current can only be reduced.

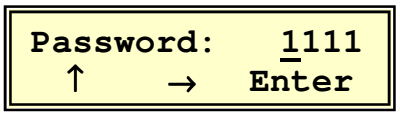
Use the arrow keys to adjust the current. Hit 'Next' key to go back to the nominal settings menu.

4.7.6. How To Set Meter Selections (Includes Temperature & Date Format)

From the default menu, press any key and then select **'Confg'**.

Select **'Next'** until the following menu is displayed.

Select **'Enter'**.

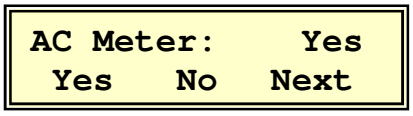


With arrow keys, select the password and hit **'Enter'** key. If 1111 is defaulted (as shipped), go directly to **'Enter'.**

Enter the system setup by hitting **'Enter'** key.

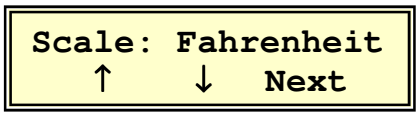
Select **'Next'** until the menu below is displayed.

Enter the meter selection setup by hitting **'Enter'** key.



This menu will only appear if this option has been enabled and can be turned off by selecting 'No".

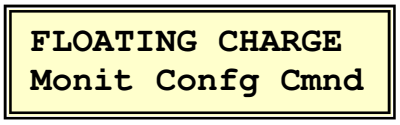
Select '**Next**' until the following menu is displayed.



Use the up/down arrows to select the temperature scale. This relates to the temperature compensation option (if ordered) but also changes the date format
Fahrenheit=MM/DD/YY
Celsius=DD/MM/YY

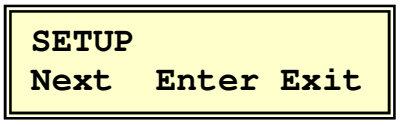
Hit 'Next' key to go to meter selections menu.

4.7.7. How To Set Highrate Options

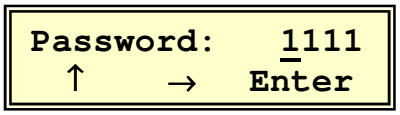


From the default menu, press any key and then select **'Confg'**.

Select **'Next'** until the following menu is displayed.



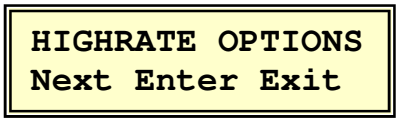
Select **'Enter'**.



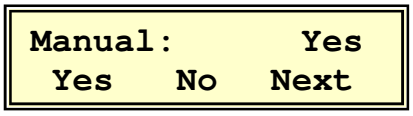
With arrow keys, select the password and hit **'Enter'** key. If 1111 is defaulted (as shipped), go directly to **'Enter'.**

Enter the system setup by hitting **'Enter'** key.

Select **'Next'** until the menu below is displayed.

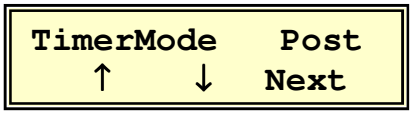


Enter the settings setup by hitting **'Enter'** key.



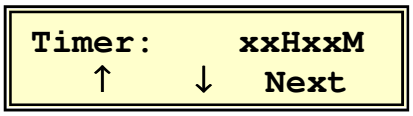
This allows the manual highrate charge to be permanently disabled. Refer to Charger Modes for explanation of operation.

Select '**Next**' until the following menu is displayed.



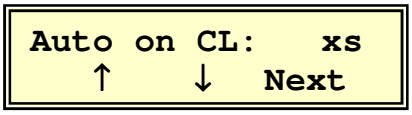
Use the up/down arrows to select Post or Direct. Refer to Charger Modes for explanation of operation.

Select '**Next**' until the following menu is displayed.



Use the up/down arrows to select highrate charge time. Refer to Charger Modes for explanation of operation.

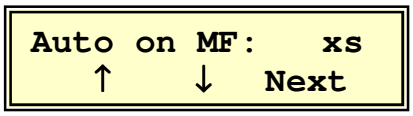
Select '**Next**' until the following menu is displayed.



(If Ordered)

Use the up/down arrows to select activation time. Refer to Charger Modes for explanation of operation.

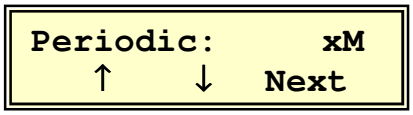
Select '**Next**' until the following menu is displayed.



(If Ordered)

Use the up/down arrows to select activation time. Refer to Charger Modes for explanation of operation.

Select '**Next**' until the following menu is displayed.



(If ordered)

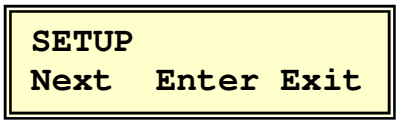
Use the up/down arrows to select highrate cycle time in months. Refer to Charger Modes for explanation of operation.

Hit 'Next' key to go to highrate options menu.

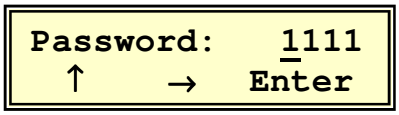
4.7.8. How To Set Load Sharing Regulation - Droop (If Ordered)

From the default menu, press any key and then select '**Confg**'.

Select '**Next**' until the following menu is displayed.



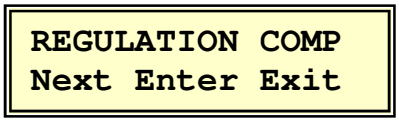
Select '**Enter**'.



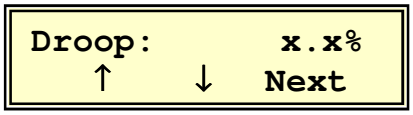
With arrow keys, select the password and hit '**Enter**' key. If 1111 is defaulted (as shipped), go directly to '**Enter**'.

Enter the system setup by hitting '**Enter**' key.

Select '**Next**' until the menu below is displayed.



This menu only appears if load sharing or temperature compensation has been supplied Enter the regulation compensation setup by hitting '**Enter**' key.



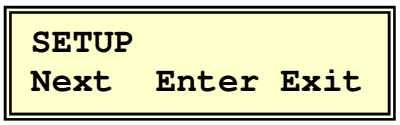
This allows the setting of regulation for load share (parallel) operation. Refer to Load share option for explanation of operation.

Hit 'Next' key to go to Regulation Compensation options menu.

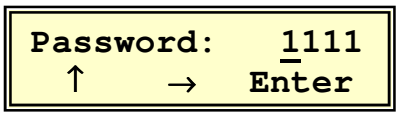
4.7.9. How To Set Temperature Compensation (If Ordered)

From the default menu, press any key and then select '**Confg**'.

Select '**Next**' until the following menu is displayed.



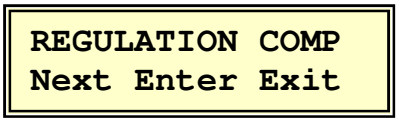
Select '**Enter**'.



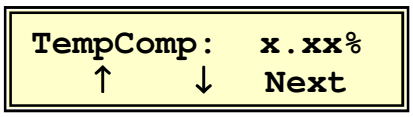
With arrow keys, select the password and hit '**Enter**' key. If 1111 is defaulted (as shipped), go directly to '**Enter**'**.**

Enter the system setup by hitting '**Enter**' key.

Select '**Next**' until the menu below is displayed.



This menu only appears if load sharing or temperature compensation has been supplied Enter the regulation compensation setup by hitting '**Enter**' key.



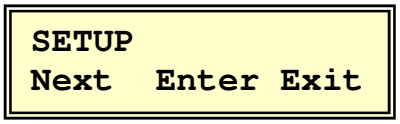
This allows the setting of the voltage compensation with respect to battery temperature operation. Refer to Battery Temperature Compensation option for explanation of operation.

Hit 'Next' key to go to Regulation Compensation options menu.

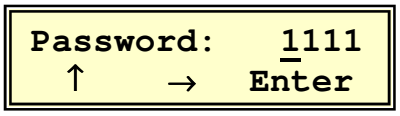
4.7.10. Alarm Setup

From the default menu, press any key and then select '**Confg**'.

Select '**Next**' until the following menu is displayed.



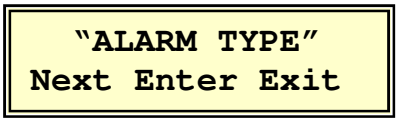
Select '**Enter**'.



With arrow keys, select the password and hit '**Enter**' key. If 1111 is defaulted (as shipped), go directly to '**Enter**'**.**

Enter the alarm setup by hitting '**Enter**' key.

Select '**Next**' until the menu below is displayed.

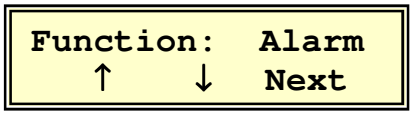


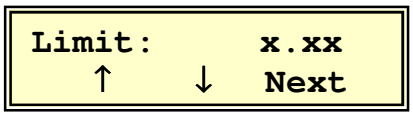
The available "ALARM TYPE" are listed below:

- High mains voltage alarm parameters.
- Low mains voltage alarm parameters.
- Charger fault alarm parameters.
- High DC voltage shutdown alarm parameters.
- Battery discharged alarm parameters.
- High DC voltage alarm parameters.
- Low DC voltage alarm parameters.
- Ground fault + alarm parameters.
- Ground fault – alarm parameters.

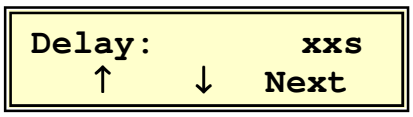
To enter the individual alarm setup, hit '**Next**' until the alarm is found and hit '**Enter**' key. For an explanation of the alarm menus, refer to the Combined Alarm and Status Monitor section.

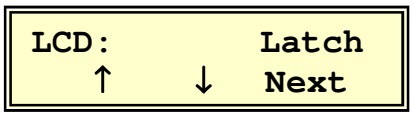
The individual alarm menus are shown below:

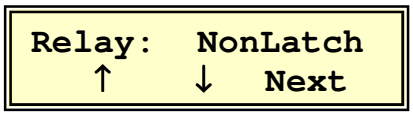


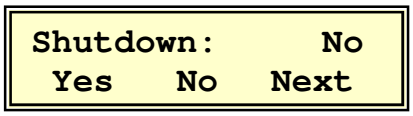


Limit menu is not available for Charger Fault alarm

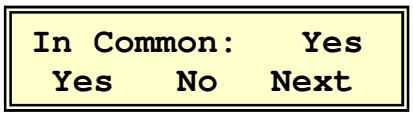








Shutdown menu is not available for Battery Discharged and Low DC Volts alarms.



Hit ‘Next’ key to go to “ALARM TYPE” menu.

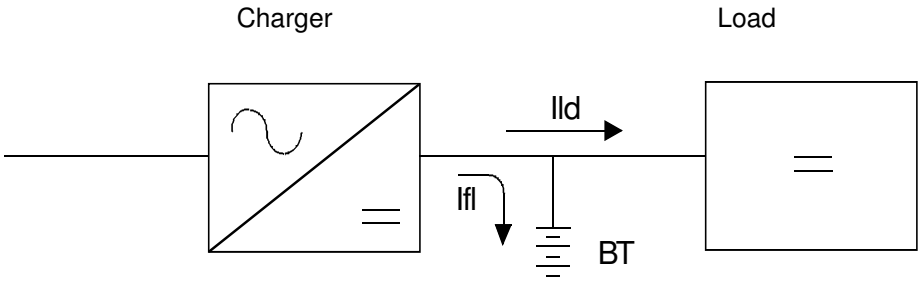
5. FUNCTIONAL DESCRIPTION

The SLRd Battery Chargers are constant-voltage, current-limited thyristor-controlled rectifiers suitable for charging all types of stationary nickel cadmium and lead acid batteries while supplying DC loads.

5.1. OPERATING SEQUENCES

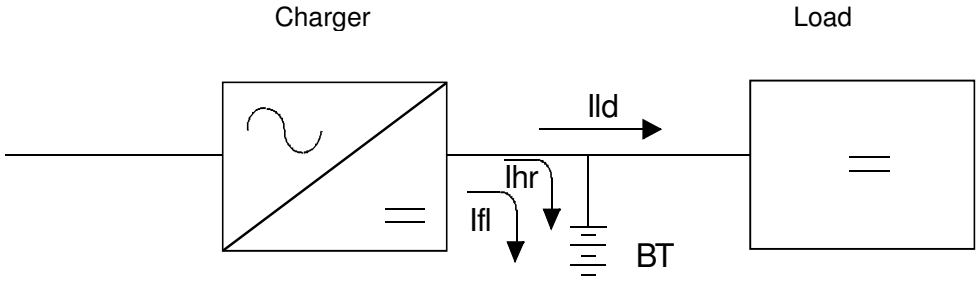
Battery Charger with associated battery

Mains power on - battery floating



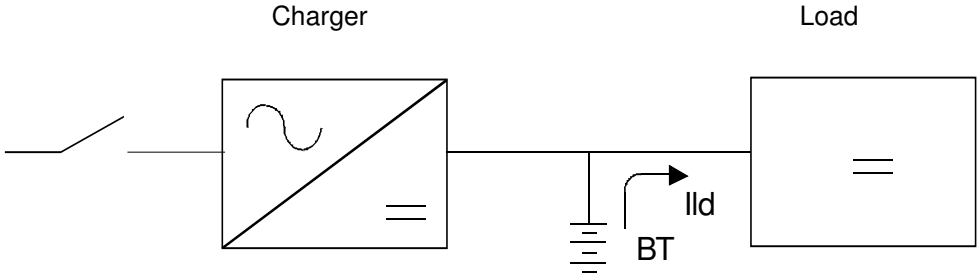
The charger supplies the load (Ild) and delivers a "floating" charge current (Ifl) to battery BT.

Mains power on - battery recharging



The charger recharges battery BT at a highrate (Ihr) and supplies the load (Ild). The charger automatically switches to "floating" charge (Ifl) when the battery is fully charged. Thereafter the battery is kept floating (Ifl).

Mains power off

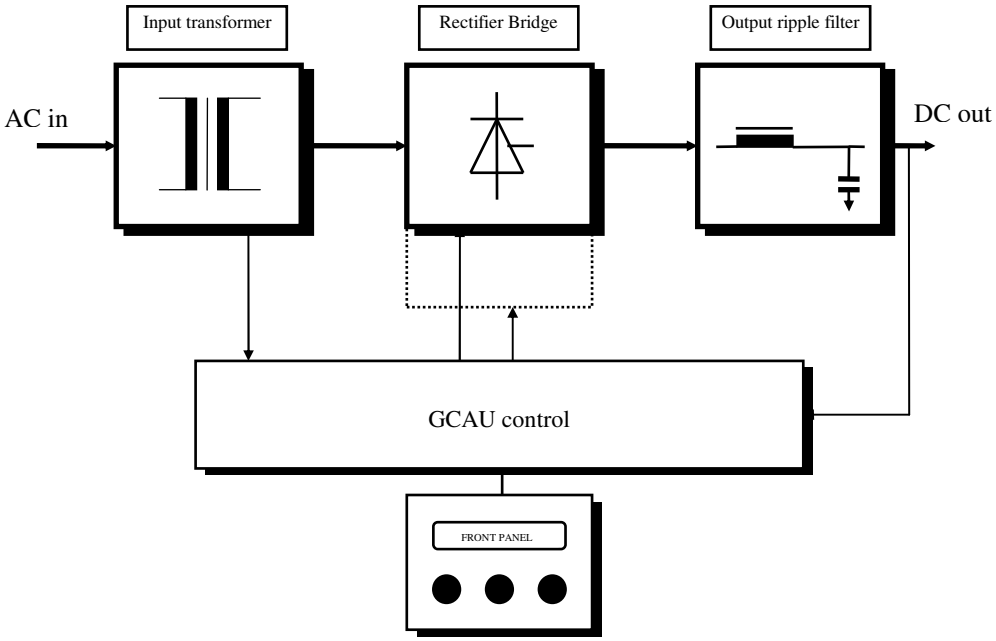


The battery immediately substitutes for the charger in supplying the load (Ild).

6. PRINCIPLE OF OPERATION

The range of battery chargers are designed to supply a constant DC power to any critical load.
The standard range of battery chargers offer a complete control and monitoring system to ensure proper operating status and uses a LCD screen of 16 characters and two lines to display all necessary information for the operator. Three user keys and two LED's allow the user to operate the battery charger using a menu structure and to indicate a fault condition. The single-phase battery charger is thyristor controlled and is designed to operate in constant voltage mode.

The battery charger consists of four basic blocks which are the input transformer, the rectifier bridge, the output filter, the GCAU control card and the front panel.



Block diagram

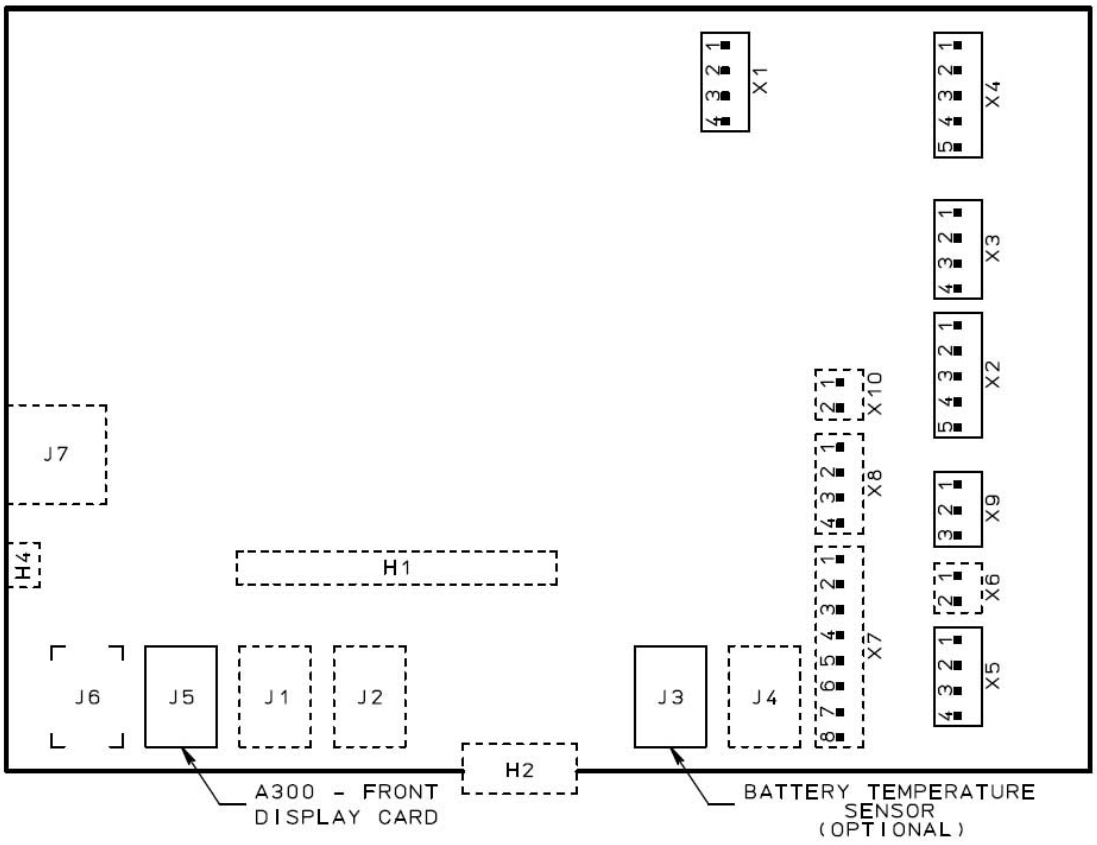
6.1. "GCAU" GENERIC CONTROL AND ALARM UNIT (A1)

This card has two dedicated microcontrollers, memory for the microcontroller and all necessary analogue interface circuits for measure and control. This card is mounted inside the cabinet.

The card consists of two major functional blocks:

- An **analogue** block providing the following main functions:
  . analogue signal (current and voltage) matching,
  . synchronisation for thyristor control,
  . power converter thyristor gate drive by electrically isolated pulses,
  . electronics power supply ,
  .analogue control signal 0-10V.

- A **digital** block with two micro controllers providing the following main functions:
  . analogue input (voltage, current and temperature) measurement,
  . digital input/output monitoring,
  . system operating and monitoring sequences controlled by a program stored in memory,
  . setpoint (reference) generation for the analogue regulators,
  . full digital control algorithm (separate micro controller),
  . serial communication for display unit,
  . on- board Flash memory and EEPROM.



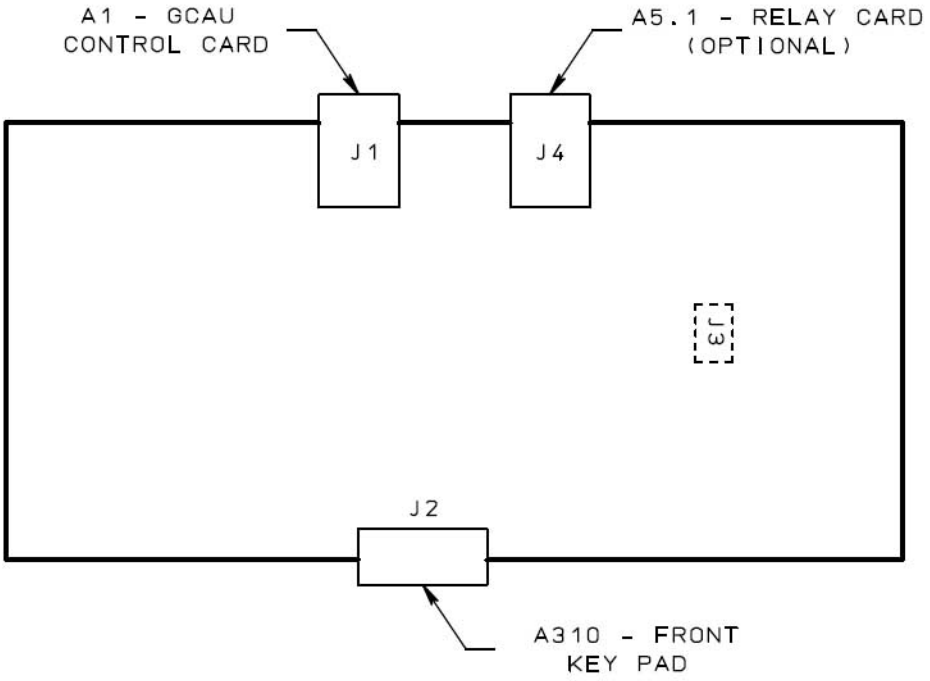
6.2. DISPLAY CARD (A300) AND KEYBOARD ASSEMBLY (A310)

The Display card is mounted on the front of the system and is controlled by the GCAU card. It is a plug-in device and is connected through RJ 4-4 connectors with a 4-wire cable. All data and necessary power supply voltages are transferred over this cable. The display is a 9mm character height two line by sixteen-character alpha numeric LCD with LED backlight.
The Keyboard is connected to the display unit, which decodes the three operating buttons and controls the two indicator LEDs.

.

The keyboard assembly has two LEDs indicators:

- Green LED: "System OK" (indicates proper operation).
- Red LED: "Fault" (a fault is present).



6.3. CHARGER MODES

The battery chargers are all equipped with two charge modes, Floating charge and Highrate charge. The floating mode is used for maintaining the battery in a charged condition (normal) and highrate mode recharges the battery to 100% using a higher charge voltage within a user adjustable programmed time. The float and highrate charge function can be initiated from the Cmnd menu structure on the front panel. Refer to the menu structure for this operation.

6.3.1. Floating & Highrate Voltage Settings

The SLRd battery charger has been factory set to the values specified on the order. These setting must be checked after battery charger setup to confirm they agree with the battery manufacturer's recommended values for the type of battery being used. Reviewing settings and adjustments can be made through the Confg menu structure.

NOTE
The battery manufacturer may recommend a single rate charge (no Highrate). In this case the Floating and Highrate settings should be adjusted to the same recommended single rate charge value.

NOTE
If the setting were not specified on the order, the following standard settings will be used**. THESE MUST BE CHANGED TO MATCH THE BATTERY**

24VDC Battery Chargers	Floating – 26.8VDC	Highrate – 27.0VDC
48VDC Battery Chargers	Floating – 53.5VDC	Highrate – 54.0VDC
120VDC Battery Chargers	Floating – 133.8VDC	Highrate – 135.0VDC

6.3.2. Manual Highrate Charge

Manual highrate charge is initiated using the key path and the Cmnd menu structure. When activated the battery charger will switch to a higher DC level. It is indicated on the LCD with the text HIGHRATE CHARGE. All highrate length of time is controlled by an internal programmable timer and switches back to float charge automatically when this time elapses. The timer can be adjusted in the Config menu structure after the password has been entered. The factory set value is 10 hours but can be adjusted from 0 to 99 hours. The time remaining on the highrate timer is shown in the Monit menu structure. The manual highrate charge can be cancelled through the Cmnd menu structure.

6.3.3. Automatic Highrate Charge Modes Options (If Ordered)

Auto on CL Mode (If Ordered)

This mode automatically activates highrate charge when the battery charger enters current limit. The time that the battery charger is in current limit before activating highrate can also be adjusted. If enabled, the factory setting is 36 seconds. Adjustment range is 1 to 255 seconds.

Timer Mode Setting

This determines how the current limit mode highrate functions. The Post setting requires that the battery charger come out of current limit before the highrate timer begins its time cycle. This is the factory setting. The Direct setting causes the highrate timer to start the time cycle immediately upon current limit.

Auto on MF (If Ordered)

This mode automatically activates highrate charge when the AC mains input is removed and begins the charge cycle once the AC mains returns. The length of time that the mains has to be removed before highrate is activated, can be adjusted between 1 and 255 seconds. If enabled, the factory setting is 10 seconds.

Periodic (If Ordered)

This mode automatically activates a highrate cycle once per the period set. The factory default setting (if enabled) is 1 month but is adjustable to 12 months.

6.4. COMBINED ALARM AND STATUS MONITOR – CASM

The SLRd battery charger is supplied with a complete monitoring and annunciation system. The alarms are configurable to provide the user with a system that meets their requirements. LCD indication and group alarm contacts are provided with individual alarm contacts available as an option.

6.4.1. Connecting Common/Group Alarm Contacts

The Combined Alarm and Status Monitor (CASM) provides group summary alarm relay contacts. These are dry contacts in form C format, normally open (NO) – common (C) – normally closed (NC). These contacts are rated 250VAC @ 2A resistive, 24VDC @ 2A resistive or 150VDC @ 0.1A resistive.

Grouped Alarms

- AC Mains Failure (High AC Mains + Low AC Mains)
- Charger Fault
- High DC Volts
- Low DC volts
- Ground Fault + (Positive)
- Ground Fault – (Negative)
- High DC Volts Shutdown
- Battery Discharged

Alarm connections

- TB1-5 Common alarm normally open contact (NO) in the alarm condition
- TB1-6 Common alarm common point (C)
- TB1-7 Common alarm normally closed contact (NC) in the alarm position

6.4.2. Alarm Settings

The table below lists the standard alarms and factory settings available on the SLRd battery charger. Adjustments can be made through the Confg menu structure.

Function	Allows the user to enable or disable the alarm
Limit	Allows the user to adjust the alarm activation point. The reset point (increase or decrease depending on alarm type) is 3 % of the set value and is not adjustable.
Delay	Allows the user to set the length of time required for the alarm to be registered. If the alarm appears and clears before this time expires, the alarm will not be registered.

LCD	Allows the user the option of having to manually reset the text portion (display) of the alarm. When set to latch, the alarm condition will be displayed after the alarm has cleared.
Relay	Applies to the optional relay card only. Allows the user the option of having to manually reset the relay contacts of the alarm. When set to latch, the alarm contacts indicate an alarm condition after the alarm has cleared. The standard common alarm contacts are nonlatched.
Shutdown	Allows the user to control the operation of the battery charger when the alarm is activated (where available).
In Common	Allows the user control over which alarms are grouped into the standard common remote alarm relay.

6.4.3. Ground Fault Alarm

The ground fault alarm limit is expressed in impedance (Kohms). The default setting is 100 ohms per volt based on battery charger nominal DC voltage. The leakage current corresponding to the set point can be calculated by the following formula:
DC Voltage / Set point (Kohms) = alarm activating leakage current (mA).

Certain battery installations require that the battery be grounded. For these installations the ground fault alarm will be permanently activated and should be disabled.

Additional ground fault circuits connected to the battery can also interact with each other causing a ground fault alarm. In this case additional detectors should be removed leaving only one monitor.

The ground fault alarm can be turned off by changing the function to off through the Confg menu structure.

SLRd Alarm Table

Alarm	Function	Limit			Delay Seconds	LCD	Relay	Shutdown	In Common
		120VAC	208VAC	240VAC					
High Mains Volts	[alarm] / off	[132.0] / 90.0 - 700	[228.8] / 90.0 - 700	[264.0] / 90.0 - 700	[4] / 0 - 14400	[Latch] / Nonlatch	[Nonlatch] / Latch	[No] / Yes	[Yes] / No
Low Mains Volts	[alarm] / off	[108.0] / 90.0 - 700	[187.2] / 90.0 - 700	[216.0] / 90.0 - 700	[4] / 0 - 14400	[Latch] / Nonlatch	[Nonlatch] / Latch	[No] / Yes	[Yes] / No
Alarm	**Function**	**Limit**			**Delay Seconds**	**LCD**	**Relay**	**Shutdown**	**In Common**
		24VDC	**48VDC**	**120VDC**					
Charger Fault	[alarm] / off	**N/A**	**N/A**	**N/A**	[4] / 0 - 14400	[Latch] / Nonlatch	[Nonlatch] / Latch	[No] / Yes	[Yes] / No
High DC Volts Shutdown	[alarm] / off	[***] / 12.0 - 35.0	[***] / 20.0 - 65.0	[***] / 70.0 - 160.0	[60] / 0 - 14400	[Latch] / Nonlatch	[Nonlatch] / Latch	[Yes] / No	[Yes] / No
Battery Discharged	[alarm] / off	[****] / 12.0 - 35.0	[****] / 20.0 - 65.0	[****] / 70.0 - 160.0	[4] / 0 - 14400	[Latch] / Nonlatch	[Nonlatch] / Latch	**N/A**	[Yes] / No
High DC Volts	[alarm] / off	[*] / 12.0 - 35.0	[*] / 20.0 - 65.0	[*] / 70.0 - 160.0	[4] / 0 - 14400	[Latch] / Nonlatch	[Nonlatch] / Latch	[No] / Yes	[Yes] / No
Low DC Volts	[alarm] / off	[**] / 12.0 - 35.0	[**] / 20.0 - 65.0	[**] / 70.0 - 160.0	[4] / 0 - 14400	[Latch] / Nonlatch	[Nonlatch] / Latch	**N/A**	[Yes] / No
Ground Fault +	[alarm] / off	[2.4] / 0.0K - 500K	[4.8] / 0.0K - 500K	[12.0] / 0.0K - 500K	[4] / 0 - 14400	[Latch] / Nonlatch	[Nonlatch] / Latch	[No] / Yes	[Yes] / No
Ground Fault -	[alarm] / off	[2.4] / 0.0K - 500K	[4.8] / 0.0K - 500K	[12.0] / 0.0K - 500K	[4] / 0 - 14400	[Latch] / Nonlatch	[Nonlatch] / Latch	[No] / Yes	[Yes] / No

[ ] / xx - Default setting / adjustment range
N/A - Not Available
***** - Factory setting based on specified Highrate setting (+ 5%)
****** - Factory setting based on specified Float setting (- 5%)
******* - Factory setting based on specified Highrate setting (+ 10%)
******** - Factory setting based on specified Float setting (- 20%)

6.5. BATTERY COMPENSATION OPTION

The SLRd battery chargers can sense the temperature at battery bank and compensate the floating or the highrate voltage based on this temperature. As the temperature increases the battery chargers output voltage is decreased and a decrease in temperature causes an increase in output voltage. This provides correct maintaining/recharge voltage to the battery. The sensor is located in a plastic housing and can be mounted on a cell interconnecting link close to the centre of the battery bank. The connection from sensor to GCAU card inside the battery charger is a 4 wire telephone cable (specify length when ordering this option).

The compensation setting can be accessed through the Confg menu structure under Regulation compensation. The value is specified in a percentage. The value entered will adjust the set floating and highrate voltages by that percentage for each 1.8 degrees of temperature change. The temperature scale is factory set to Fahrenheit but can be changed to Celsius through the Confg menu structure under Meter Selection. The factory setting (if enabled) is 0.22% and is adjustable from 0.00% to 0.50%.
Example.
Actual output voltage (with **increase** in temperature from 68 degrees F) =
[set Voltage] – ([set voltage] x [set value%] / 100) x (batt. Temp ^{o} F – 68 ^{o} F) / 1.8

Actual output voltage (with **decrease** in temperature from 68 degrees F) =
[set Voltage] + ([set voltage] x [set value%] / 100) x (68 ^{o} F - batt. Temp ^{o} F) / 1.8

NOTE
When the Temperature Compensation option is enabled, the Floating and Highrate voltages that are entered in the Confg menu structure are the values at 68 Degrees F (20 degrees C). The actual battery charger output voltages may be at different values based on battery bank temperature.

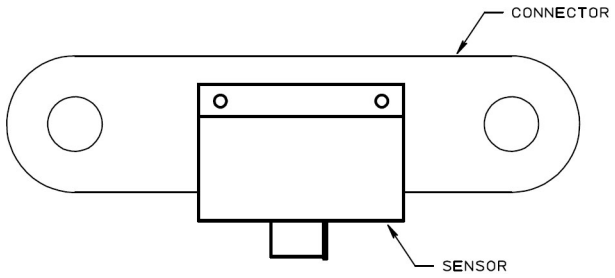
NOTE
Since both the Temperature Compensation option and Load sharing option modify the battery charger output voltage, the combination of these options will limit their effectiveness.

6.5.1. Connecting The Temperature Sensor

CAUTION: CHARGED CELLS CONTAIN STORED ENERGY AND CARE MUST BE EXERCISED WHEN USING ANY METAL TOOLS AROUND THE BATTERY TO AVOID SHORTING.

The sensor provided gives a negative coefficient resistance proportional to the temperature of the battery it is mounted on. The sensor should be mounted and wired as follows:

1. Choose an inter-cell connector on a battery cell located approx. in the middle of the battery bank.
2. Drill two holes 0.98 inches (25 mm) apart approximately in the middle of the connector, using a #43 drill bit.
3. Mount the sensor on the connector with the plug-in terminals facing away from the battery bank using the #4 self-tapping screws.
4. Connect the cable assembly (telephone type) of sufficient length from the sensor to the battery charger main control board connector J3. This cable must be routed away from all power wiring.
5. Ensure that the temperature sensor housing is coated entirely with a silicon rubber compound (Type Dow Corning #738 or #314 or equivalent) after installation.



6.6. LOAD SHARING OPTION *("DROOP" FACTOR)*

This option allows two SLRd battery chargers of the same rating connected in parallel to share the load current. This load sharing is passive and requires no interconnection signals between the two battery chargers removing any possibility of negative return issues.
Load sharing is accomplished by applying a "droop factor" to each battery charger's output voltage. As the output current increases, the output voltage drops. This will cause the battery charger with less output current to assume more of the load current due to its higher voltage until the currents and voltages of each battery charger are balanced. The set droop value will cause the output voltage to be reduced by that percentage at the battery chargers full output current rating. At half the output current rating the output voltage would be reduced by half the set percentage.
When enabled, the droop factor is factory set to 2% and adjustable from 0.0% to 2.0%.

NOTE
Since both the Temperature Compensation option and Load sharing option modify the battery charger output voltage, the combination of these options will limit their effectiveness.

6.7. *CASM INDIVIDUAL REMOTE RELAY CARD (A5.1) OPTION*

Relay card A5.1 provides remote signalling of individual alarms. Each card has eight relays. Each relay provides one normally open and one normally closed contact connected to a common point (Form C type). Standard alarm setups and user programming are described in the Alarm section.

6.7.1. Connecting To The CASM Individual Remote Relay Card

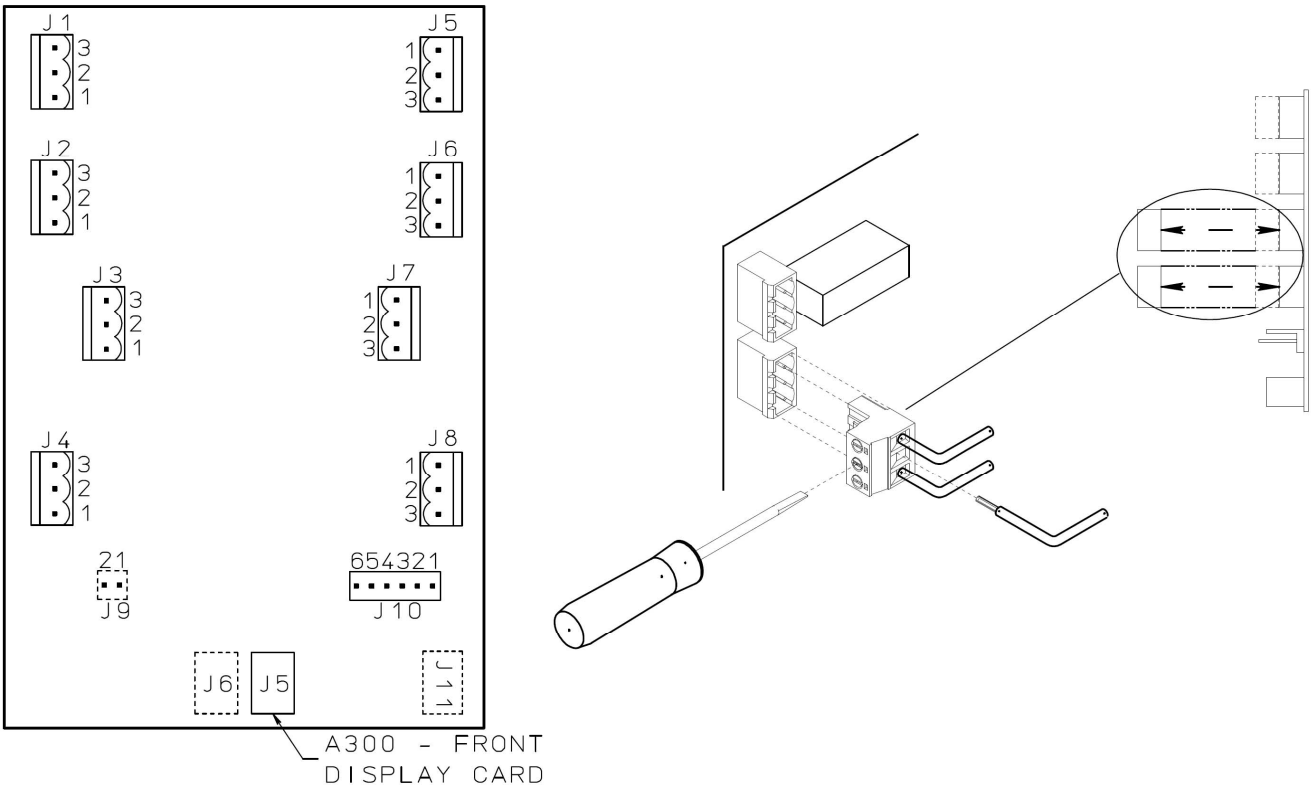
The CASM (Combined Alarm and Status Monitor) provides signals to activate individual alarm relay contacts on the Remote Relay Card. These are dry contacts in form C format, normally open (NO) – common (C) – normally closed (NC). These contacts are rated 250VAC @ 2A resistive, 24VDC @ 2A resistive or 150VDC @ 0.1A resistive.

Individual Alarms

• AC Mains Failure	Terminal Block J1	Relay K1
• Charger Fault	Terminal Block J2	Relay K2
• High DC Volts	Terminal Block J3	Relay K3
• Low DC Volts	Terminal Block J4	Relay K4
• Ground Fault + (Positive)	Terminal Block J5	Relay K5
• Ground Fault – (Negative)	Terminal Block J6	Relay K6
• High DC Volts Shutdown	Terminal Block J7	Relay K7
• Battery Discharged	Terminal Block J8	Relay K8

Terminal blocks J1 – J8 designations

- Position 1 is the common point (C)
- Position 2 is the normally open contact (NO) in the alarm condition
- Position 3 is the normally closed contact (NC) in the alarm position



6.8. AC VOLTMETER OPTION

As standard, load voltage and current are displayed in the Monit menu structure. If enabled, this option allows reading the mains AC input power supply in the measurements menu. Opening of the input circuit breaker will remove voltage from the meter.

7. SERVICING AND MAINTENANCE

The following chapter gives guidelines for tracing and solving problems related to the battery chargers.
Before going into the battery charger fault finding procedures verify the following:

Check that the input and output circuit breakers are closed
Check AC input voltage
Check the battery voltage polarity versus the battery charger polarity
Check the number of cells versus the battery charger settings
Verify all cable connections are secured
Verify no damage is noticed to the components
Check all auxiliary fuses

If a board is to be replaced, it is absolutely necessary that the parameters are identical in the new board.

WARNING*:* DO NOT OPERATE THE BATTERY CHARGER WHEN THE BOARD DOES NOT CONTAIN THE CORRECT PARAMETERS OR WHEN IN DOUBT ABOUT THE CONTENT. PLEASE CONTACT FACTORY.

Carefully use the procedures written hereafter. If in doubt, contact your sales representative.

7.1. TROUBLESHOOTING

Fault	***No***	***Probable cause***
Battery charger does not start	1	AC input voltage and/or Bad connection(s)
Battery charger starts but when current is delivered, it shuts down.	1 2	If the system is powered from a generator, the frequency or voltage fluctuations can cause a shutdown of the battery charger. Shutdown is caused by a high DC voltage detection or battery charger failure. Refer to these fault finding procedures
Battery charger works but key-board does not function	1	Verify the keyboard and display connections to the GCAU card (backside of the front panel and inside wall of cabinet)
After switch on the input AC breaker trips Immediately	 1 2 3 4	***Note:*** This is a major system fault. Disconnect all voltage sources and verify the following: Check the input voltage matches the input rating of battery charger Check the thyristors for shorts following the procedure below: The resistance between cathode and anode, and visa versa, should be several Mega ohms. The resistance between the cathode and gate, and visa versa, lies between 15 and 40 ohms. Replace faulty thyristors if necessary Check the freewheeling diode for shorts. Replace if necessary Disconnect the gate wiring of the thyristors and restart the battery charger. If the AC breaker does not trip, replace the GCAU card.
After switch on, the output DC breaker trips Immediately	1 2	Disconnect the power and verify the shunt wiring of the battery charger. Check the connection between the shunt and the GCAU card. The probable cause is malfunction of the GCAU card or a wrong current setting in the system set-up. Verify the current setting and replace the GCAU if necessary.
After switch on the battery charger operates in the current limit and no output voltage is present.	1 2	Switch off the unit and check the load and/or battery cables for short circuits. Switch off the unit and check the filter capacitors for shorts. replace if necessary.

Fault	*No*	*Probable cause*
Battery charger output voltage is unstable.	1	Verify that the input voltage is stable and that the mains supply VA rating matches the VA rating of the battery charger. As a rule of thumb, the available input VA rating must be higher than or equal too, three times the battery charger VA rating. (input voltage x input current)
	2	Verify the mains frequency is stable. If the frequency changes due to high inrush currents of other equipment, the battery chargers are constantly regulating resulting in an unstable output voltage. This especially true when using generator sets with low VA ratings compared to the rectifier VA rating.
Battery charger operates in current limit continuously	1	Check the load current versus the maximum output current of the battery charger. Decrease the load if necessary.
	2	Check the number of connected cells versus the charger settings
	3	Verify the float voltage. Allow the battery charger voltage to reach the specified floating voltage, if the measured voltage is lower than the specified float level.
	4	Check the battery cells for shorts by measuring all cell voltages.
Battery charger output voltage drops when load is increased and the system does not operate in current limit.	1	If the battery charger operates in highrate charge with a lower than 10% input voltage, the highrate voltage may decrease as load is increased. Verify that the AC input voltage does not deviate below -10%.
	2	Check the secondary transformer voltage
The alarm Charger Fault is displayed	1	If the battery charger current is higher than 110% of the setting the alarm is activated. Check the current limit of the system.
	2	If the output voltage is lower than 5% of the actual floating voltage provided the system does not operate in the current limit, this alarm is activated.
	3	Confirm that the DC breaker is closed. Check AC input Voltage Confirm the floating voltage using a digital voltmeter according to the settings.
	4	If none of the above checks solves the problem, the probable cause could be the malfunction of the GCAU card. Replace the card if necessary.
The alarms HIGH DC VOLTS or HIGH DC VOLTS SHUTDOWN is displayed		These alarms are activated if the load voltage is higher than the adjusted value.
	1	Verify the setting in the alarm set-up
	2	Verify the float/highrate voltage setting. Correct the setting if necessary.

Fault	*No*	*Probable cause*
The alarm LOW DC VOLTS or BATTERY DISCHARGED is displayed	1	The system is on emergency operation. The alarm indicates that you are discharging the battery. Take the necessary precautions before the autonomy of the battery has elapsed. Verify AC input.
	2	Verify the setting of the alarm in the alarm set-up. Correct the setting if necessary.
The alarm EARTH FAULT + or EARTH FAULT - is displayed	1	The impedance between earth and the positive or negative of the DC output is less than 100 ohms per system volt (default value). Verify the equipment connected to the DC output for any earth-leakage. The detection level of this alarm can be adjusted in the alarm set-up.
	2	Check for insulation breakdown or electrolyte leakage Check for other ground fault monitoring circuits.
The alarm MAINS FAILURE is displayed	1	The mains failure alarm is a combined low and high detection. Normally it is adjusted to + and - 10% of the nominal input voltage.
	2	Verify AC input breaker is closed Check AC input voltage Verify the setting using in the alarm set-up. If necessary, correct the setting. Note that at voltages below 50%, the battery charger is automatically inhibited.

7.2. BATTERY CHARGER MAINTENANCE

Electronic boards are sensitive to E.S.D. (electrostatic discharge). When they are not installed in the equipment, keep them in antistatic bags.

Before handling a board, maintenance personnel must manage to be at the same potential as the equipment to be worked on and take all customary precautions.

At regular intervals, carry out an inspection including the following:

- Remove dust at yearly intervals.
- Disconnect the mains input line and the battery.
- Examine the components and the wiring. Pay special attention to the signs of overheating and melted insulation. Check all connections. Check for loose wires.
- Check that the cooling air flow is not impeded.
- Check the operation of the battery charger and the voltage levels

7.3. BATTERY MAINTENANCE

For the recommended battery maintenance procedures, refer to the battery manufacturer's manual.

7.4. CUSTOMER SERVICE

If the troubleshooting procedure fails to fix your problem, contact the factory
The following after sales services are available, please contact your nearest factory representative for:

- Repair
- Supply of spare parts
- Preventive maintenance.
- User training
- Round-the-clock emergency service

Please include your model and serial number with correspondence.

8. SPARE PARTS LIST

Item	A1	A300	A5.1	F1	F2	BA			D10		C1				C2			
Part # / Model #	4111-66-12484-01	BPF003010000	BPF003020000	3281-66-01099-20	3281-66-01099-20	3541-66-50232-02	3541-66-50233-02	3541-66-50236-02	3512-66-00509-08	3512-66-03606-04	3360-66-03109-06	3360-66-03109-08	3360-66-03109-24	3360-66-03109-50	3360-66-03109-06	3360-66-03109-08	3360-66-03109-24	3360-66-03109-50
SLRd24-6F	1	1	1*	1	1	1	-	-	1	-	-	-	1	-	-	-	-	-
SLRd24-6FE	1	1	1*	1	1	1	-	-	1	-	-	-	1	-	-	-	1	-
SLRd24-12F	1	1	1*	1	1	1	-	-	1	-	-	-	1	-	-	-	-	-
SLRd24-12FE	1	1	1*	1	1	1	-	-	1	-	-	-	1	-	-	-	1	-
SLRd24-16F	1	1	1*	1	1	1	-	-	1	-	-	-	1	-	-	-	-	-
SLRd24-16FE	1	1	1*	1	1	1	-	-	1	-	-	-	1	-	-	-	1	-
SLRd24-20F	1	1	1*	1	1	1	-	-	1	-	-	-	1	-	-	-	-	-
SLRd24-20FE	1	1	1*	1	1	1	-	-	1	-	-	-	1	-	-	-	1	-
SLRd24-25F	1	1	1*	1	1	1	-	-	1	-	-	-	-	1	-	-	-	-
SLRd24-25FE	1	1	1*	1	1	1	-	-	1	-	-	-	-	1	-	-	1	-
SLRd24-30F	1	1	1*	1	1	1	-	-	1	-	-	-	-	1	-	-	-	-
SLRd24-30FE	1	1	1*	1	1	1	-	-	1	-	-	-	-	1	-	-	1	-
SLRd24-40F	1	1	1*	1	1	-	1	-	-	1	-	-	-	2	-	-	-	-
SLRd24-40FE	1	1	1*	1	1	-	1	-	-	1	-	-	-	2	-	-	-	1
SLRd24-50F	1	1	1*	1	1	-	1	-	-	1	-	-	-	2	-	-	-	-
SLRd24-50FE	1	1	1*	1	1	-	1	-	-	1	-	-	-	2	-	-	-	1
SLRd48-6F	1	1	1*	1	1	-	-	1	1	-	-	1	-	-	-	-	-	-
SLRd48-6FE	1	1	1*	1	1	-	-	1	1	-	-	1	-	-	-	1	-	-
SLRd48-12F	1	1	1*	1	1	-	-	1	1	-	-	1	-	-	-	-	-	-
SLRd48-12FE	1	1	1*	1	1	-	-	1	1	-	-	-	1	-	-	1	-	-
SLRd48-16F	1	1	1*	1	1	1	-	-	1	-	-	-	1	-	-	-	-	-
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SLRd120-12F	1	1	1*	1	1	-	-	1	1	-	1	-	-	-	-	-	-	-
SLRd120-12FE	1	1	1*	1	1	-	-	1	1	-	1	-	-	-	1	-	-	-
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SLRd120-16FE	1	1	1*	1	1	1	-	-	1	-	2	-	-	-	1	-	-	-
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SLRd120-25F	1	1	1*	1	1	1	-	-	1	-	2	-	-	-	-	-	-	-
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SLRd120-30FE	1	1	1*	1	1	1	-	-	1	-	3	-	-	-	1	-	-	-
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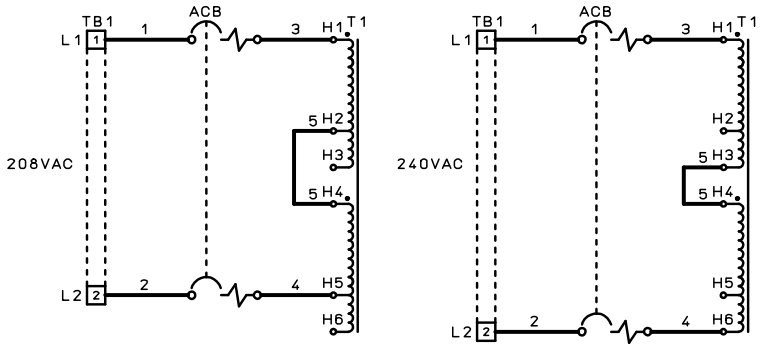
SLRd120-50F	1	1	1*	1	1	-	1	-	-	1	4	-	-	-	-	-	-	-
SLRd120-50FE	1	1	1*	1	1	-	1	-	-	1	5	-	-	-	1	-	-	-

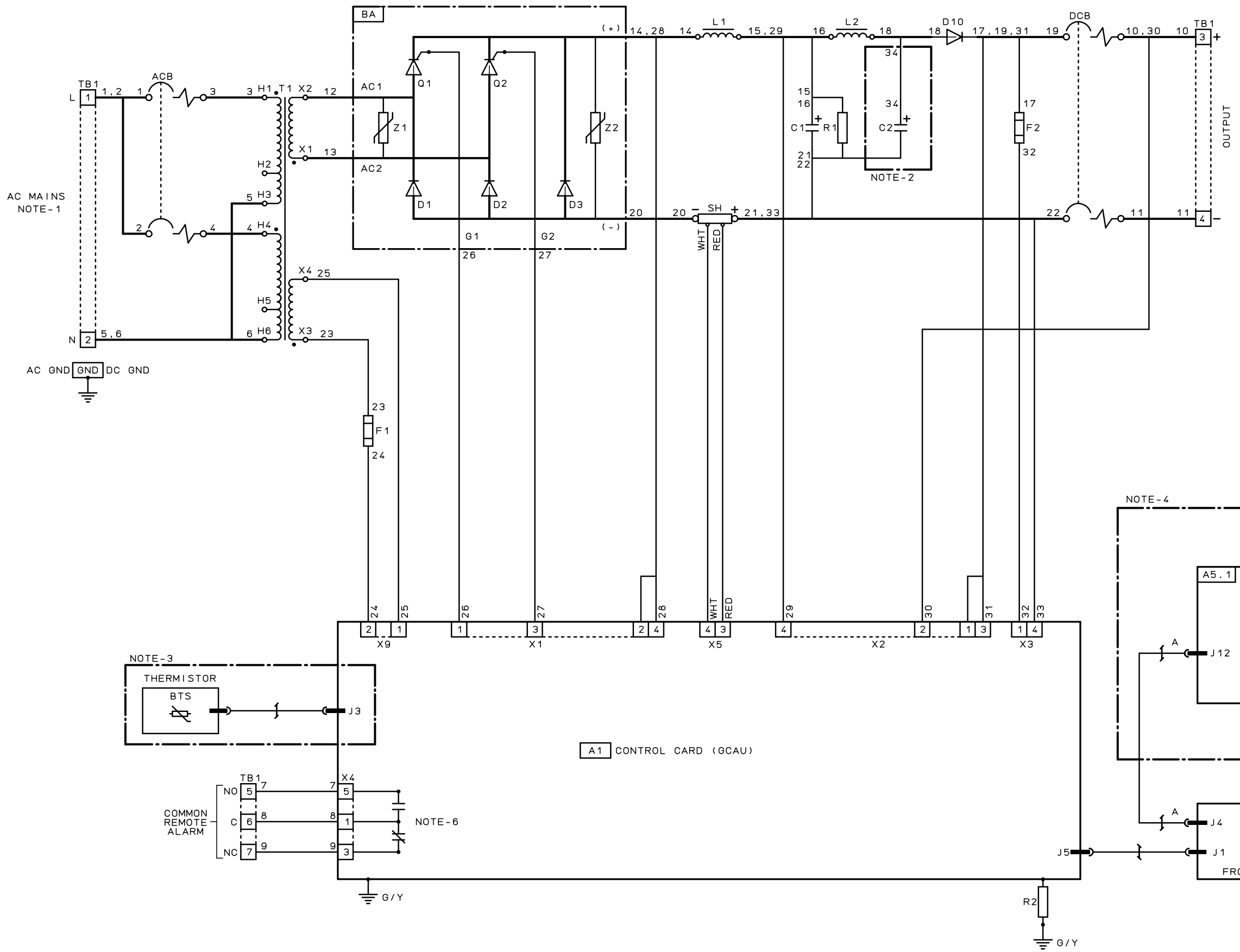
* - Only required for units with optional relay board selected.

NOTES

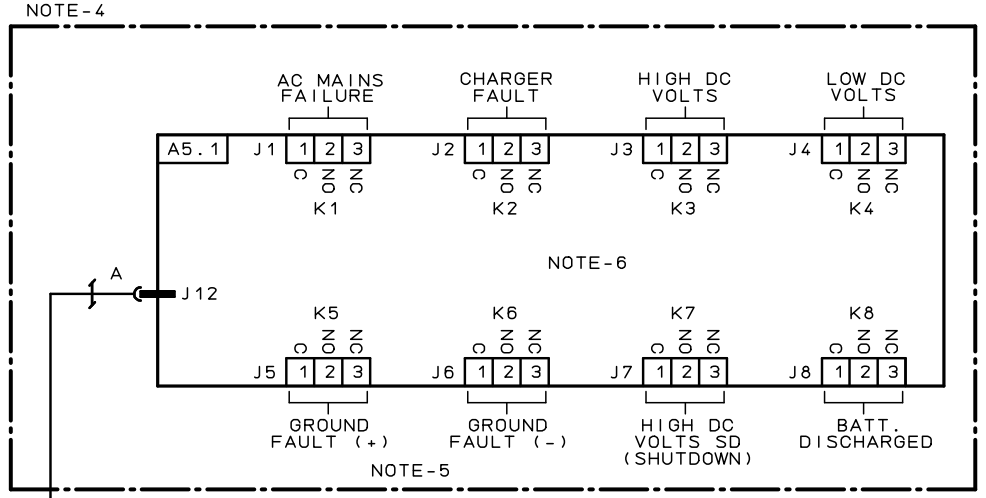
1. AC INPUT CONNECTION SHOWN IS FOR 120VAC. SEE BELOW FOR 208VAC AND 240VAC.



2. OPTIONAL BATTERY ELIMINATOR FILTER.
3. OPTIONAL BATTERY TEMPERATURE COMPENSATION.
4. OPTIONAL REMOTE RELAY CARD (8 RELAYS).
5. GROUND FAULT ALARMS CAN BE INHIBITED IF REQUIRED. REFER TO MANUAL.
6. CONTACTS ARE SHOWN IN THE ALARM CONDITION (RELAY DE-ENERGIZED).
   CONTACT RATINGS:
   AC: 250V 2A RES.
   DC: 24V 2A (OR 150V 0.1A) RES.



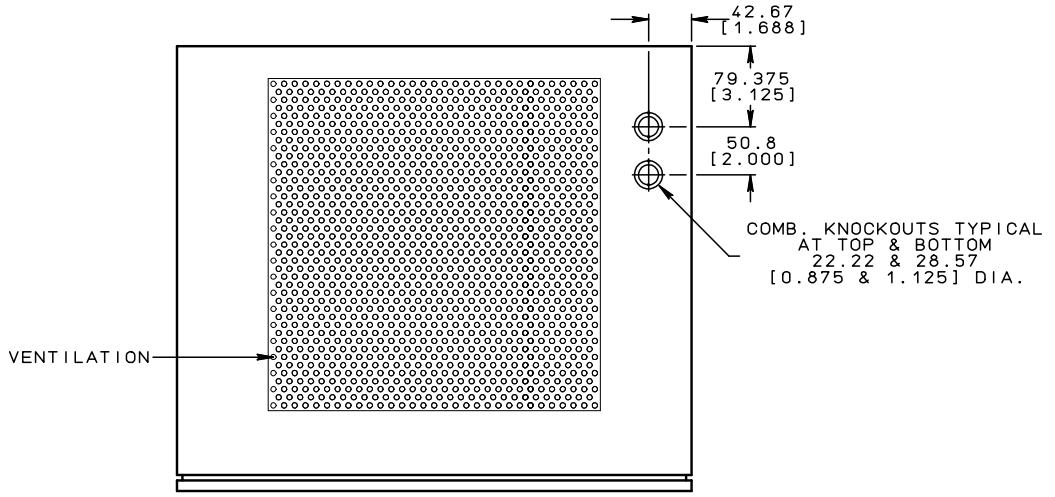
NOTE-4



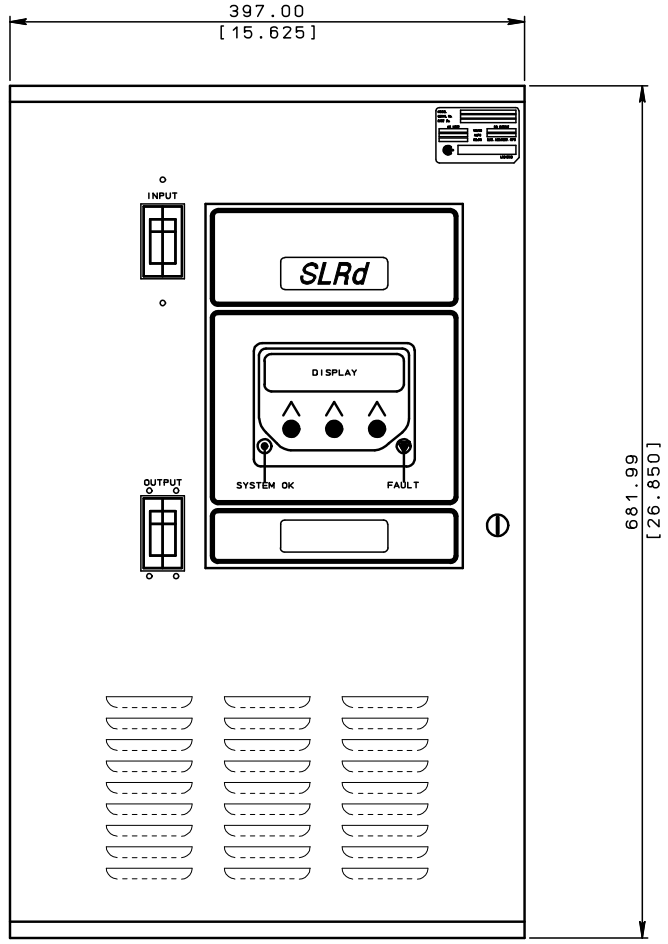
SCHEMATIC BATTERY CHARGER TYPE SLRd			
	TOL	DWN BY A.S.	CHKD BY A.S.
	SCALE	DATE 2006-05-04	APPR BY S.C.
DWG No 4725-65-73127-11	SHEET		REV 5

NOTES

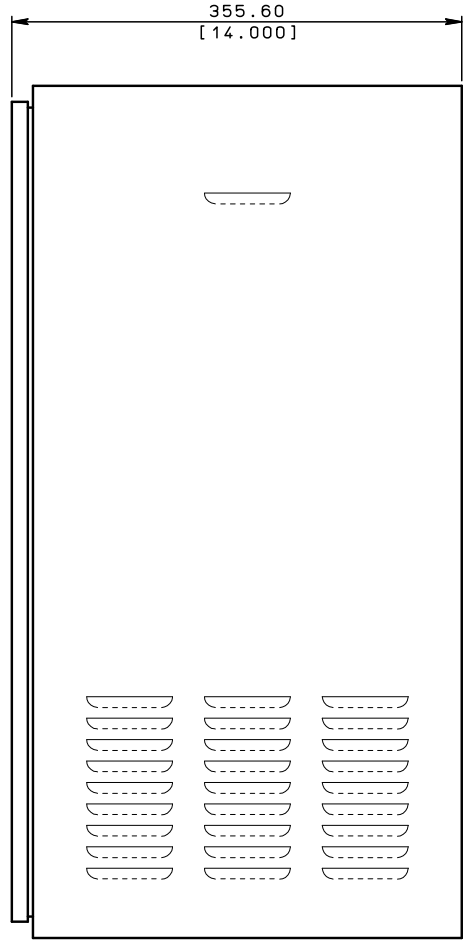
1. DIMENSIONS IN BRACKETS [ ] ARE IN INCHES.
2. COMPONENTS ACCESSIBLE FROM CABINET FRONT.
3. DOOR OPENING APPROXIMATELY 100°.
4. ALLOW 51.00mm [2.00] AT TOP AND 254.00mm [10.000] ON BOTH SIDE FOR PROPER VENTILATION.
5. MATERIAL: ENCLOSURE - 1.50mm [16GA] C.R.S.
   REAR PANEL - 2.50mm [12GA] C.R.S.
   DOOR - 1.50mm [16GA] C.R.S.
6. RELAY RACK CAN NOT BE COMBINED WITH DRIP CAP.
7. FINISH: ANSI 61 GREY.



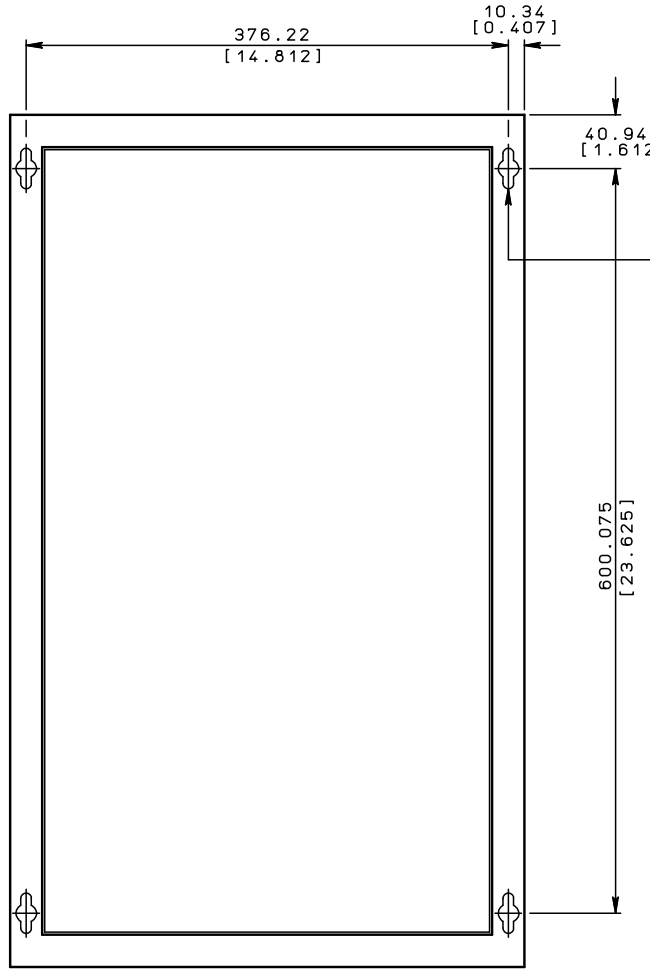
TOP VIEW



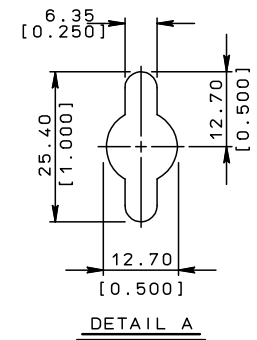
FRONT VIEW



SIDE VIEW



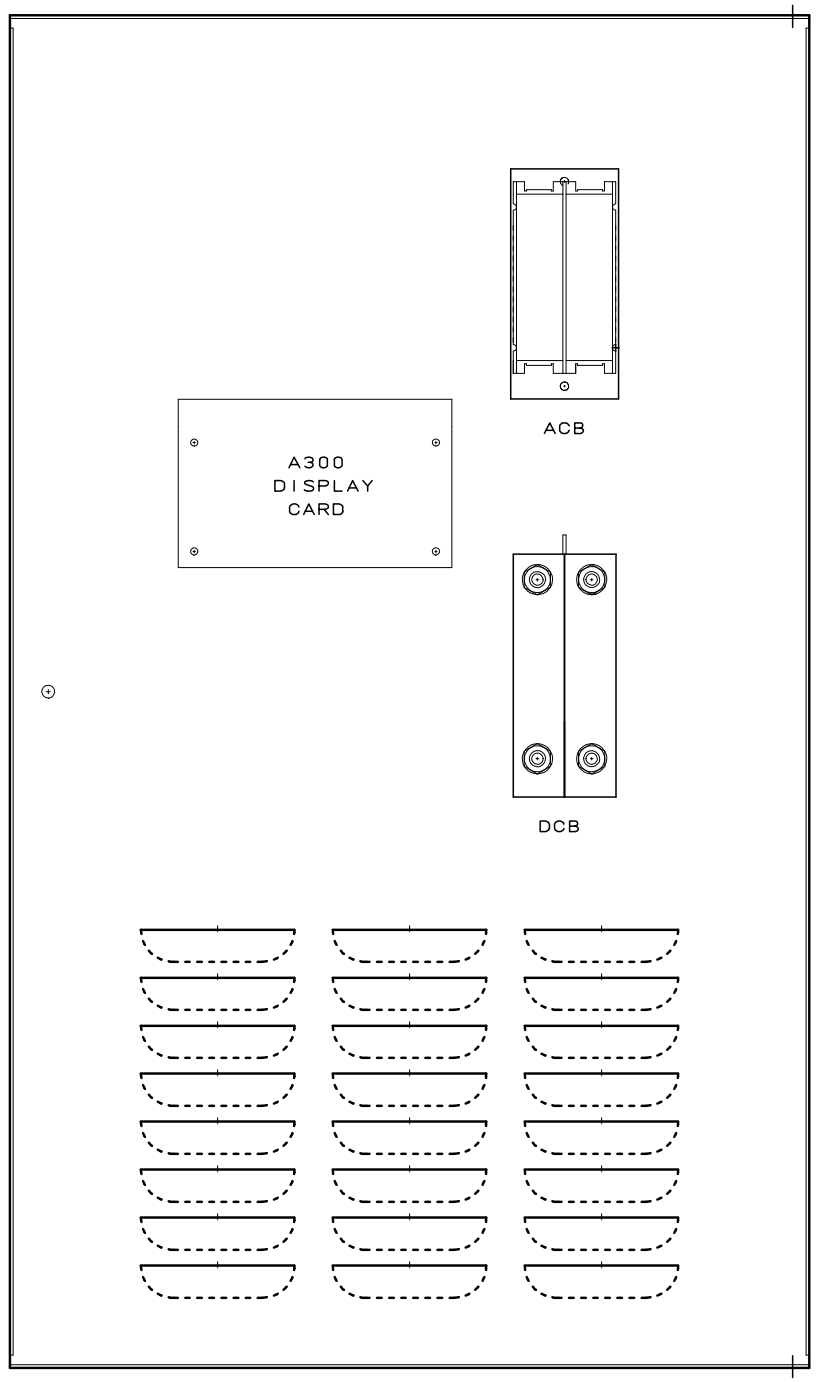
REAR VIEW



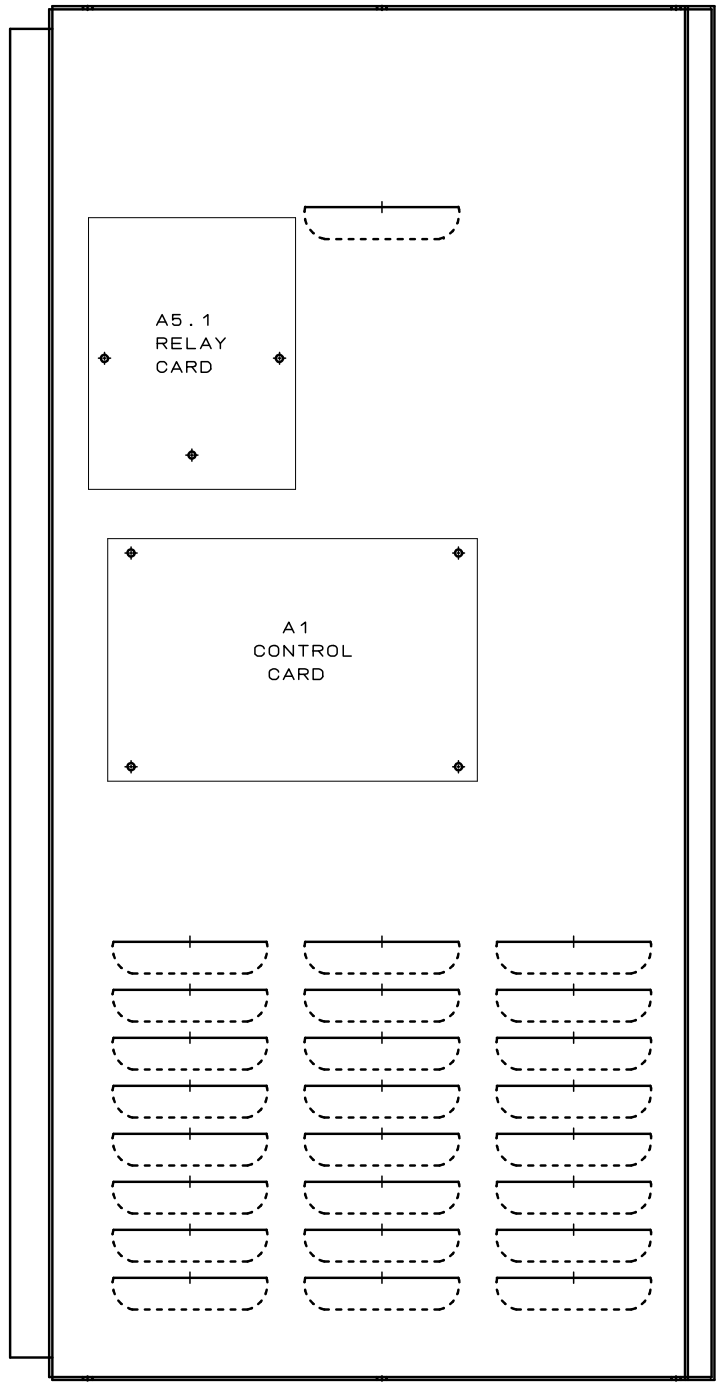
DETAIL A

CABINET OUTLINE
SLRd WALL MOUNT

	TOL +/- 1 mm	DWN BY S.C.	CHKD BY S.C.
	SCALE N.T.S.	DATE 2006-12-12	APPR BY D.S.
DWG No	2160-65-73072-81	SHEET	REV 0

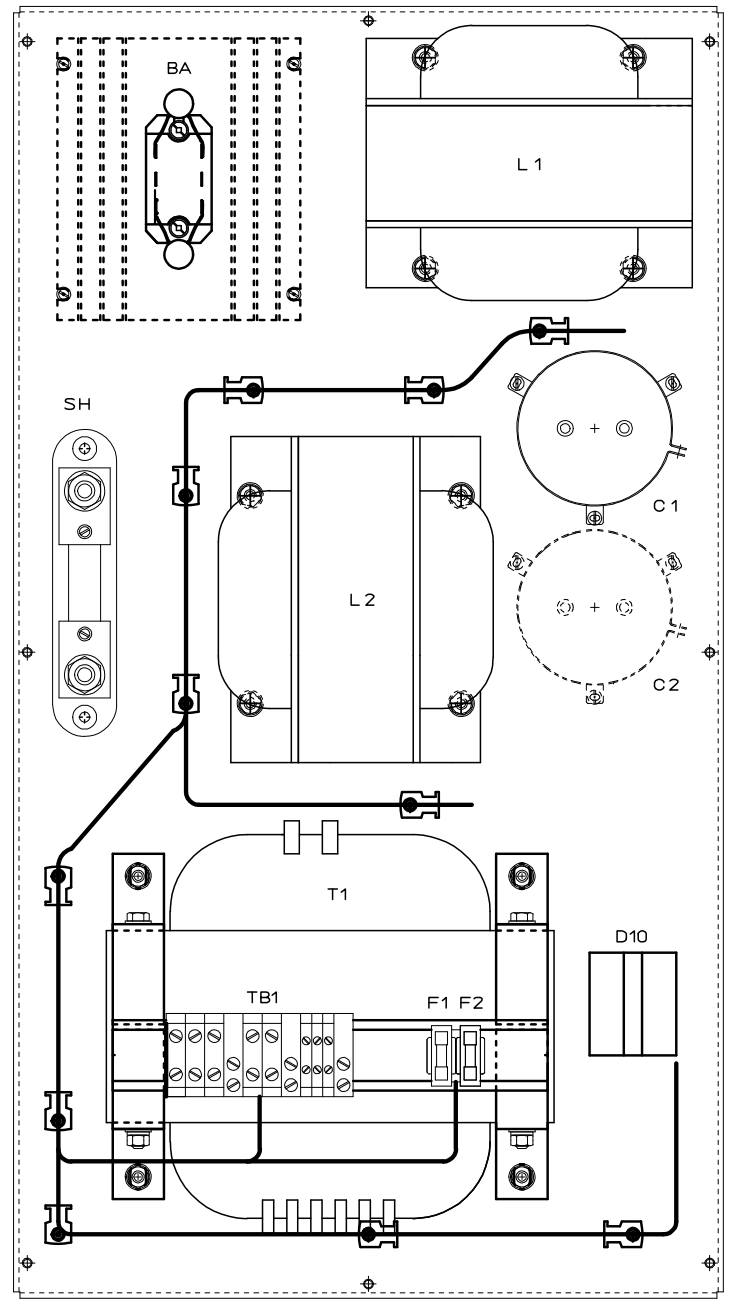


INSIDE OF DOOR



LEFT SIDE PANEL

C1/C2 QUANTITY AND LOCATION VARY BY MODEL AND FILTER TYPE.



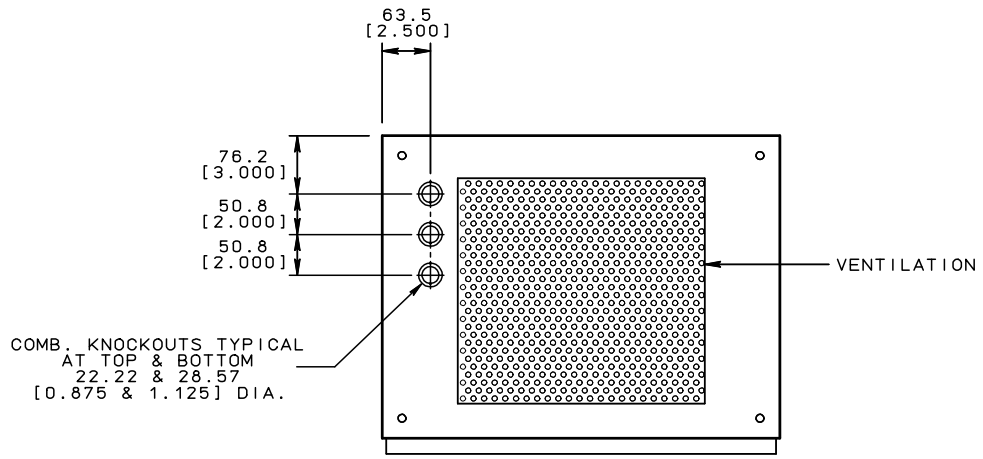
REAR PANEL

COMPONENT LAYOUT
SLRd WALL MOUNT

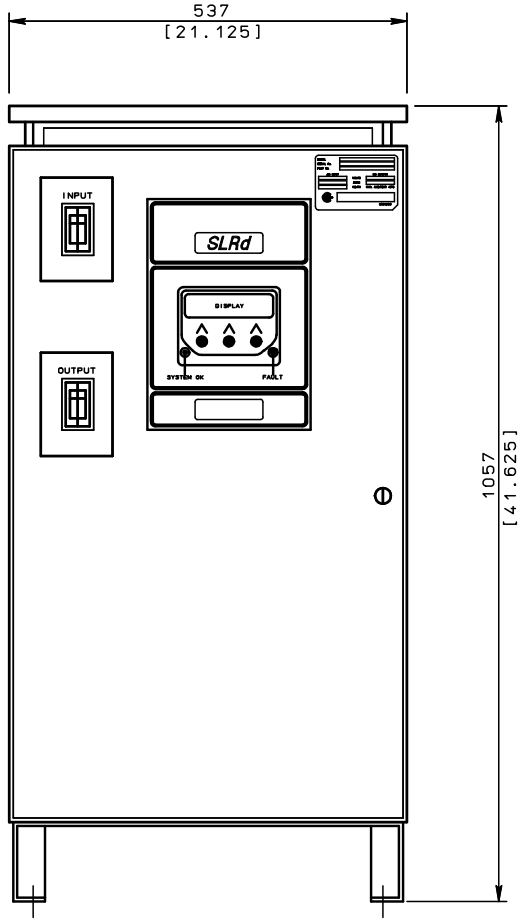
TOL N/A	DWN BY S.C.	CHKD BY S.C.	
SCALE N.T.S.	DATE 2006-12-12	APPR BY D.S.	
DWG No 2160-65-73072-82	SHEET	REV 0	

NOTES

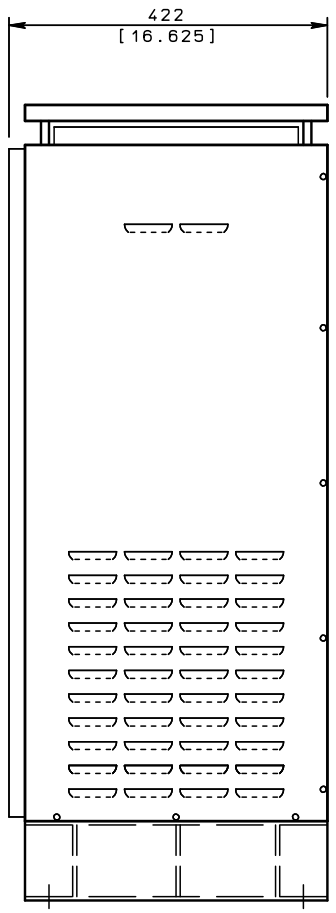
1. DIMENSIONS IN BRACKETS [ ] ARE IN INCHES.
2. COMPONENTS ACCESSIBLE FROM CABINET FRONT.
3. DOOR OPENING APPROXIMATELY 100°.
4. ALLOW 51.00mm [2.00] AT TOP AND 76.00mm [3.000] ON BOTH SIDE AND REAR FOR PROPER VENTILATION.
5. MATERIAL: ENCLOSURE - 1.50mm [16GA] C.R.S.
   REAR PANEL - 2.00mm [14GA] C.R.S.
   FEET - 2.50mm [12GA] C.R.S.
6. FINISH: ANSI 61 GREY.



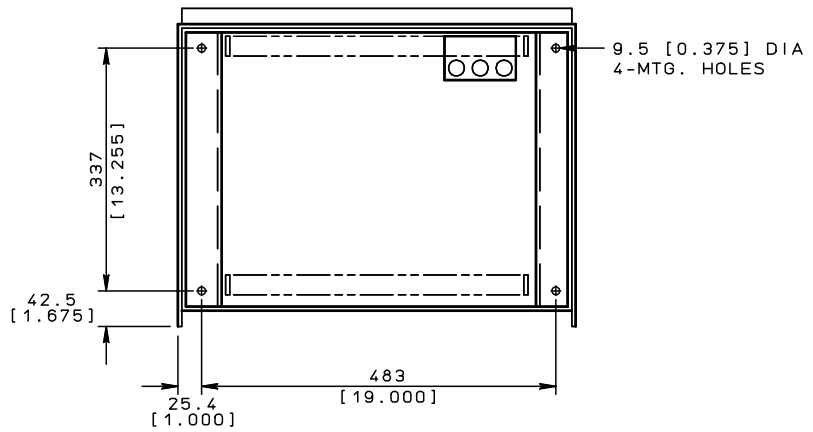
TOP VIEW



FRONT VIEW



SIDE VIEW



BOTTOM VIEW

CABINET OUTLINE
SLRd FLOOR MOUNT

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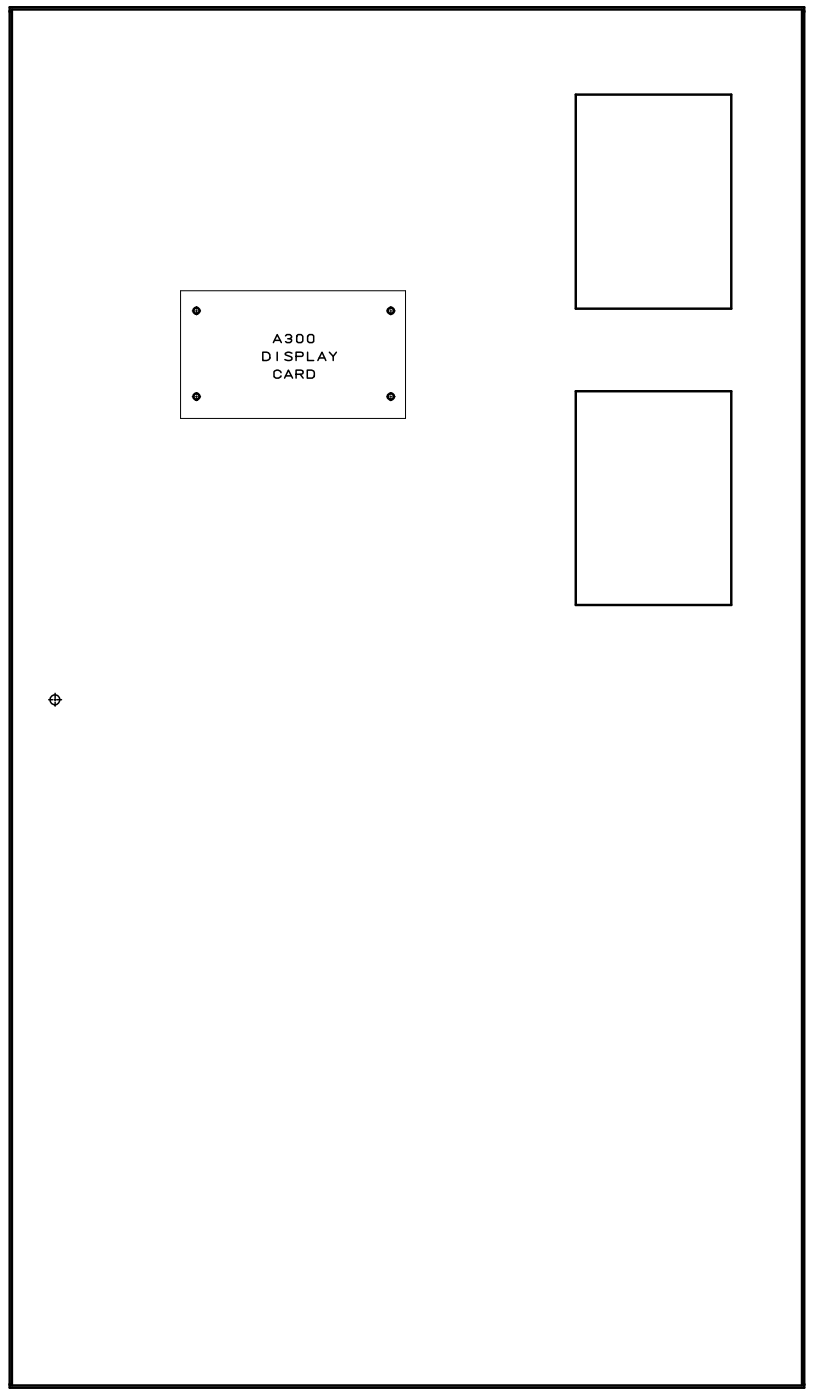
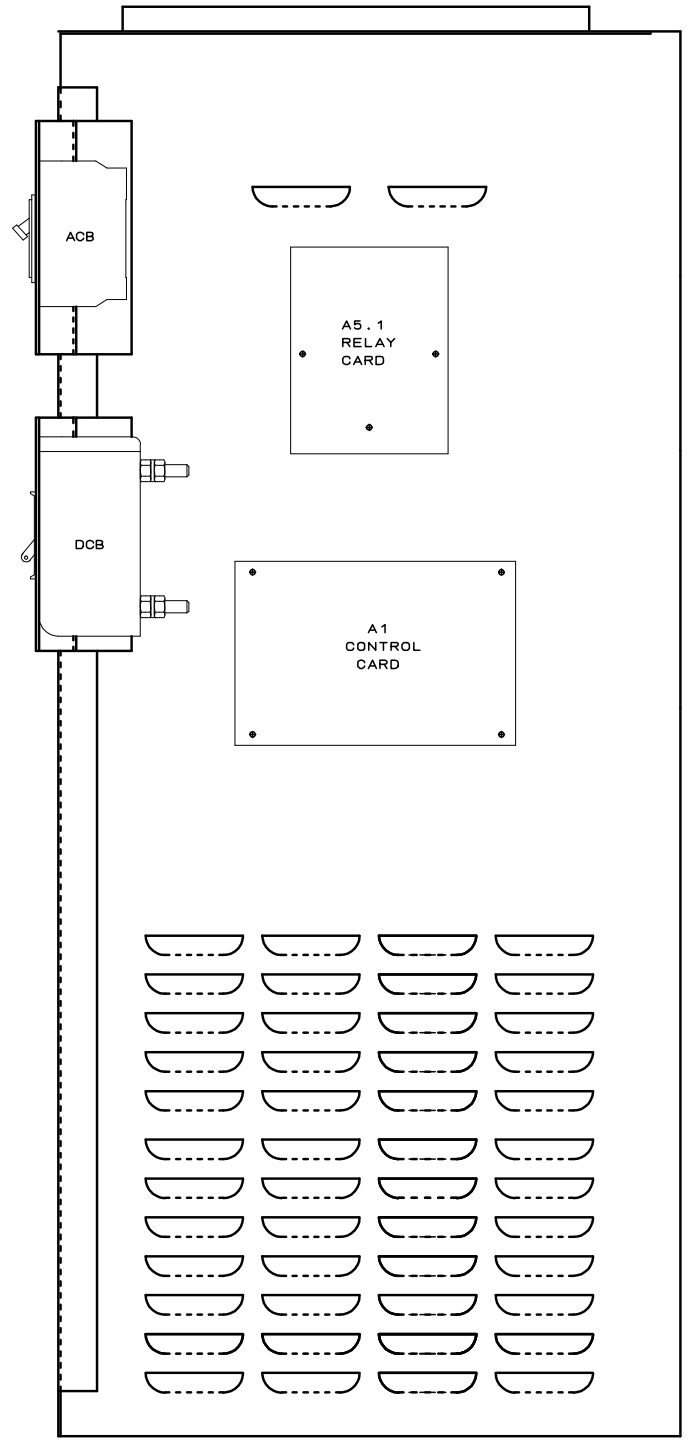
	SCALE N.T.S.	DATE 2006-12-12	APPR BY D.S.
DWG No	2160-65-79324-81	SHEET	REV 0

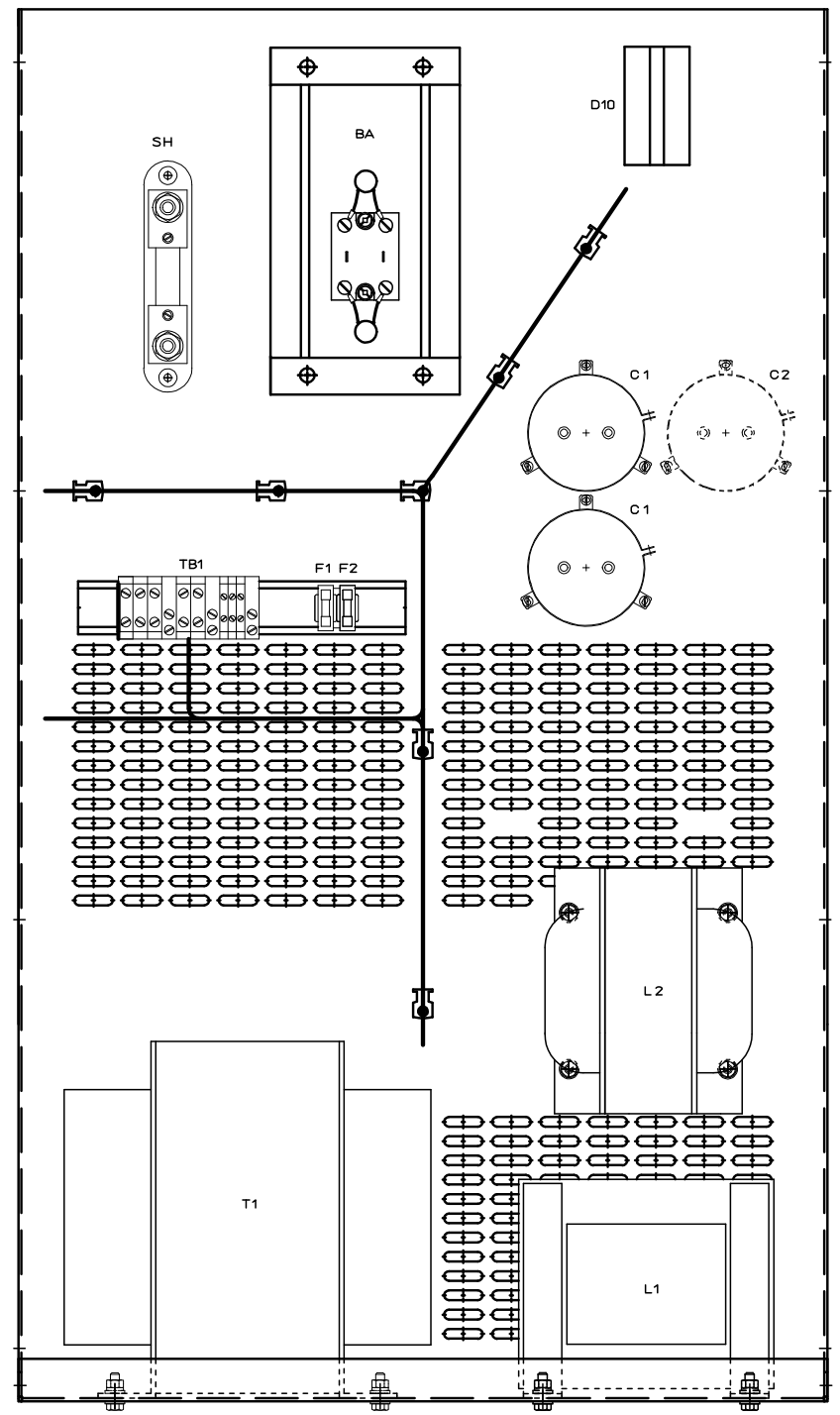


INSIDE OF DOOR



LEFT SIDE PANEL

C1/C2 QUANTITY AND LOCATION VARY BY MODEL AND FILTER TYPE.



REAR PANEL

COMPONENT LAYOUT
SLRd FLOOR MOUNT

TOL N/A	DWN BY S.C.	CHKD BY S.C.	
SCALE N.T.S.	DATE 2006-12-12	APPR BY D.S.	
DWG No 2160-65-79324-82	SHEET	REV 0	

10. NOTES

MANUFACTURER'S WARRANTY

Seller warrants to Purchaser only that each of its products is free from defects in material and factory workmanship, such warranty to be conditional upon the product having been properly installed, serviced and operated under normal conditions according to Seller's instruction.

Seller's liability under this warranty is limited to repairing or replacing without charge at its factory any defective products which, at purchaser's expense, have been returned to Seller's factory under its return policy or, where applicable, to one of its authorized service stations within one (1) year after being put into service by the Purchaser, or one and one-half (1½) years from the date of shipment, whichever occurs first. The repair or replacement of any defective products shall constitute fulfillment of Seller's obligations to Purchaser.

This warranty applies to Seller's products which are shown by Purchaser to have been originally defective and shall not apply to products which must be repaired, or replaced, due to normal wear, misuse, negligence, accident or to products which have been repaired or altered outside of Seller's factory or at one of its authorized service stations unless authorized by Seller.

Seller shall not be liable for loss, damage or expense, consequential or otherwise, from the use of its products or from any other cause.

This warranty supersedes, and is given in lieu of, all other warranties expressed or implied or conditions whether statutory or otherwise as to quality and fitness for any purpose for which the products are supplied. No person, agent or dealer is authorized to give any warranty on behalf of Seller nor to assume for Seller any other liability in connection with any of its products unless made in writing and signed by an officer of the Seller.

Delivering quality

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Due to continuous research, product improvements and enhancements, contents of this manual are subject to change without notice.

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