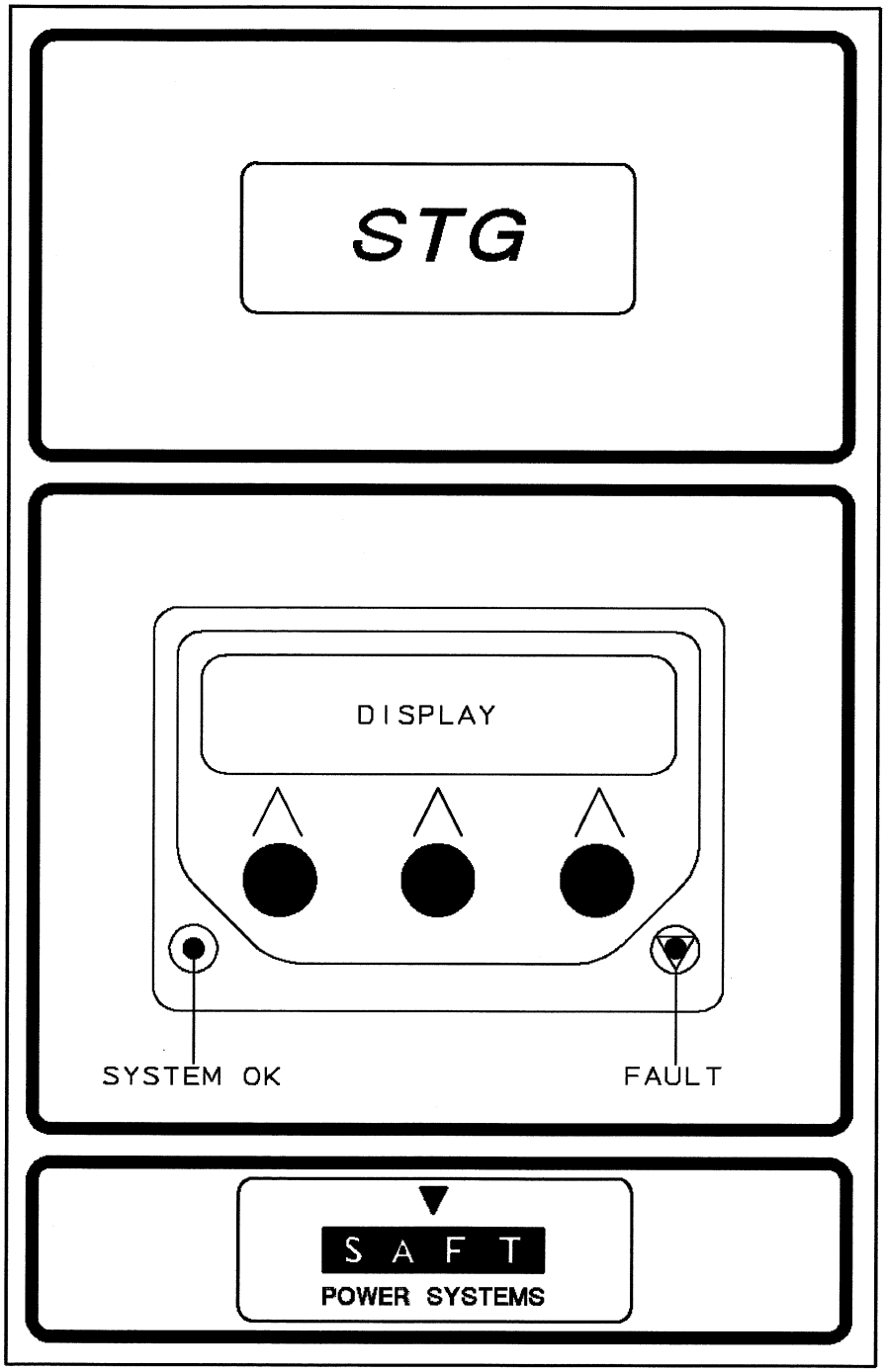
STG SERIES BATTERY CHARGER



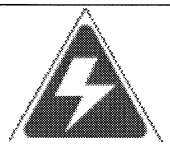
USER MANUAL

CONTENTS

1. INTRODUCTION

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.

WARNING

THIS CHARGER HAS BEEN FACTORY SET

MODEL	VAC	FLOAT	HI RATE
STG 24-xx	240	25.8	26.8
STG 48-xx	240	51.6	53.5
STG 120-xx	240	129.0	133.8

Charger must be readjusted for the specific application.

NOTE

This battery charger is shipped from the factory with the above nominal Float, Equalize voltages and AC Input Voltage.

You must program the proper Float and Equalize Voltages for your battery, refer to the instruction card furnished with your battery. Refer to Section 2.7 for AC Input programming.

Example: If the instruction card for your battery states a float voltage of 1.40 Vpc (Volts per cell), an equalize voltage of 1.45 Vpc, and if the battery you are connecting to this charger has 20 cells, then program the battery charger for the following:

20 CELLS
1.40 FLOAT VOLTAGE
1.45 EQUALIZE VOLTAGE

(These settings would produce a total output voltage of 20 x 1.40 = 28 Volts in float mode and 20 x 1.45 = 29 Volts in equalize mode.)

To program these voltages, refer to Section 3 in this manual.

2. INSTALLATION

2.1. RECEIVING THE EQUIPMENT

Upon receipt, visually inspect the equipment for shipping damage.

Check the contents of the package against the delivery slip before disposing of the package.

If damaged, or if partial loss is found, file a claim with the carrier without delay and take any necessary steps to protect your rights.

If the equipment will not be installed immediately, store it in a ventilated, dry room, away from rain or splashes of water and chemicals. The room should comply with the environmental requirements defined in Section 2.6.

The following accessories are included with the battery charger:

- Temperature Sensor (Qty 1)
- Terminal Block Jumper (Qty 1)
- Terminal Block Jumper Separator (Qty 1)
- User Manual (Qty 1)

Handling

The equipment must be handled with care. The battery charger is 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 cabinet.

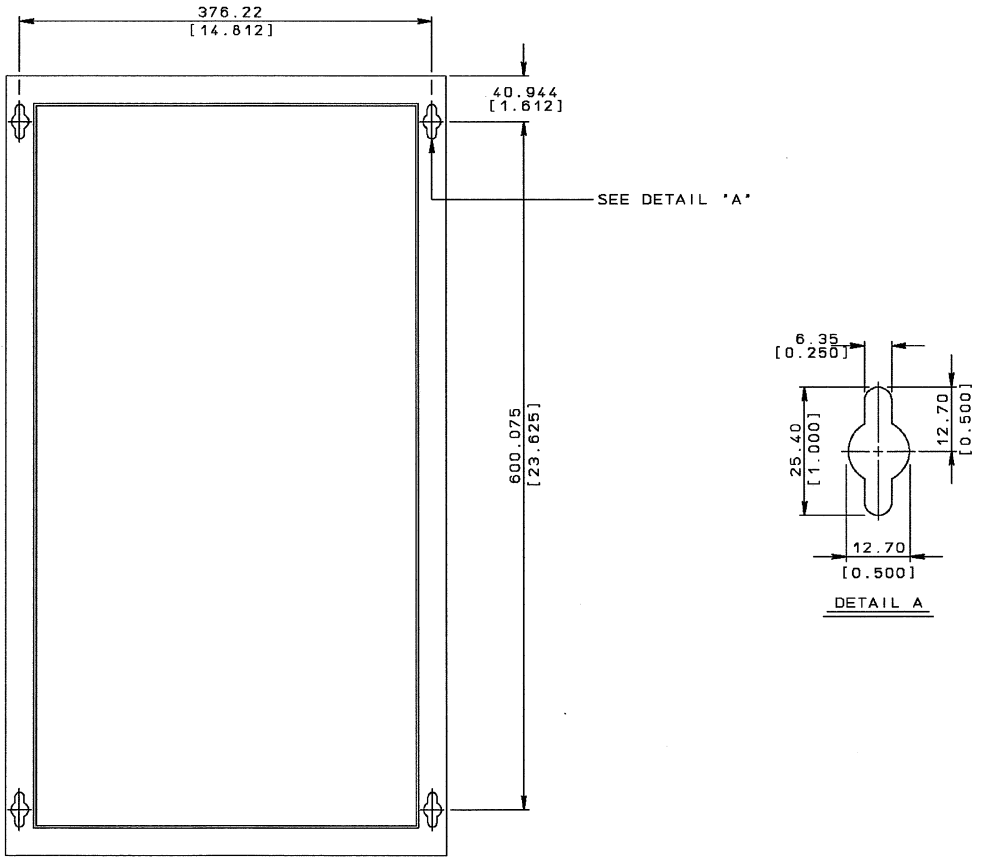
2.2. INSTALLING AND SECURING THE BATTERY CHARGER

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 surface sufficiently flat so that the cabinet will not be distorted when secured.
- A wall surface sufficiently strong to carry the weight of the equipment.
- Provide three inches clearance on sides and tops.
- Provide sufficient clearance so that the door can be opened.

The recommended mounting hardware :

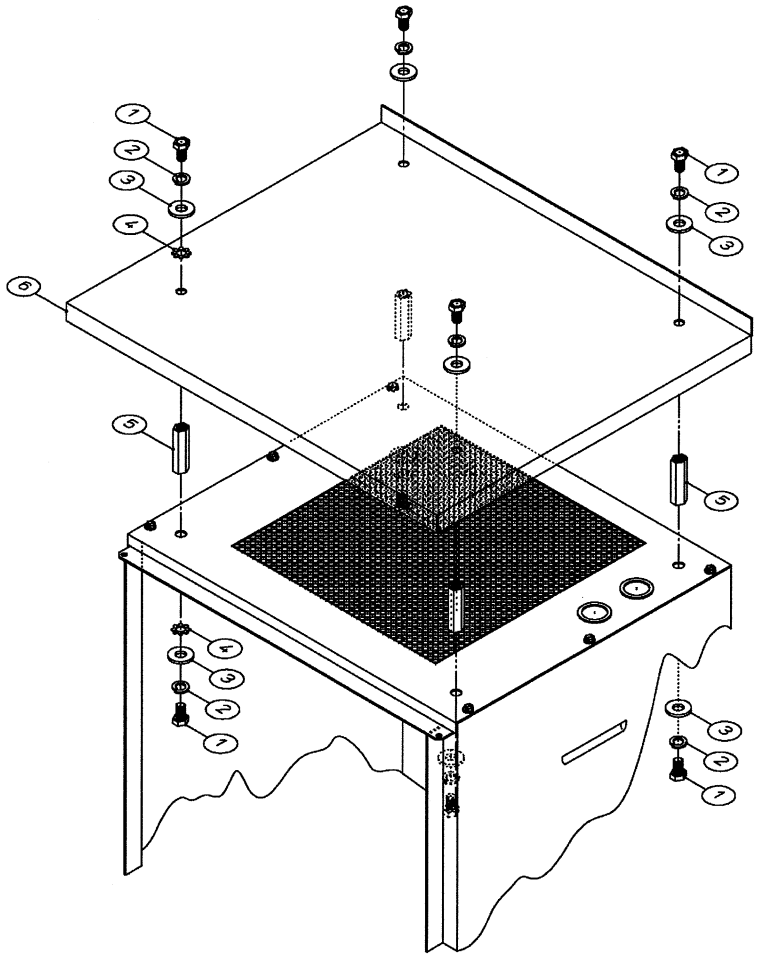
- ¼ inch lag bolts, quantity 4 (not supplied).



2.3. 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.



NOTES

LEGEND

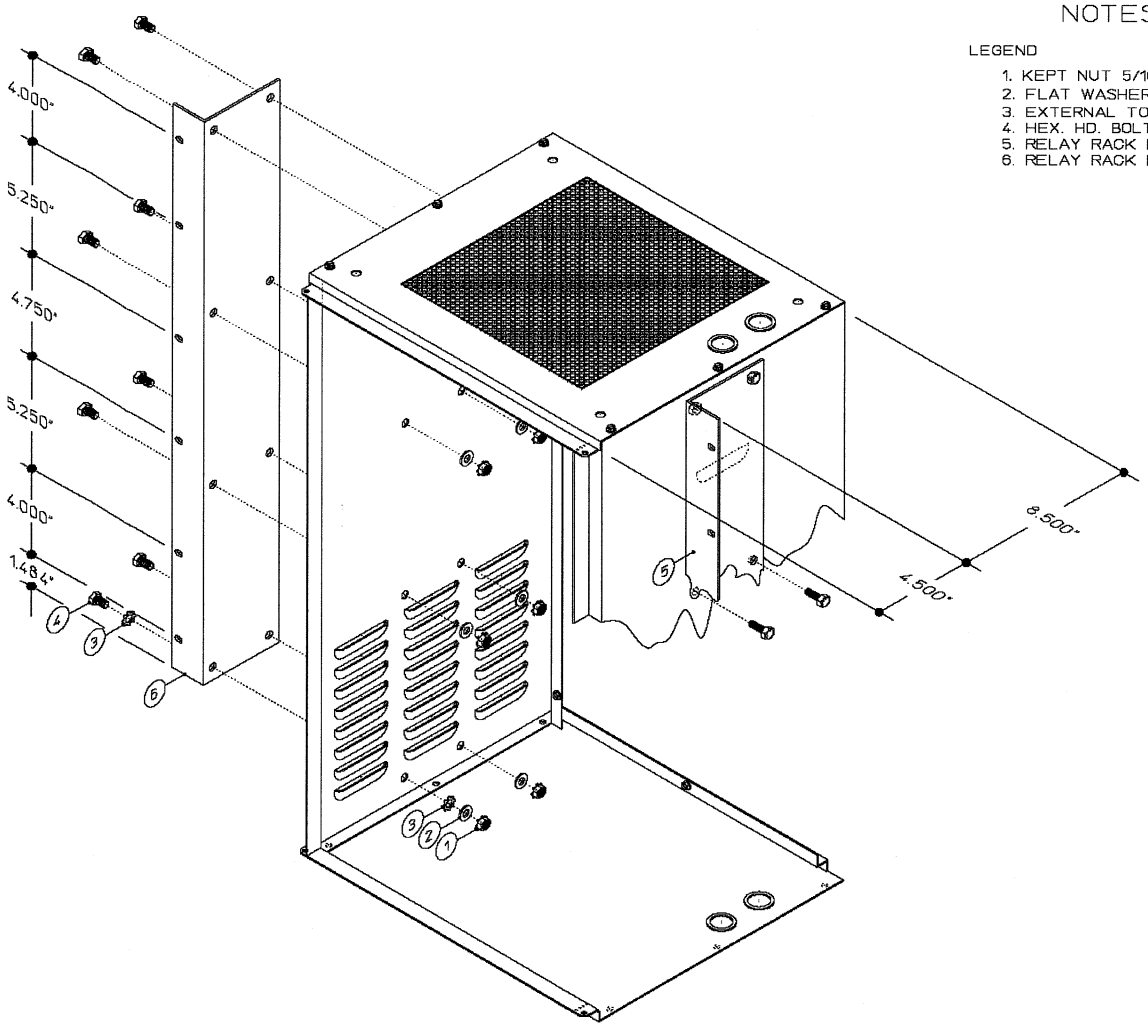
1. HEX. HD. BOLT 5/16"-18 x 3/4" LG. (8)
2. LOCK WASHER 5/16" (8)
3. FLAT WASHER 5/16" (8)
4. EXTERNAL TOOTH WASHER 5/16" (2)
5. SPACER NUT 5/16"-18 x 1 3/4"(4)
6. DRIP CAP (1)

Do not use rack mounting brackets with this option.

2.4. INSTALLING THE RELAY MOUNTING BRACKETS (IF ORDERED)

THE RELAY MOUNTING 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 254mm (10 inches) above the cabinet for proper ventilation.



Do not use the drip cap with this option.

2.5. INSTALLING THE BATTERY

Refer to installation procedures recommended by the battery manufacturer.

2.6. ENVIRONMENTAL REQUIREMENTS (EXCLUDING THE BATTERY)

TEMPERATURE

Storage: -25°C to 70°C (-13°F to 158°F)
Operating: 0°C to + 40°C (32°F to 104°F)

For operation between 40°C (104 °F) and 55°C (131 °F), derate the output current by 2.0% per 1°C (per 1.8°F).

RELATIVE HUMIDITY

Storage: 15% to 90% in the original package.
Operating: 20% to 80% (non-condensing)

ALTITUDE

≤ 1000m (3280 ft)

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

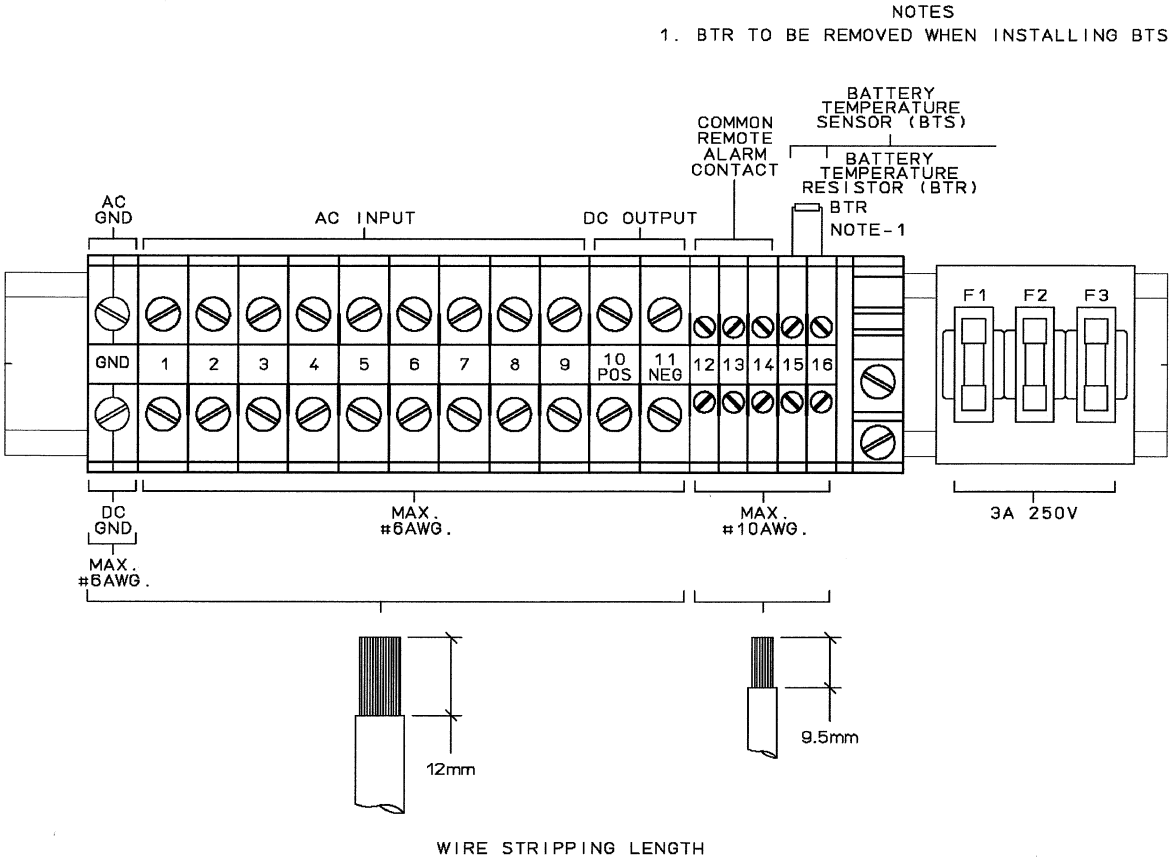
2.7. BATTERY CHARGER CONNECTIONS

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

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, battery protection devices should be switched open.

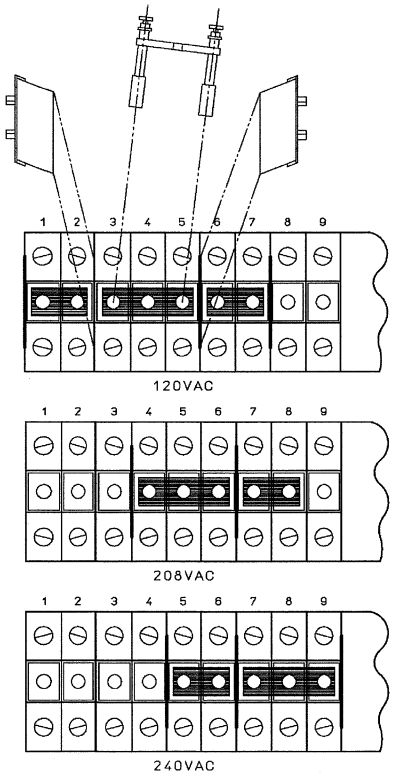
Shown below is the input, output, common alarm and temperature sensor connections. You **MUST** confirm the **AC** jumper settings and connections are configured for your application.



Note: For common alarm contacts, Terminal #12 is normally closed, Terminal #13 is common and Terminal #14 is normally open in the alarm condition.

Note: Terminals #15 and #16 are required when using the battery temperature sensor (BTS). If temperature compensation is required, the battery temperature resistor (BTR) must be removed and replaced with the wires from the battery temperature sensor (Included). The BTS if used should be mounted on a battery inter-cell connector close to the center of the battery bank (see section 2.11)

The factory setting for the AC mains voltage is 240 VAC. To change the mains voltage to either 120 VAC or 208 VAC, the terminal block jumpers must be changed. Note that for 120VAC, three jumpers and four jumpers separators are required. The additional parts can be found in the parts bag supplied with this charger. Refer to the figure below.

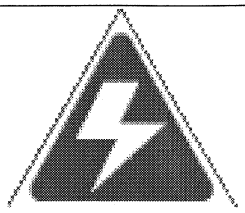


For 120 VAC Line connects to Terminal #1 and Neutral connects to Terminal #3 **(Note Jumper arrangement)**

For 208 VAC Line 1 connects to Terminal 1 and Line 2 connects to Terminal #2 **(Note Jumper arrangement)**

For 240 VAC Line 1 connects to Terminal 1 and Line 2 connects to Terminal #2 **(Note Jumper arrangement)**

2.8. 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 the shipping plugs from Ni-Cd batteries. Always use maintenance accessories (especially electrolyte handling tools) suited to the batteries.
Lead-acid batteries must be stored in a charged condition for no more than three months at an ambient temperature of 0°C (32 °F) to 30°C (86°F).

Reminder

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

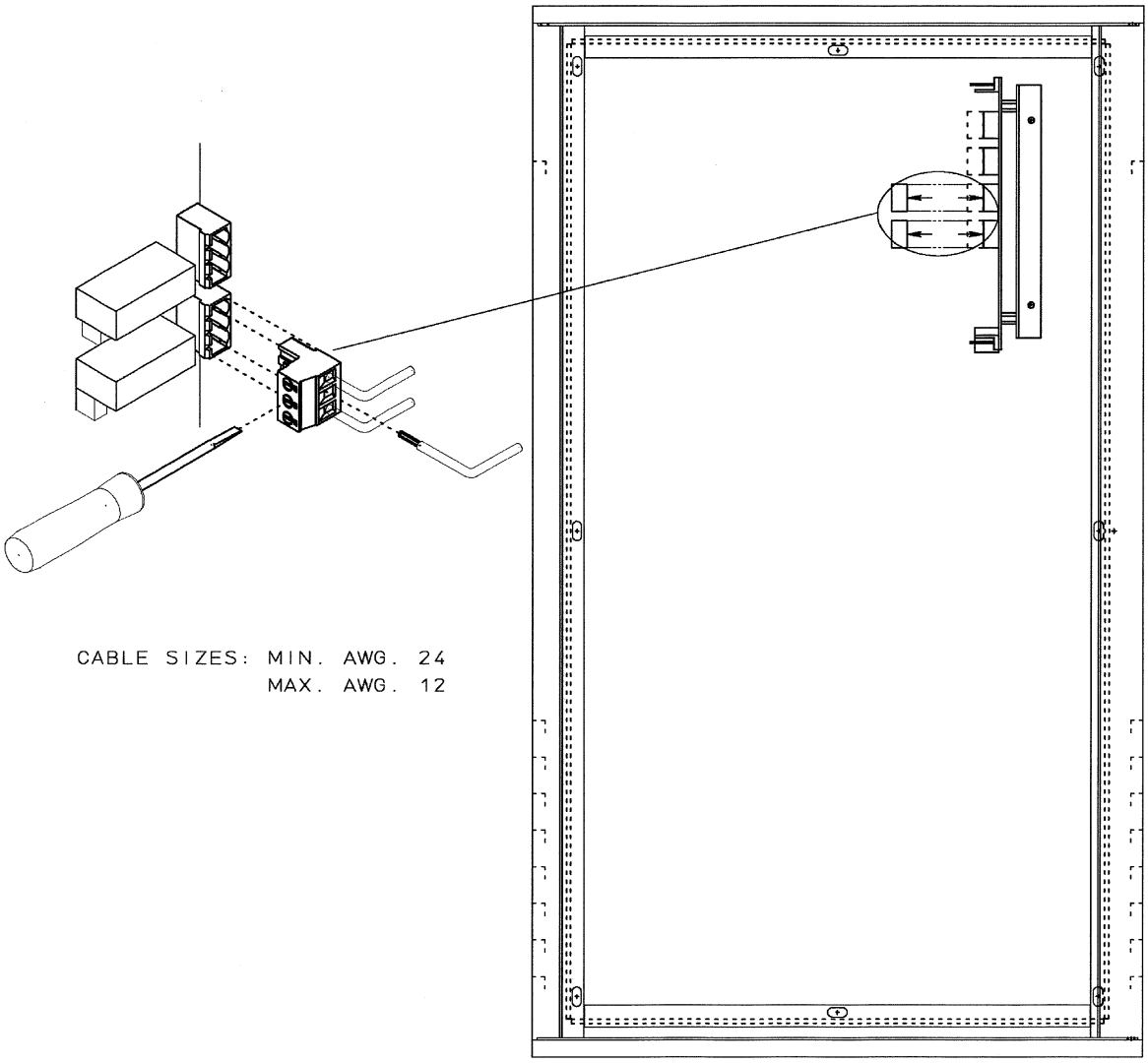
Battery on stand

- Position the battery cells and connect them in series.
- Check that no cell is reversed.
- Check that the connections are tight.
- Connect the battery (-) to the (-) terminal of the battery charger.
- Connect the battery (+) to the (+) terminal of the battery charger.

2.9. CONNECTING THE LOAD

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

2.10. CONNECTING ADDITIONAL ALARM CONTACTS



CABLE SIZES: MIN. AWG. 24
MAX. AWG. 12

Relay Function

1 – AC Mains Failure
2 – DC Charger Voltage Failure
3 – Rectifier Failure
4 – Earth Failure (+/-)

2.11. 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:

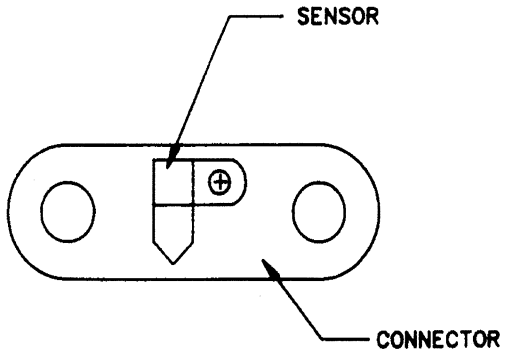
1. Choose an inter-cell connector on a battery cell located approx. in the middle of the battery bank.

2. Drill a single hole in the middle of the connector, using a #20 drill bit.

3. Mount the sensor on the connector with the screw terminals face up and away from the battery bank using the #10 self-tapping screw and a #10 flat washer.

4. Connect a pair of #20 AWG wires of sufficient length from the sensor screw terminals (polarity unimportant) to the terminal block (TB1 position 15 & 16 see section 2.7) provided in the battery charger.

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.



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 jumper arrangement settings on 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:
P095.xx.yy.PGM : internal software version (xx) and (yy) edition
P095.xx.yy.TXT : module text version (xx) and (yy) edition

After a few seconds, the display shows the floating voltage and the battery charger current (at no load).

Note: The current value is about 0.5A.

- To check that the battery polarities are correct, take a voltage reading using a DC voltmeter across Terminals #10 (+) and #11 (-).

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.

3.3. BATTERY CHARGER SET UP PARAMETERS

The battery chargers use a microcontroller to process all reference data and alarm handling. It derives its information from a special memory device called EEPROM located on the CCU board. This EEPROM (Electrically Erasable Programmable Read Only Memory) contains all data necessary to calculate such values as the charge voltages and current limits. The programmed parameters of the DC system are separated into three major groups, which are (1) system set-up, (2) alarm set-up, and (3) calibration mode.

3.4. SYSTEM SET UP

To enter the programming mode, follow the key presses shown on the following page. The black circle indicates which of the three buttons on the front panel must be pressed in order to go from one screen to the next.

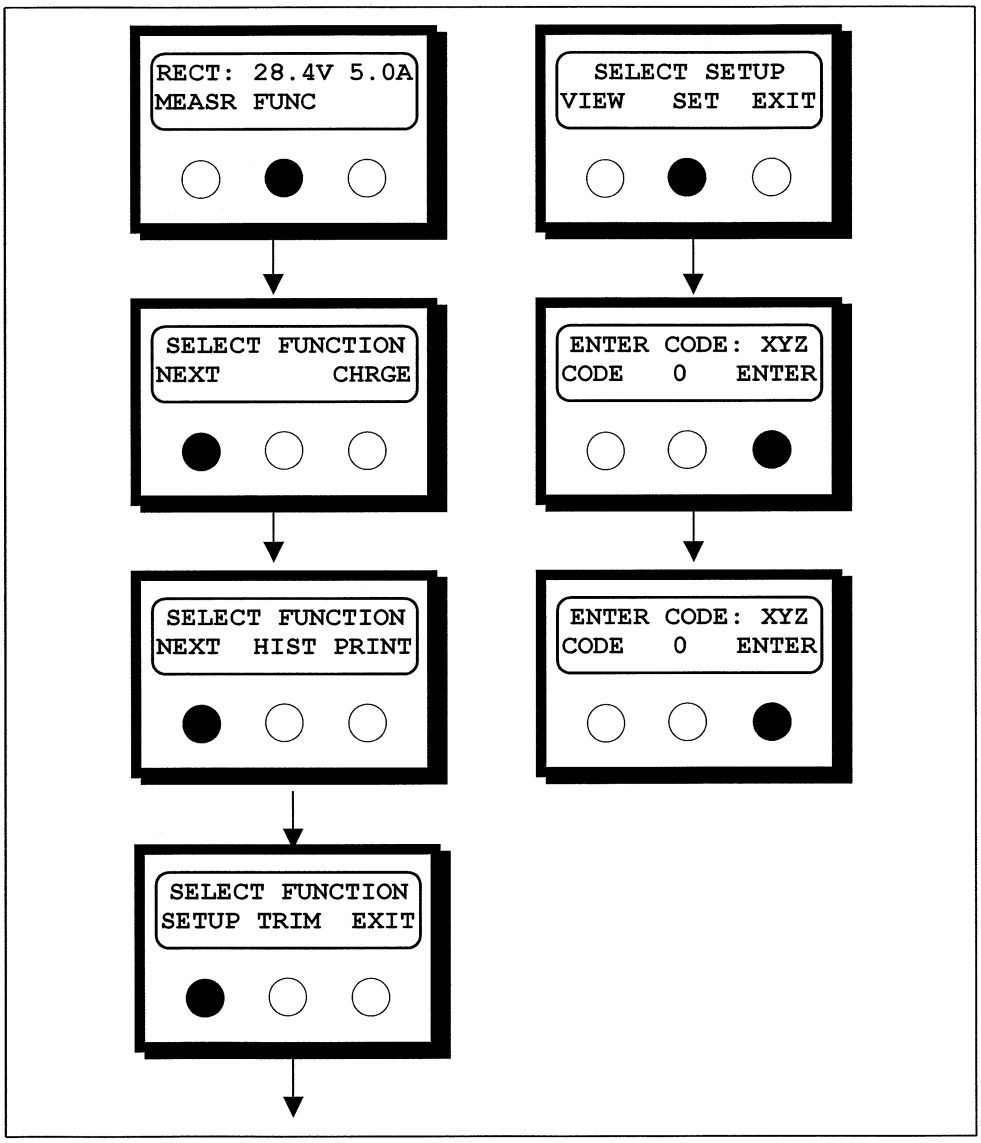
While following the key presses, the display on the front panel will eventually read "ENTER CODE: XYZ", where XYZ is some number. To get past this prompt, the user must enter a password. (This password has been put in place to protect the battery charger's settings from accidentally being changed.)

The password is calculated from the displayed code (XYZ) and incorporates three numbers. The method to derive the numbers follows where C1, C2 and C3 represents the entered codes.

Example with displayed code 569

C1	=	X+Y	C1	=	5+6	=(1)	1 (enter 1)
C2	=	C1+Y	C2	=	1+6	=	7 (enter 7)
C3	=	C2+Z	C3	=	7+9	=(1)	6 (enter 6)

If the number C(x) is 10 or greater, use the last digit only.



3.5. CHARGER SET UP SETTINGS

To set up your battery charger, press the "next", "set", and "exit" on the front panel of the charger as shown in Step A to Step Dd below.

Step	PARAMETER	next	set	exit	SELECTION	Factory Settings	Customer Settings
A	Programming Mode				SYSTEM only		
B	Language	●			English/French/Spanish	English	
C*	Nominal input AC voltage		●		Adjustable from 0V to 700V (120/208/240)	240VAC	
D	Nominal output DC voltage	●			Do not adjust factory setting	Rating	
E	Nominal DC Amps	●			Do not adjust factory setting	Rating	
F	Rectifier output shunt value	●			Do not adjust factory setting	50A	
G	Battery shunt selection	●			Do not adjust factory setting	No	
H	AC meter display	●			Do not adjust factory setting	Yes	
I	Load meter display	●			Do not adjust factory setting	No	
J	Adjustable Amps	●			Do not adjust factory setting	No	
K	Adjustable Volts	●			Do not adjust factory setting	No	
L*	Total number of connected battery cells		●		Adjustable between 1 and 200 cells	12/24/60	
M*	Floating voltage per cell		●		Adjustable between 1V and 2.3V per cell	2.15V	
N	High-rate charge function		●		Manual Hi Rate	Yes	
O	High-rate charge relay output	●			Do not adjust factory setting	0	
P	Fan delay	●			Do not adjust factory setting	00H	
Q	High-rate voltage per cell		●		Adjustable between 1 V and 2.6V per cell	2.23V	
R*	High rate charger time		●		Adjustable between 00 and 99h (00=30sec)	12H	
S*	High-rate timer mode	●			Do not adjust factory setting	Direct	
T	Auto Charge	●			Do not adjust factory setting	No	
U	Select Vo application	●			Do not adjust factory setting	No	
V	Commissioning function	●			Do not adjust factory setting	No	
W	ID Batch number	●			Do not adjust factory setting	Blank	
X	Shutdown options	●			Do not adjust factory setting	No	
Y	Select Temperature compensation		●		Active or not active	Yes	
Z	Temperature compensation value %/C		●		Adjustable between 0 and 0.4% per °C	0.2	
Aa	Amphour meter display	●			Do not adjust factory setting	No	
Bb	Battery Test	●			Do not adjust factory setting	No	
Cc	Communication				Do not adjust factory setting	1	
Dd	Programming Mode		ALR	●	Select ALARM or SYSTEM only		

* This step requires customer adjustment.

3.6. ALARM SET UP PROCEDURE

To set up your battery charger, press the "next", "set", and "exit" on the front panel of the charger as shown in Step A to Step W below.

Step	PARAMETER	next	set	exit	SELECTION	Factory Settings	Customer Settings
A	Programming Mode				Select ALARM		
B	Mains Failure		•		Yes/No	Yes	
C	Low level setting		•		Available settings (108 / 187 / 216)	216V	
D	High level setting		•		Available settings (132 / 229 / 264)	264V	
E	Delay	•			Do not adjust factory setting	4 sec.	
F	Relay output	•			Do not adjust factory setting	1	
G	Display latched	•			Do not adjust factory setting	Yes	
H	Relay latched	•			Do not adjust factory setting	No	
I	High Charge Voltage	•			Do not adjust factory setting	No	
J	Low Charge Voltage	•			Do not adjust factory setting	No	
K	High DC Volts	•			Do not adjust factory setting	Yes	
L	Low DC Volts	•			Do not adjust factory setting	Yes	
M	Rectifier Fail	•			Do not adjust factory setting	Yes	
N	Earth Fault (+)	•			Do not adjust factory setting	Yes	
O	Earth Fault (-)	•			Do not adjust factory setting	Yes	
P	Spare 1 Alarm	•			Do not adjust factory setting	No	
Q	Spare 2 Alarm	•			Do not adjust factory setting	No	
R	Spare 3 Alarm	•			Do not adjust factory setting	No	
S	Spare 4 Alarm	•			Do not adjust factory setting	No	
T	High Temperature	•			Do not adjust factory setting	No	
U	High Battery current	•			Do not adjust factory setting	No	
V	High Rectifier Current	•			Do not adjust factory setting	No	
W	Common Fault			•	Do not adjust factory setting	Yes	

4. OPERATING THE BATTERY CHARGER

The range of battery chargers is designed to supply a constant DC power to any critical load.
The standard range of the battery charger offers 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 allows 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 chargers consists of four basic blocks. The input transformer, the rectifier bridge, the output filter, the CCU control card and the front panel. Refer to ***Fig.4.1*** for identification of the different functional blocks.

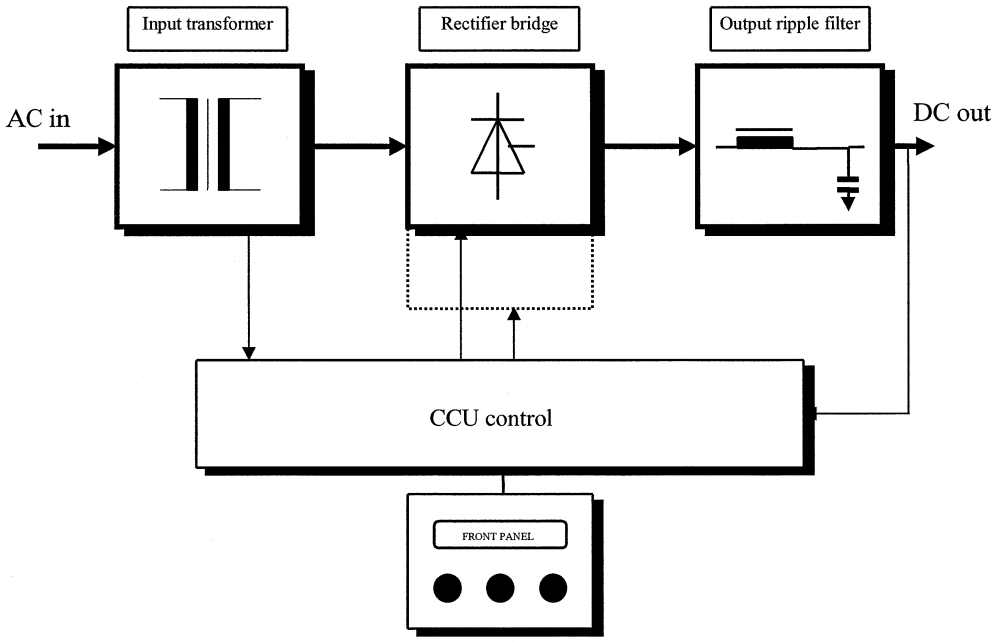


Fig 4.1 - Block diagram

4.1. CHARGE MODES

The battery chargers are all equipped with two charge modes e.g. Floating charge and High rate charge. The two charge modes are respectively used for maintaining the battery in charged condition (normal operation mode) and recharge the battery to 100% with a higher charge voltage within a programmed time. The float and high-rate charge function can be initiated from the key path on the front panel. Refer to the menu structure for this operation.

4.2. MANUAL HIGH-RATE CHARGE

Manual high-rate charge is initiated using the key path and the menu structure. When operated the battery charger will switch to a higher DC level. It is indicated on the LCD with the text HIGHRATE CHARGE. The high-rate time is controlled by an internal programmable timer and switches back to float charge automatically if this time is elapsed. Manual high rate charge is generally used once or twice a year depending on the number of discharges. If the manual high-rate charge must be cancelled, press the FL/HR switch on the key path again.

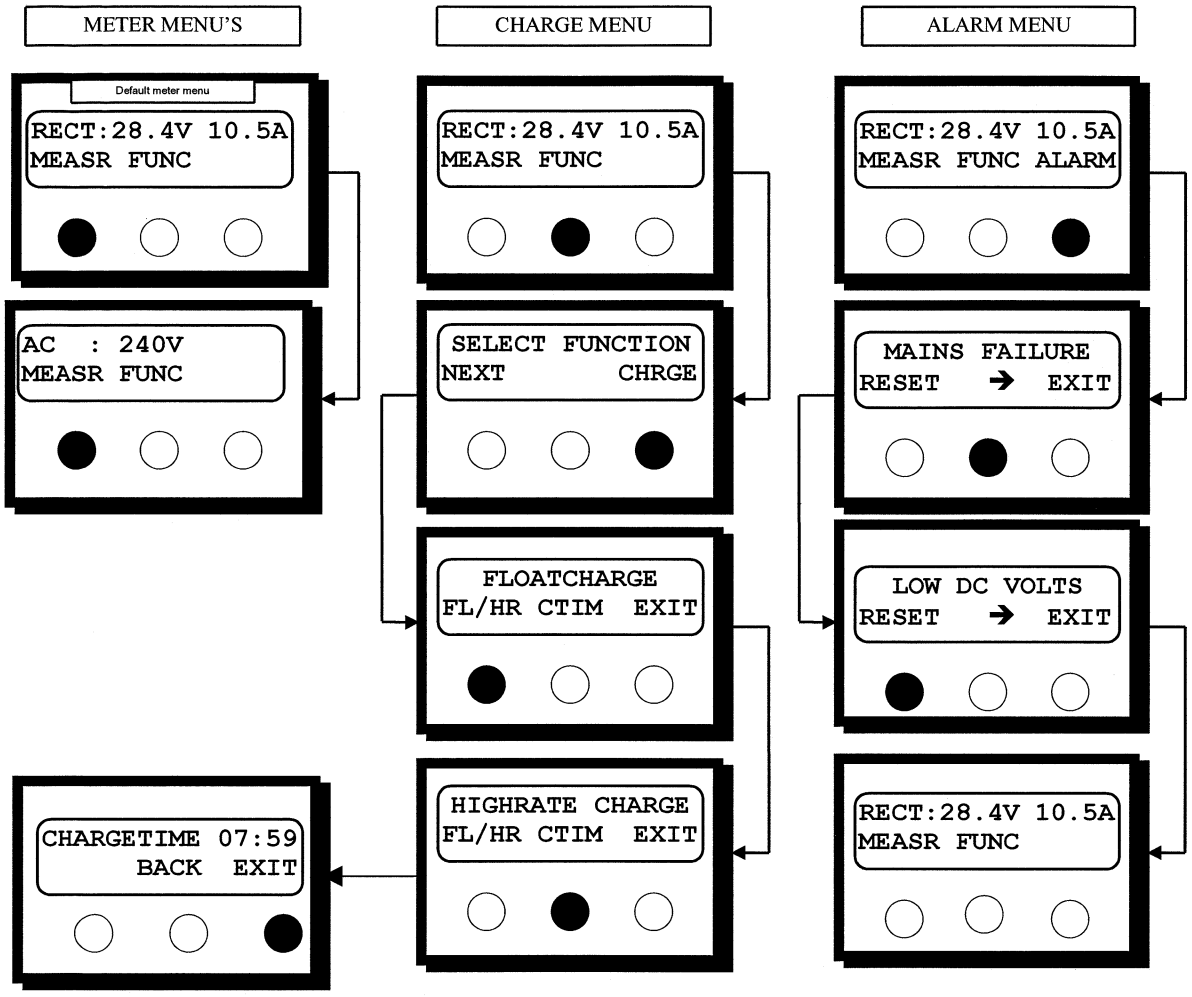
4.3. METER FUNCTIONS

The battery chargers are equipped with an integrated volt and amp meter. The display indicates the battery charger DC voltage, DC current, and input AC voltage. Use the MEASR key to scroll through the different measurements.

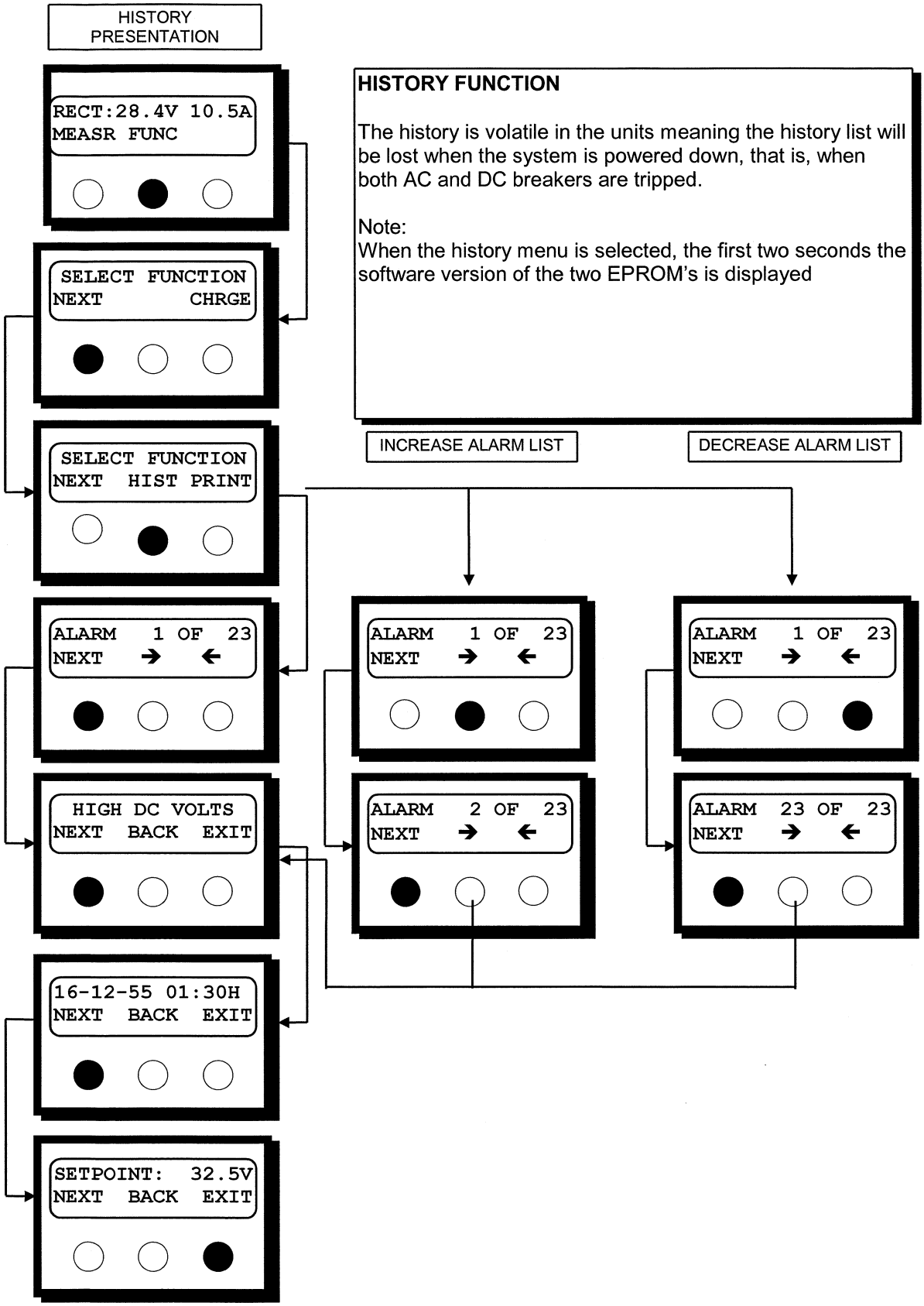
4.4. PROTECTION

The battery chargers are protected against surges by varistor. Overload protection of the battery chargers is accomplished using an electronic current limit and circuit breakers. Control wiring and power supply wiring are protected with miniature fuses.

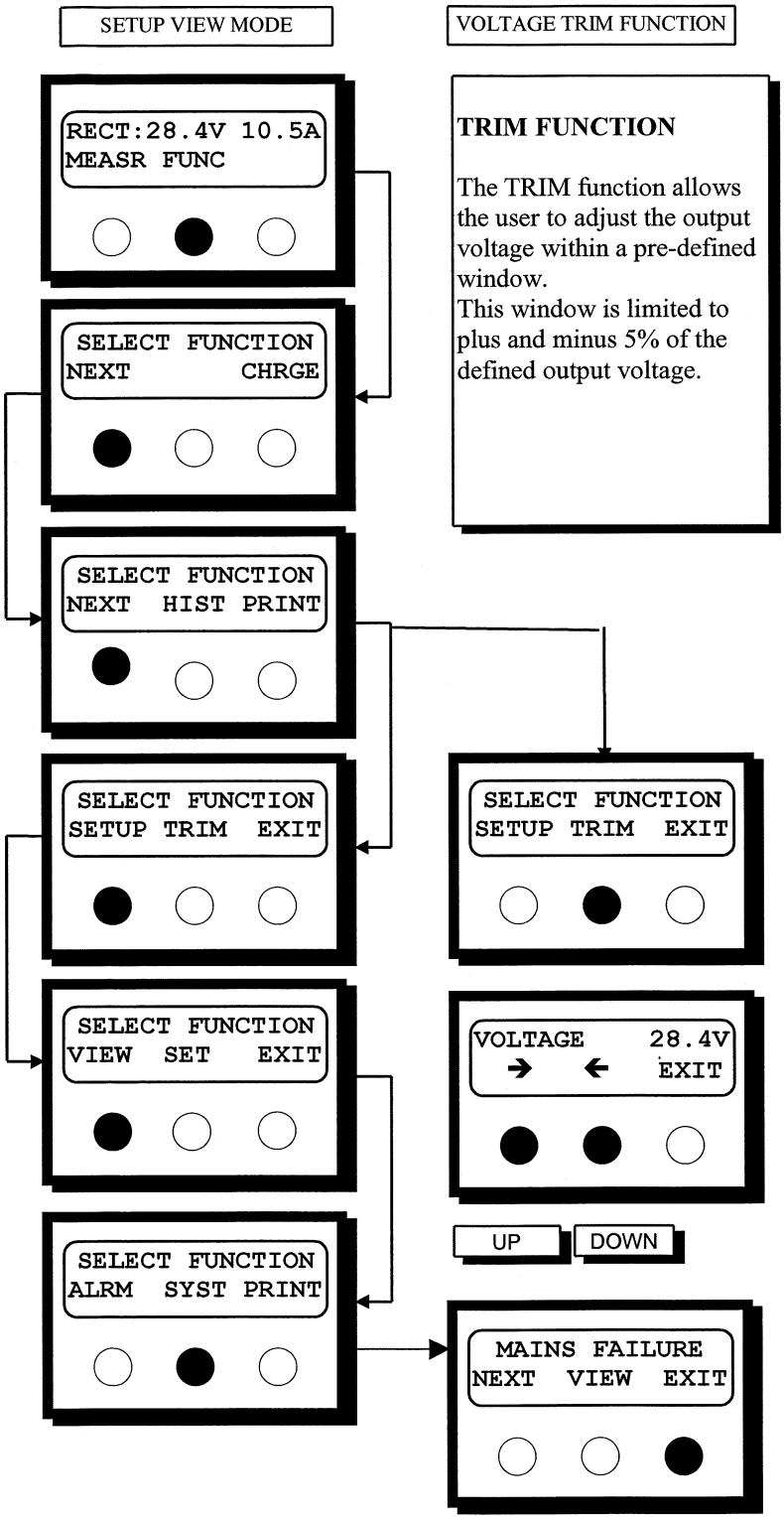
4.5. PRIMARY OPERATING MENUS



4.6. HISTORY MENU



4.7. VIEW AND TRIM MODE



4.8. CALIBRATION

For factory set up only.
WARNING: MODIFING CALIBRATION SETTING WILL VOID YOUR WARRANTY.

4.9. SOFTWARE PROGRAMMING

If a board has 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.

4.10. HARDWARE PROGRAMMING

WARNING: Each CCU card is hardware programmed at the factory according to the nominal DC voltage. NEVER install a CCU card were the programming is unknown. Please consult the factory.

5. 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 the input voltage versus the input jumper configuration
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

Carefully use the procedures written hereafter. If in doubt, contact the factory.

5.1. BATTERY CHARGER FAULT FINDING PROCEDURES

Fault	*No*	*Probable cause*
Battery charger does not start	1	Bad connection(s)
Battery charger starts but when current is delivered, it shuts down.	1	If the system is powered from a generator, the frequency or voltage fluctuations can cause a shutdown of the battery charger.
	2	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 flat cable, which is connected to the CCU card on the backside of the front panel.
After switch on the input AC breaker trips Immediately		***Note:*** This is a major system fault. Disconnect all voltage sources and verify the following:
	1	Check the input jumper configuration matches the input voltage.
	2	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
	3	Check the freewheeling diode for shorts. Replace if necessary
	4	Disconnect the gate wiring of the thyristors and restart the battery charger. If the AC breaker does not trip, replace the CCU.

Fault	No	Probable cause
After switch on, the output DC breaker trips Immediately.	1	Disconnect the power and verify the shunt wiring of the battery charger.
	2	Check the connection between the shunt and the CCU card. The probable cause is malfunction of the CCU card or a wrong current setting in the system set-up. Verify the current setting and replace the CCU if necessary.
After switch on the battery charger operates in the current limit and no output voltage is present.	1	Switch off the unit and check the load and/or battery cables for short circuits.
	2	Switch off the unit and check the filter capacitors for shorts. replace if necessary.
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 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 the current limit.	1	If the battery charger operates in high-rate charge with a 10% lower input voltage, the high-rate voltage will decrease as load is increased. Only at floating voltage the battery charger operates within the specification when the input voltage is -10%.
	2	Check the secondary transformer voltage
The alarm RECTIFIER FAILURE is displayed	1	If the battery charger current is higher than 100% of the setting the alarm is activated. Check the current limit(s) of the system using the VIEW option for the system set-up.
	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. Check the floating voltage using a digital voltmeter according to the settings. If the value is incorrect, check the settings using the VIEW option of the system set-up.
	3	If none of the above checks solves the problem, the probable cause could be the malfunction of the CCU card. Replace the card if necessary.

Fault	*No*	*Probable cause*
The alarm HIGH DC VOLTAGE is displayed		This alarm is activated if the load voltage is higher than the adjusted value.
	1	Verify the setting using the VIEW command for the alarm set-up
	2	Verify the float voltage setting using the VIEW option of the system set-up. Correct the setting if necessary.
The alarm LOW DC VOLTAGE 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 is elapsed.
	2	Verify the setting of the alarm by using the VIEW command for 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. Verify the equipment connected to the DC output for any earth-leakage. The detection level of this alarm can not be adjusted in the alarm set-up.
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. Verify the setting using the VIEW command for the alarm set-up. If necessary, correct the setting. Note that at voltages below the 50%, the battery charger is automatically inhibited.
The alarm NTC FAILURE is displayed (only when battery temperature sensor is used)	1	This alarm is activated as soon as the connection between the NTC resistor and the battery charger is broken. If that happens the compensation is inhibited and the battery charger will switch back to the nominal floating voltage.

5.2. 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

5.3. BATTERY MAINTENANCE

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

5.4. TROUBLESHOOTING

When an alarm is activated, the green light is out and the red light flashes. The "ALARM" message is displayed. If pressing RESET (in the alarm menu) does not turn off the red light, refer to the following troubleshooting table for the corrective action to be taken.

ALARM	PROBABLE CAUSE	CORRECTIVE ACTION
"MAINSFAILURE"	-Battery charger -Mains breaker(s) opened -Mains voltage out of limits	-Switch on the battery charger. -Check the breaker(s), replace if necessary. -Check the mains voltage. The voltage must be that specified on the rating nameplate.
"BATTERY CHARGER FAIL"	-Open breaker -Low floating voltage with the battery charger not in current-limiting mode.	-Check and reset breaker, if the breaker trips again contact the factory -Check the mains voltage.
"HIGH DC VOLTAGE"	-The battery charger output voltage is higher than the maximum allowable value.	- Open input Ac breaker and Immediately contact the factory.
"LOW DC VOLTAGE"	End of discharge battery resulting from: -battery charger off -mains absence or low mains voltage	-Switch on the battery charger. -Check the mains. -Correctly connect the mains input.
"EARTHFAULT+" or "EARTHFAULT-"	-Low resistance between positive or negative output and cabinet ground (<100 Ohms).	- Check for the insulation fault.
"COMP.FAILURE"	-Temperature sensor fault.	-Check the sensor connection. -Check the sensors.

5.5. 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:

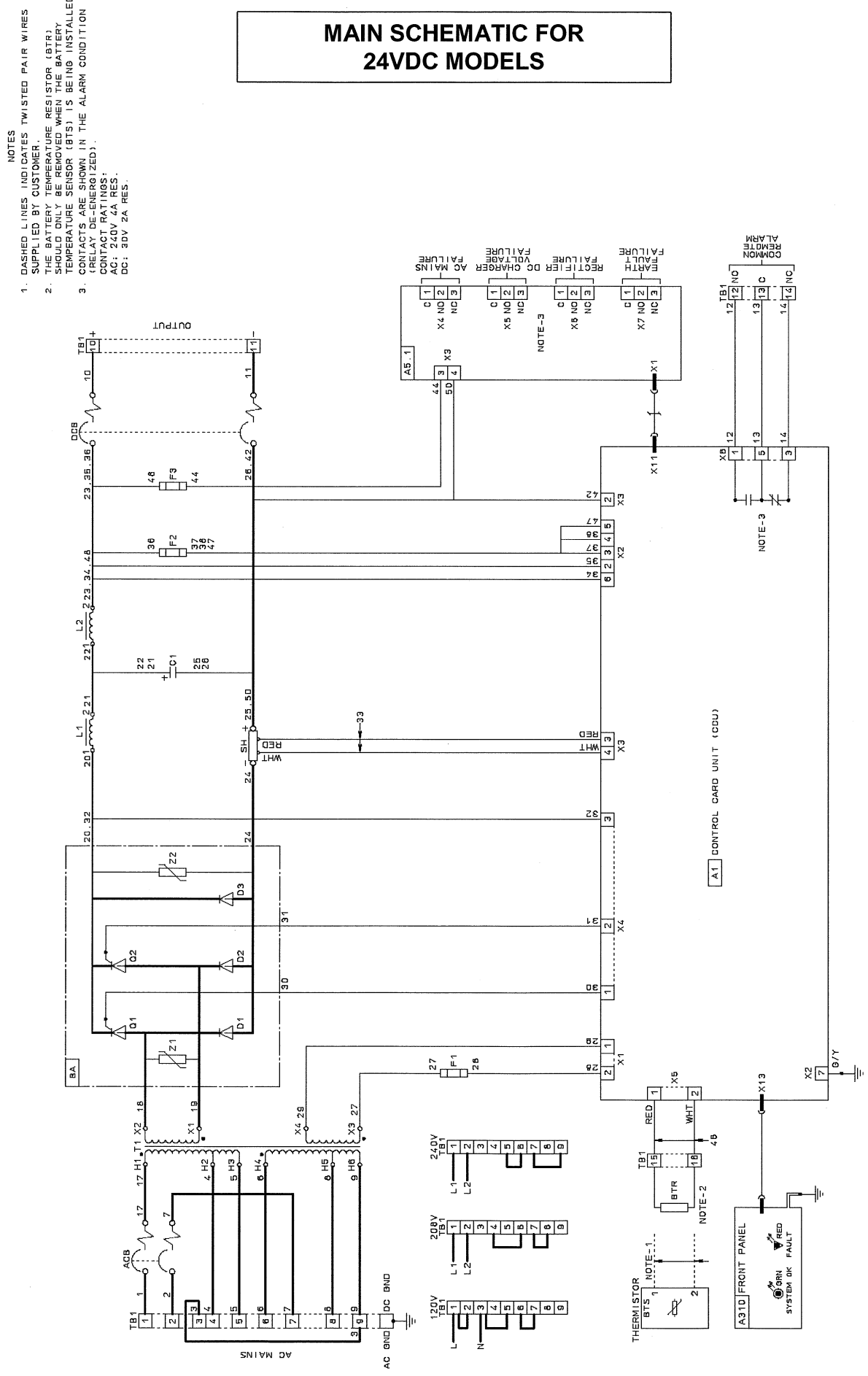
- Repair
- Supply of spare parts
- Preventive maintenance.
- User training
- Round-the-clock emergency service

Please include your model and serial number with correspondence.

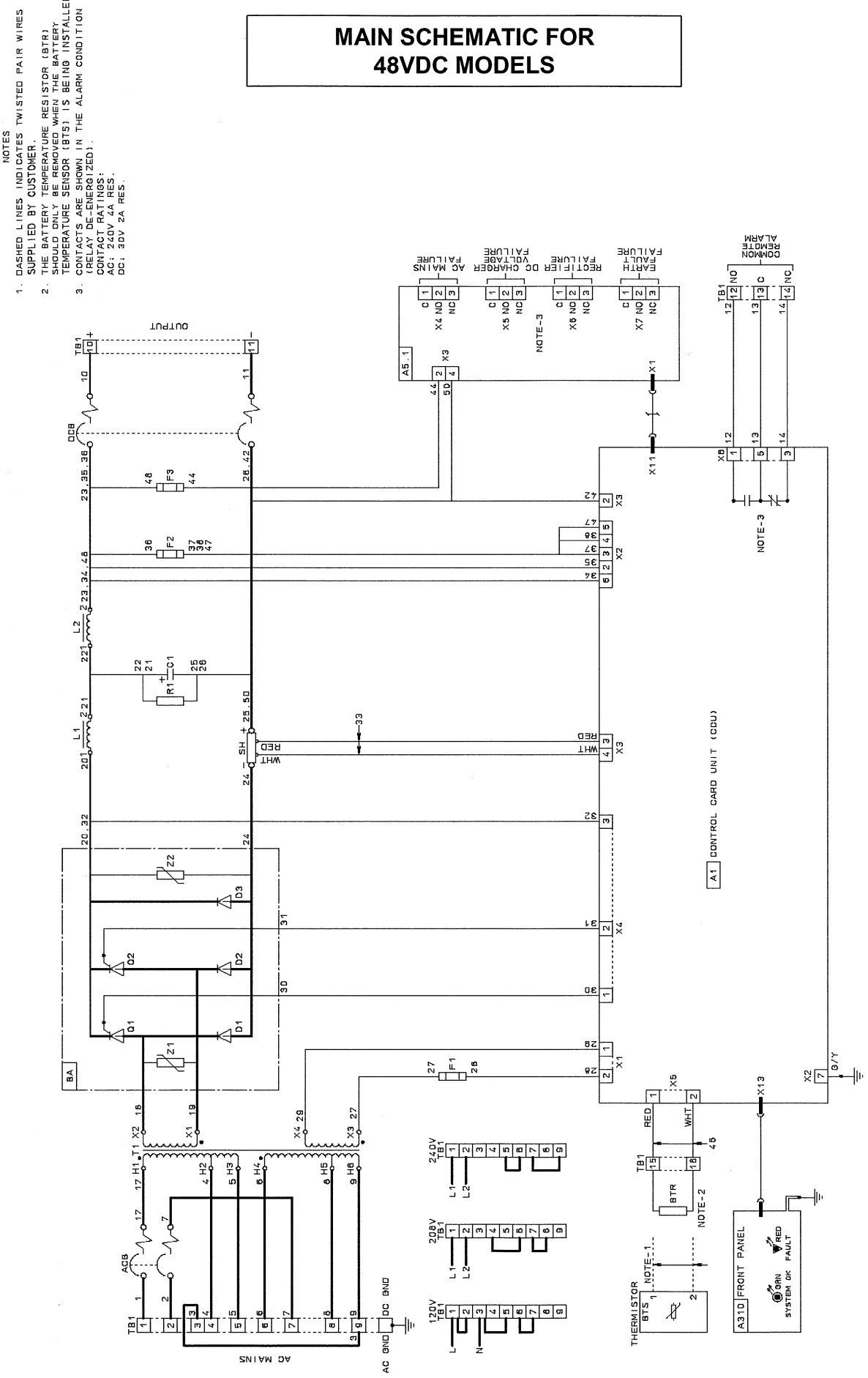
6. DIAGRAMS

The following pages contain Battery Charger Diagrams.

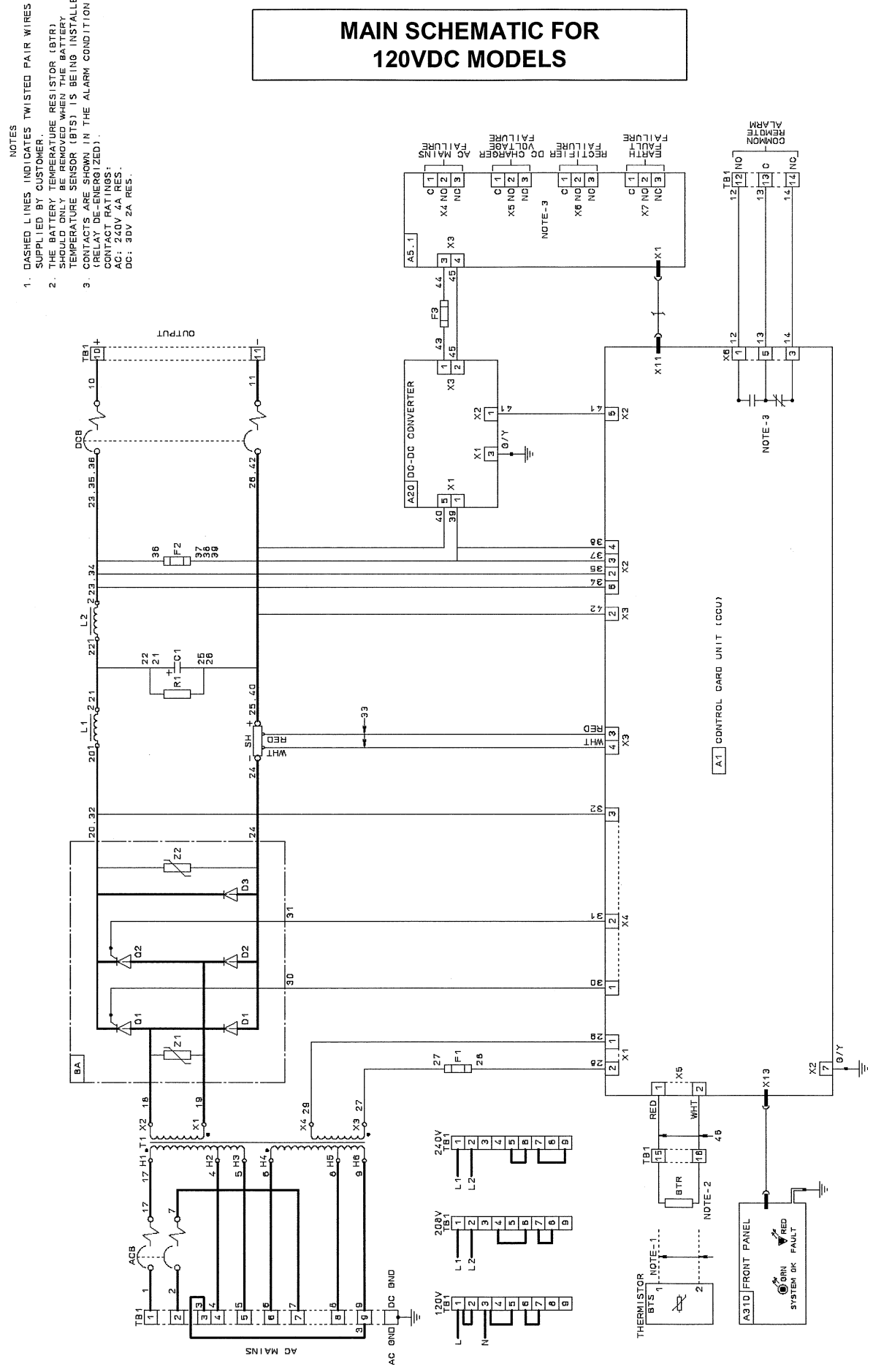
MAIN SCHEMATIC FOR 24VDC MODELS



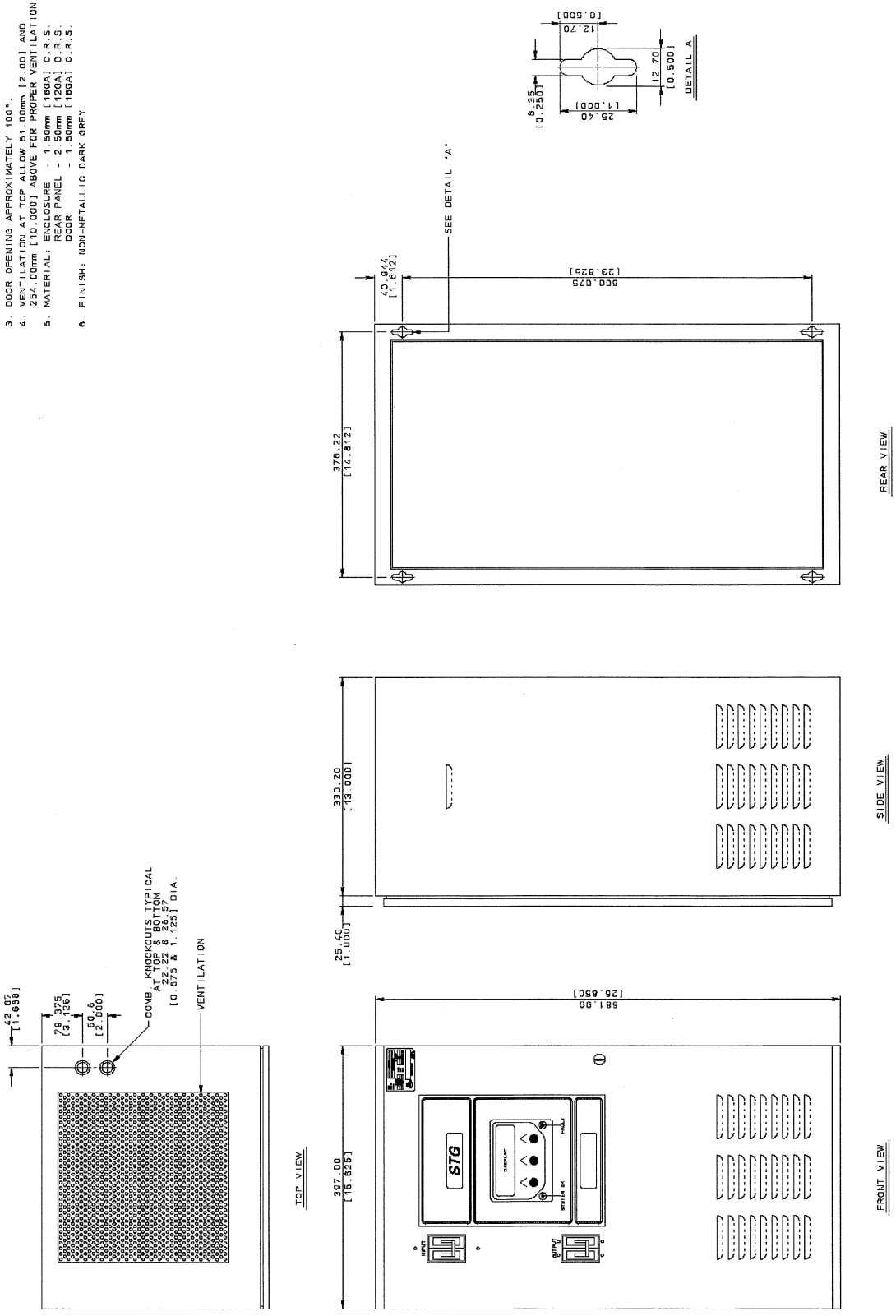
MAIN SCHEMATIC FOR 48VDC MODELS

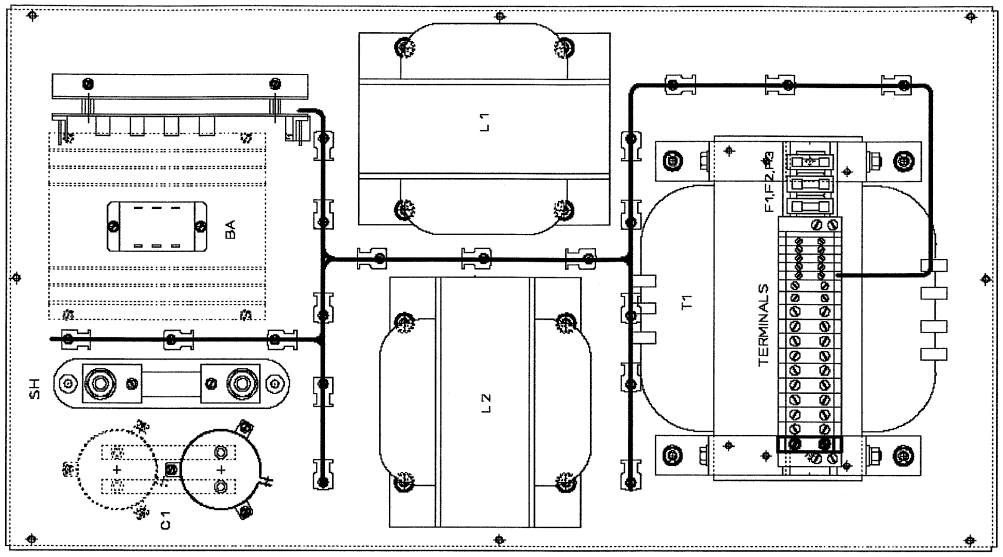


MAIN SCHEMATIC FOR 120VDC MODELS

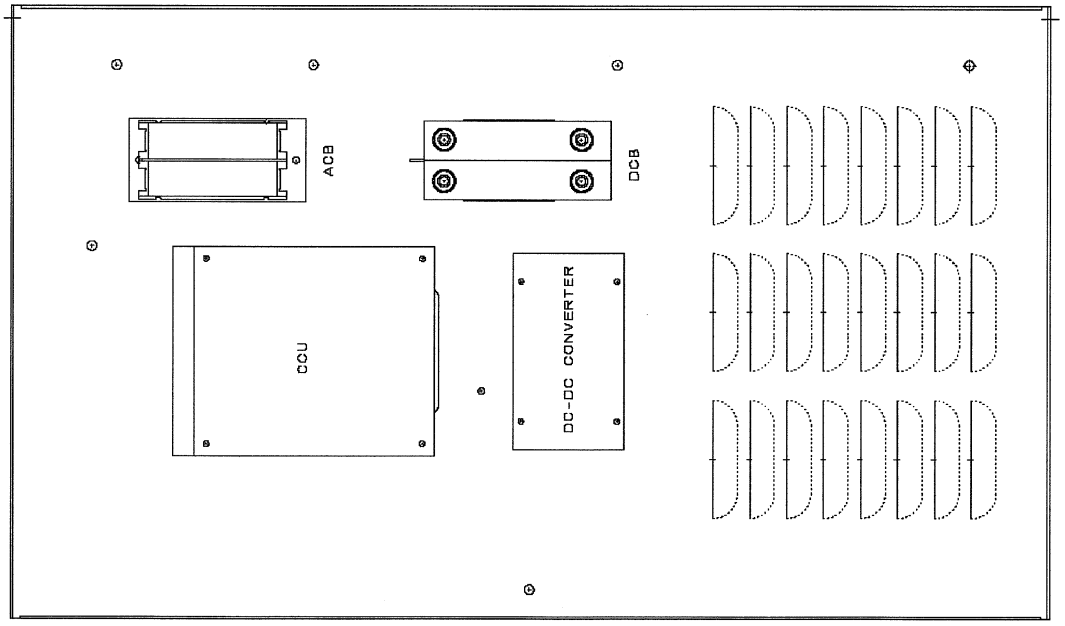


NOTES
1. DIMENSIONS IN BRACKETS [ ] ARE IN INCHES.
2. COMPONENTS ACCESSIBLE FROM CABINET FRONT.
3. DOOR OPENING APPROXIMATELY 100°.
4. VENTILATION AT TOP ALLOW 51.00mm [2.00] AND 254.00mm [10.000] ABOVE FOR PROPER VENTILATION.
5. MATERIAL: ENCLOSURE - 1.50mm [16GA] C.R.S.
   REAR PANEL - 2.50mm [12GA] C.R.S.
   DOOR - 1.50mm [16GA] C.R.S.
6. FINISH: NON-METALLIC DARK GREY.





REAR PANEL



INSIDE OF DOOR

MANUFACTURER'S

WARRANTY

Manufacturer warrants to the original user 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 manufacturer's instruction.

Manufacturer's liability under this warranty is limited to repairing or replacing without charge at its factory any defective products which, at purchasers expense, have been returned to the manufacturer's factory under its return policy or, where applicable, one of its authorized service stations within one (1) year after being put into service by the original user, or one and one-half (1-1/2) years from the date of shipment, whichever occurs first. The repair or replacement of any defective product shall constitute fulfilment of the manufacturer's obligation to the original user.

This warranty applies to manufacturer's products which are shown by the original user 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 manufacturer's factory or one of its authorized service stations unless authorized in writing by the manufacturer.

Manufacturer, seller or any of its agents 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 the manufacturer nor to assume for the manufacturer any other liability in connection with any of its products unless made in writing and signed by an officer of the manufacturer.

Where manufacturer's "Startup Service" is purchased by purchaser covering products by the manufacturer, the warranty period as provided herein will be extended to one and one-half (1-1/2) years after the product has been put into service by an authorized service technician.

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Revision 2

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