magellanpower

AUSTRALIAN MADE

OPERATION
AND
MAINTENANCE
MANUAL

SINGLE PHASE
MCRII SERIES
BATTERY CHARGER

THIS MANUAL SHOULD REMAIN WITH EQUIPMENT

OPERATION AND MAINTENANCE MANUAL

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SAFETY PRECAUTIONS

DANGER!

- This equipment contains high DC and AC voltages. Do not work on live equipment unless authorised.
- Isolate AC and DC before working on the equipment. Battery voltage may be present even when mains is isolated.
- Give internal capacitors time to discharge (1 minute) before working on the equipment.
- To completely isolate the equipment, switch off all circuit breakers and fuses and allow the internal capacitors to discharge.
- Batteries on charge, especially boost charge, generate Hydrogen which has the potential to ignite. Ensure that there is adequate ventilation available for the hydrogen to escape.
- Do not disconnect the batteries, while the charger is in operation.

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1.0 INTRODUCTION

The Magellan Powertronics MCRII Series single phase battery charger / DC power system utilises phase controlled AC to DC conversion technique together with the latest micro-processor hardware and software to produce advanced charging systems suitable for Lead Acid, Nickel-Cadmium or Lithium Iron batteries.

The MCRII charger is a constant voltage type, with current limit and two voltage levels: ***float*** and ***boost***. The boost level is used to recharge the battery whilst the float is used to keep the battery in a fully charged condition. For applications using sealed Lead Acid batteries, the boost function may be disabled.

The boost mode can be initiated manually or automatically. The manual boost is initiated by depressing the momentary boost button and the status is indicated on the LCD display. The charger then remains in the boost for a period of 0 to 24 hours (selectable) after which it will automatically revert to float mode. The automatic boost is activated if the current into the battery exceeds a pre-set limit for a pre-set time. The automatic boost is also controlled by a boost timer (0 to 24H).

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2.0 GENERAL SPECIFICATIONS

2.1 AC INPUT:

Voltage:	240V ±10%, Single Phase
Frequency:	50Hz ±5%
Current:	As per model

2.2 DC OUTPUT:

Nominal:	As per model (see test sheet)
Float:	As per model (see test sheet)
Boost:	As per model (see test sheet)
Output Current:	As per model (see test sheet)
Output Ripple	1% without battery connected

2.3 LOAD REGULATION

Static load regulation:	±1% for 1 to 100% Load ±10% Input Variation 5% Frequency Variation

2.4 OPERATING ENVIRONMENT

Maximum operating temp: 50°C	
Storage temp.	-40°C to 70°C ambient
Max humidity	95% R H

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2.5 ALARMS

Mains Fail	No Adjustment
Charger Fail	No Adjustment
Low Electrolyte	No Adjustment (for vented batteries only)
Battery Disconnected	No Adjustment
Battery Fail	As per model (software adjustable)
DC Low	As per model (software adjustable)
DC High	As per model (software adjustable)
Over volt Charger disconnect	As per model (software adjustable)
Under volts load disconnect	As per model (software adjustable)
Earth Fault	10mA (adjustable)

Note: For alarm settings please refer to the test sheet

2.6 METERING

Charger Voltage
Charger Current
Battery 1 Voltage
Battery 1 Charge/Discharge Current
Battery 2 Voltage (for dual battery systems)
Battery 2 Charge/Discharge Current (for dual battery systems)
Load Voltage
Load Current
Battery 1 Temperature
Battery 2 Temperature (for dual battery systems)
Battery Ampere hour Capacity meter
All Liquid Crystal Display - ±1% accuracy

2.7 PROTECTION

AC Input Circuit Breaker
Charger Current Limit
Battery Current Limit
Battery Circuit Breaker
Load Circuit Breakers, individual feeders
Battery Over Voltage Charger Inhibit

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Battery Over Voltage Mains Trip (optional)

2.8 CONTROLS

The following adjustments can be done by the software:

Float Voltage Adjustment
Boost Voltage Adjustment
Boost Timer Adjustment
Charger Current Limit Adjustment
Battery 1 Current Limit Adjustment
Battery 2 Current Limit Adjustment (for dual battery systems)
Load Sense Boost Inhibit
DC Low Alarm Adjustment
DC High Alarm Adjustment
High Volts Inhibit
High Volts Disconnect Adjustment
Low Volts Disconnect Adjustment
Battery Fail Voltage Adjustment

The following adjustment can be done using on-board potentiometers:
Earth Leakage Current setting

The following adjustments can be done using on-board potentiometers in chargers provided with optional Hardware Output Over and Under Voltage Trip:

Over Voltage Trip Level
Under Voltage Trip Level
Over Voltage Trip Delay
Under Voltage Trip Delay

Please refer to the CHARGER TEST SHEET in Appendix 1 for details specific to this charger.

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3.0 INSTALLATION INSTRUCTIONS

Install the battery charger in the allocated position and ensure that sufficient cooling air is available for natural convection cooling.

3.1 CABLING

Refer to the Charger Schematic and Connection Diagram in the Appendix

1. Connect Single Phase 240V and earth to terminal X1 in accordance with the schematic diagram. (Refer to "Charger Test sheet" for current demand and size cable to suit).
2. Connect the battery temperature probes to the terminals X5 1, 2. The details are given in the schematic drawing and the table provided in the Appendix. Mount the temperature probe to the negative terminal of the battery. Please also make sure that battery temperature probe is connected correctly to terminal X5. Wrong connection of the battery temperature probe will result in incorrect operation of the charger.
3. Connect the battery bank to the terminal X2. (Please observe polarity). Note: If Impedance Test or Full Battery Test Facility options are included, please connect terminal X2 (wire numbers 101 and 102) to the actual battery terminals.
4. Connect load as per the schematic drawing.
5. Connect external alarm wiring (if applicable) as per schematic drawing.

3.2 INSTALLATION PRECAUTIONS

- **The (optional) battery impedance connections (101, 102, 103 and 104 on the schematic), used with the optional Battery Impedance Test or Full Battery Test, must be connected in parallel to the standard battery connections, as in the schematic diagram.**

- **MCRII requires that the battery temperature sensor is connected to operate correctly. If it is not connected, if it is shorted, or if the polarity is reversed, the charger may not operate, as a safety precaution.**

- **The Common Alarm relay and optional Alarm Card relays are fail-safe, therefore are energised under normal operating conditions, and de-energised under fault conditions. This means that an N/C connection will be open when no fault is indicated, and close on a fault condition.**

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4.0 CIRCUIT DESCRIPTION

See Charger Schematic drawing in the Appendix
The AC input voltage is applied to the power transformer (T1) primary winding via the input EMI filter and the input Circuit Breaker CB1. Transformer (T1) galvanically isolates the AC mains input from the DC output and converts the mains voltage into secondary voltage of the required levels for the power bridge (BR1).
The half-controlled thyristor bridge operates in a phase control scheme to rectify and regulate the output power. The unfiltered DC voltage produced by the bridge is fed to the Inductor/Capacitor filter network (L1, C1) for smoothing. The filter reduces the ripple content of the output DC to a very low level. The charger current is sensed by the current shunt. A separate shunt senses the battery current for the purpose of battery current limiting and display.

4.1 CONTROL AND MONITOR CIRCUITS

The control circuit monitors the output voltage and current and compares them with set values; the thyristor conduction angle is then adjusted to ensure that the output voltage and current are in accordance with the preset levels.

The control circuit is contained on three electronic circuit boards. The Interface Board (A2) communicates with the MCRII Microcontroller Board (A3) via a 34-way ribbon cable and carries out the following functions:

1. Buffers and filters and scales the incoming voltage, current and temperature signals.
2. Buffers and level translate the control output to the SCR Firing Board (A1).

The Interface Board also contains an isolated +/-12V power supply. This power supply is in turn supplied from two sources, a step-down control transformer with 18V secondary and the battery. This ensures that the control circuit is powered even when either the mains or the battery is absent. The control power is distributed via the 34-way ribbon cable to the Microcontroller board.

The Microcontroller Board monitors the battery and charger parameters and generates alarm signals which are used to drive the alarm LEDs and relays on the relay board A4, if installed. A common alarm relay situated on the Interface Board

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(A2) de-energises if an alarm condition is detected. The common alarm signal also drives a buzzer located on the Microcontroller Board (A3). The buzzer sounds for any alarm condition and will stay on for the duration of the alarm. The buzzer can be muted by depressing the ***Mute*** button on the front panel.

The Microcontroller Board provides voltage and current control references to the Interface Board via a D/A converter. These references are compared with voltage and current feedback signals. The output signal from the error amplifier is fed to the SCR Firing Circuit (A1) where it is compared with a reference ramp synchronised to the mains. The output of the comparator then controls a high frequency oscillator to fire the thyristors through a pulse transformer.

All metering functions are generated by the Microcontroller (A3) from filtered inputs obtained from the Interface Board (A2). These signals are routed through the CPU's analogue inputs and are displayed on the graphical LCD display.

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5.0 OPERATING INSTRUCTIONS

5.1 START UP

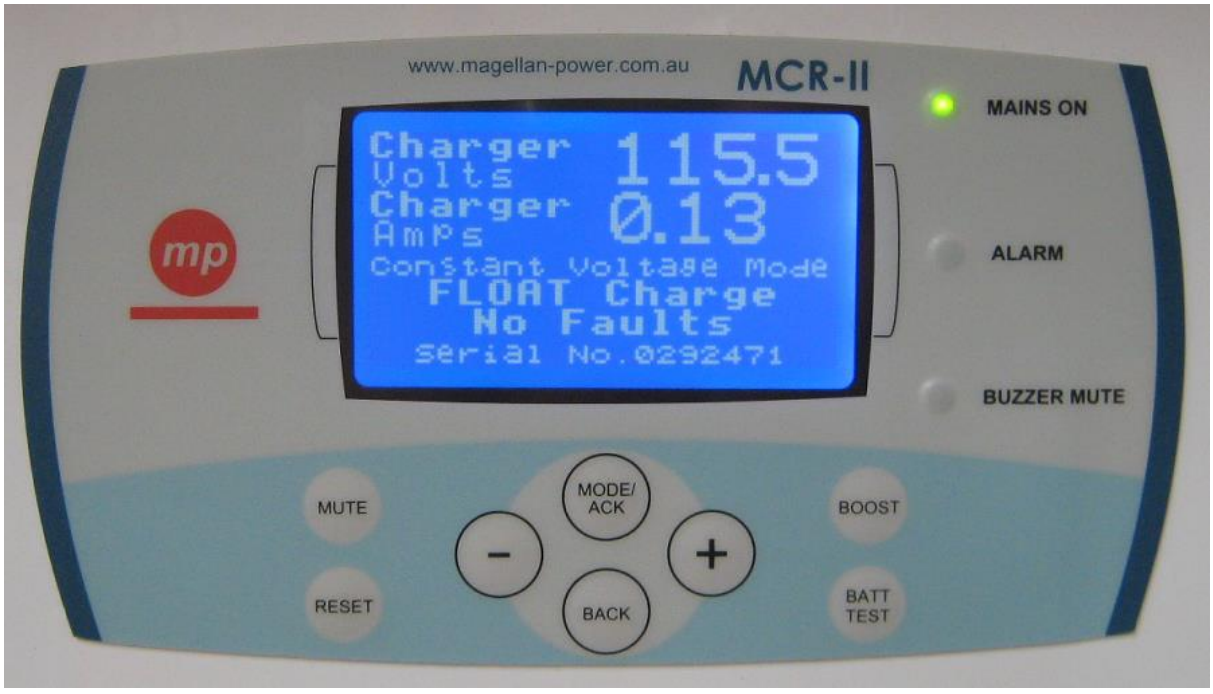
The following start up procedure should be employed whenever starting the system after a total shutdown.

1) Switch on Battery Breaker CB3. This will cause the display to come on and go through the start-up sequence, briefly display the MAGELLAN logo and show the top page after a delay of a few seconds.
2) Switch on Mains Power input circuit breaker (Refer to the schematic drawing).
3) The charger should now start to deliver some charging current to the battery. If the batteries are fully charged the voltage will quickly approach the Float level and the charger current will get reduced.
4) Switch on the Load Circuit Breaker (Refer to schematic drawing).
5) The system should now be delivering the load current and charging the batteries and all alarms would be reset.

5.2 VOLTAGE AND CURRENT DISPLAY

The following parameters are displayed on the front panel LCD:

Screen 1 Charger voltage, Charger Current, Operating Mode and Fault.



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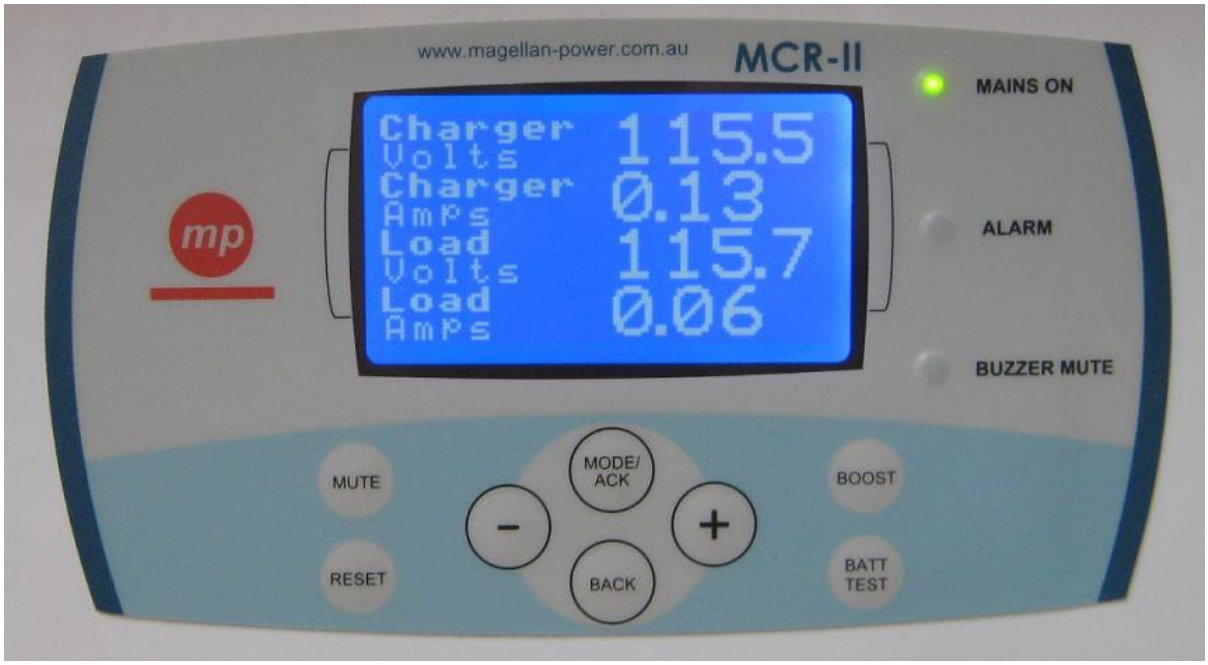
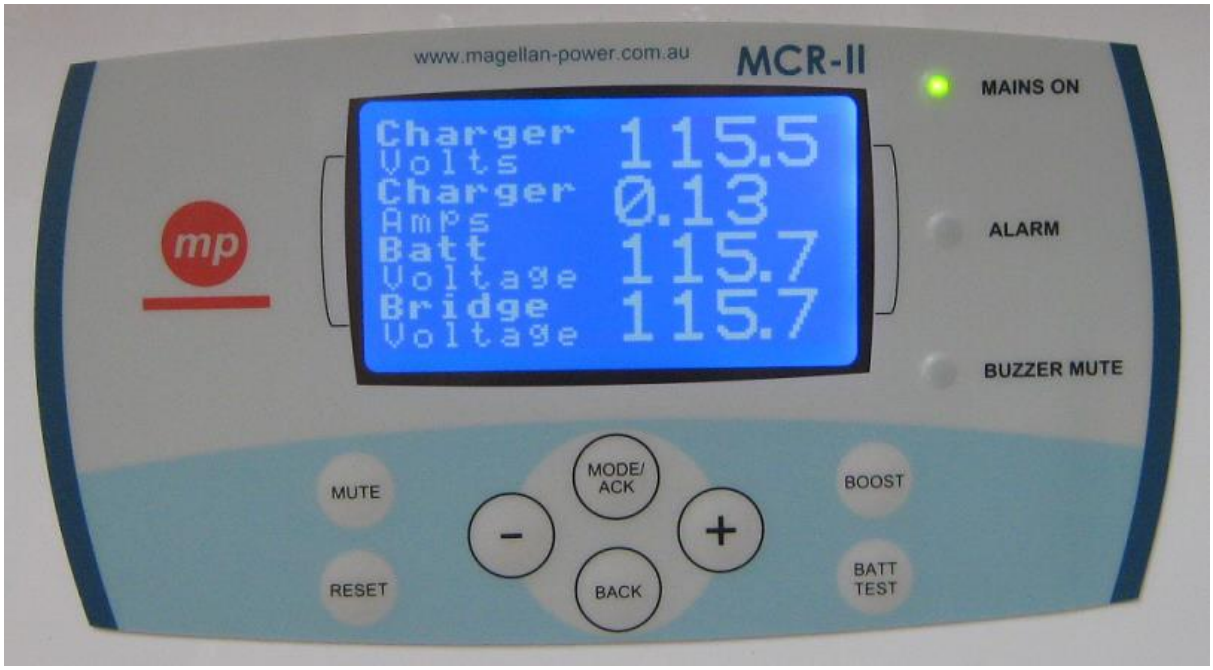
Screen 2 Charger voltage, Charger Current, Load Voltage, Load Current.



Screen 3 Charger voltage, Charger Current, Battery Voltage, Thyristor Bridge.



Screen 4 Charger voltage, Charger Current, Battery Temperature, Battery Current.

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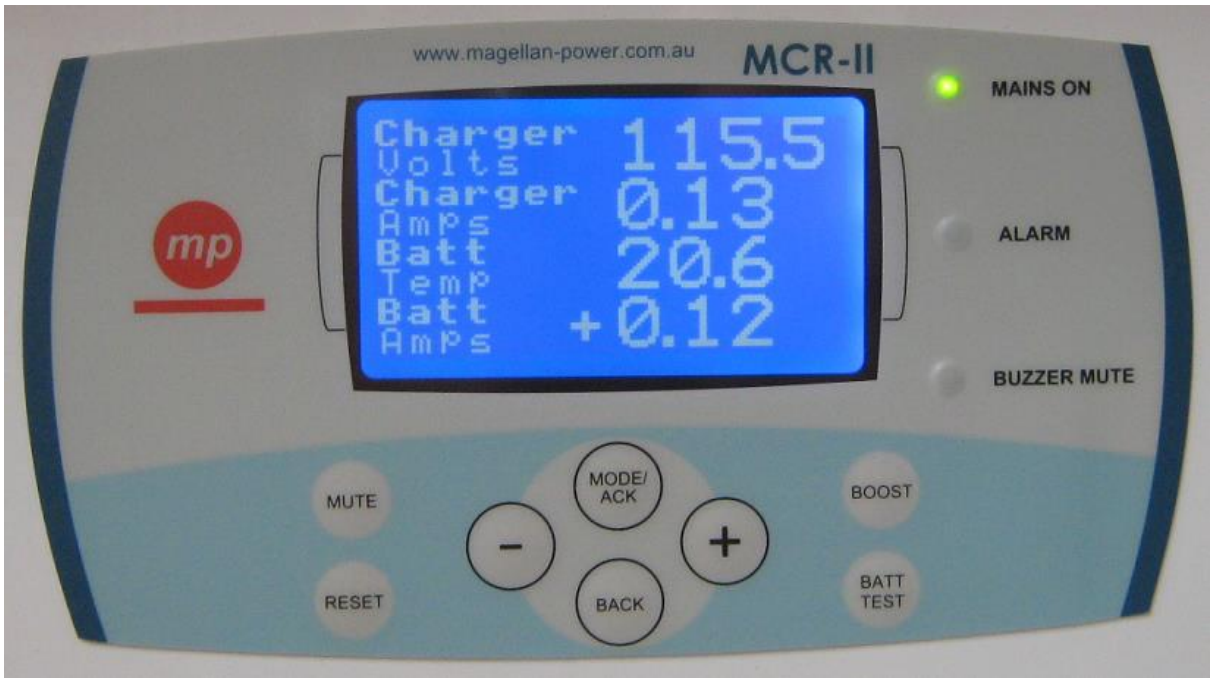
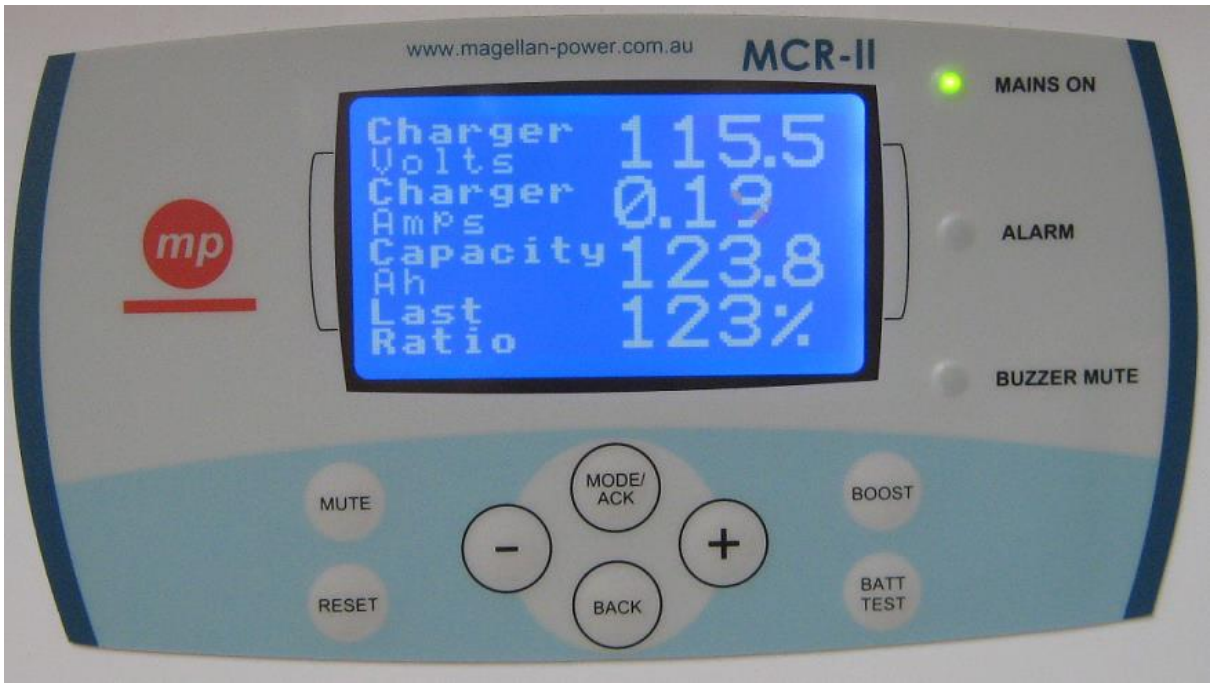


Screen 5 Charger voltage, Charger Current, Battery AH Capacity, Last AH Ratio (in % of expected capacity).



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Cycling through these screens is achieved by operating the ***Mode/Ack*** switch on the front panel. The display will automatically return to Screen 1 in 5 minutes if left on Screen 2 to 5.

5.3 BOOST CHARGING BATTERIES

5.3.1 Manual operation

The boost charging circuit is achieved by pressing the ***Boost*** button on the front panel. The system will then remain in boost mode until the internal boost timer completes the preset boost cycle.
The boost mode can be terminated by pressing the ***Boost*** button again.

5.3.2 Automatic boost

Charging of the system commences if the battery charging current exceeds a selected value for a preset period. Both the battery current value and the preset period are user adjustable. (See User Programmable Set Point Instructions).
Automatic boost mode is terminated by pressing the ***Boost*** button.

5.4 BATTERY TEST

5.4.1 MODE 1: Battery Impedance Test

The Battery Impedance test calculates internal resistance within the battery by drawing a high current pulse (approx. 50A, which does not indicate on front display) and by monitoring the battery's voltage drop.

5.4.1.1 PROCEDURE:

1) Momentarily press 'BATT TEST' button
2) Display goes automatically to capacity and Last ratio menu. Wait for 5-6 seconds for Impedance and Baseline mOhms to appear on the screen.
3) Repeat step 1 until Impedance mOhms shows a stable reading after multiple trails (proximately 5 times).

5.4.1.2 First time or New Batteries:

After observing that the Battery Impedance is stable, hold Reset button for 6 seconds to set the measured impedance as the baseline impedance. This is done to obtain a reference impedance to compare with future impedance values. This baseline impedance is now the reference for future impedance measurement and comparison.

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When the difference between the measured impedance and the Baseline Impedance is greater than 75% of the Baseline Impedance, the Battery Fail Alarm will be activated.

5.4.2 MODE 2: Discharge Test

The Discharge Test operates by discharging the battery into a load that is connected across the battery for 5 minutes. During this test, the charger voltage is lowered to a preset value and the battery voltage is monitored to check that it does not drop below the "Battery Discharge Threshold" Setpoint.

A Battery Fail alarm is activated if the battery voltage drops below "Battery Discharge Threshold". If the internal timer completes its cycle before battery voltage drops to "Battery Discharge Threshold" level, the charger will return to normal mode without activating any alarm.

The Battery Test Facility is optional. The default time of 5 minutes for this test can be changed by front panel in the menu Battery Test Setup. (*Refer pg:24*)

5.4.2.1 PROCEDURE:

1) Press and hold 'BATT TEST' button for 5 seconds.
2) Display goes automatically to Capacity and Last ratio menu.
3) The display shows time left for this test and indicates the current drawn from the battery.
4) The latest Impedance and Baseline Impedance values are also displayed alternately.

Note: This test is done once in every 30 days by default from (1 to 99 days).

5.4.3 MODE 3: Battery Capacity Test

The Battery Capacity Test fully discharges the battery to record its available capacity in ampere hours and will also display this value as a percentage of the expected (rated value of the battery) value. The batteries are discharged down to their End Voltage (called CAP TEST LEVEL on Battery test setup) into the discharge load connected across them. It may take few hours depending on the Amp/hr of the battery.

During this test the charger voltage is lowered to a safe level for the load connected. The battery voltage and current are monitored by the CPU which constantly calculates ampere hours discharged from the battery. This test continues until battery voltage reaches 'End Voltage' as specified. After the 'End Voltage' is reached, calculated Ah capacity with time taken will be displayed.

Special note: The test will be terminated if battery voltage falls below the End Voltage at any moment during this test.

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5.4.3.1 PROCEDURE:

1) Press and hold 'BATT TEST' button for more than 10 seconds.
2) Display goes automatically to Capacity and Last ratio menu, and alternately shows Battery Impedance and Baseline mOhms, and then Capacity and Battery Amps.
3) After the test is completed charger will start charging the battery.
4) Charge the battery bank.
   Warning: Batteries should always be left in the charged state. Leaving batteries in discharge stated will result in battery damage.

How to terminate the tests abruptly:

- Pressing the 'RESET' button any time during any of these three modes.
- Detection of 'MAINS FAIL' alarm will automatically terminate battery test modes.

5.5 TEMPERATURE COMPENSATION

This facility adjusts the charger voltage in accordance with the battery temperature. The charger voltage is lower at higher temperatures. For the Battery Temperature Compensation to operate the temperature probes must be connected to the terminals X5 provided on the charger. The temperature probes are to be mounted on the battery terminals, ensuring good thermal contact.

If the battery temperature probes are not connected, then the battery temperature indicated on the LCD panel would be very high. Incorrect connection, or disconnection of the probes may result in the charger not operating, to avoid overcharging an apparently hot battery.

5.5.1 Alarm Reset and Mute

5.5.1.1 Reset

Operating the ***Reset*** key on the front panel will reset any latched alarms, reset the alarm mute and terminate a battery test (if active). All alarm functions (except for Under and Over voltage trip) may be preset in either a latching or non-latching state.

When an alarm latch is set to the ON position (See User Programmable Set Point Instructions), both the alarm LED and the common alarm will continue to indicate that an alarm condition exists until the alarm has cleared and the *Reset* key on the front panel is activated. When an alarms latch is set to the Off position, the alarm LED and the common alarm will only indicate while the alarm condition exists.

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Under voltage trip is always non-latching, as it also drives an auxiliary relay whose function is to reconnect the battery as soon as the charging system returns to normal. (This is an optional feature)

(See Alarm Operational Description).

Over Voltage trip is always latching.

5.5.1.2 Mute

The ***Mute*** key will silence the audible alarm while an alarm state exists.
The operation of the alarm mute has two pre-settable modes. (See User Programmable Set Point Instructions).

In mode 1, the ***Mute*** key will continue to silence the audible alarm until a new alarm condition occurs, or the ***Reset*** key on the front panel is activated.

In mode 2, the ***Mute*** key will continue to silence the audible alarm until it is reset by the ***Reset*** key on the front panel. Therefore, any new alarm that occurs after the ***Mute*** key has been activated will not operate the audible alarm.

5.5.1.3 Constant Current Charging

The MCR Series Rectifier has a built-in constant current charging function to enable the user to perform commissioning charges when new batteries are installed, or when cycling the existing battery bank.

To perform constant current charging, it is necessary to ensure no load is connected to the charger (due to the high output voltage). The system has built in protection that will terminate the constant current mode if any load current is detected.

Select the Constant Current Setting menu. (See User Adjustable Set Point Instructions.) A warning screen will appear informing the user to ensure the load is disconnected. Press the ***Mode*** key on the rectifier front panel to clear the warning.

Set the Constant Current Mode to ON by using the ***Arrow*** keys.

Pressing the ***Mode*** key will display the period which the charger will operate in Constant Current Mode. Adjust by using the ***Arrow*** keys (if necessary.)

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Pressing the ***Mode*** key will now display the charging rate at which the charger will operate while in constant current mode. Adjust by using the ***Arrow*** keys (if necessary).

Pressing the battery test key will initiate constant current mode. The charger will remain in this mode until the preset time has elapsed. The charger will then return to its normal state.

Constant current charging can be manually terminated by operating the ***Reset*** key.

5.5.2 Remote Communications (*Optional*)

The charger can communicate to an external or remote computer or LAN via an optional communication card. The communication methods available are:

- RS-232, DB-9
- RS-485
- Ethernet RJ-45

All information relating to the communications port is located in the MCRII Remote Communications Manual supplied with the MCRII Remote Communications Package.

Note: for Ethernet RJ-45 communication used right angle connector to avoid the door

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6.0 ADJUSTMENTS

The Programmable Setpoints can be programmed either from the Keypad LCD panel or from a computer connected to the charger through the communication card. Some of the settings are password protected to prevent unauthorised changes from being implemented. This password protection is not present when using the computer link.

6.1 SETTING FROM THE KEY-PAD

1. Hold down MODE/ACK, - and + keys together for more than 5 seconds. This will take the controller to the programming mode.
2. Go to the appropriate Sub-menu by operating the -/+ arrow keys. Select by pressing the MODE key. Pressing the MODE key again will take the screen to the next item under the Sub-menu.
3. Once the desired Setpoint is displayed, adjust by pressing the -/+ keys on the front panel key-pad for the required setting.
4. To save and exit press BACK key.

6.2 SETTING FROM THE COMPUTER

The details are given in the MCRII Remote Communications Manual supplied with the MCRII Remote Communications Package.

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6.3 PROGRAMMABLE SET POINT DESCRIPTIONS

Following is a description of the function each adjustable set point.

Sub Menu 1 Float and Boost Charging Settings

The following set points are used to set the charger output voltage settings and to set the boost operational parameters.

Float Voltage	Sets the charger output voltage in float mode.
Boost Voltage	Sets the charger output voltage in boost mode.
Boost Timer	Sets the period of one boost cycle.
Battery 1 Boost Activation Current	Sets the Battery 1 current level at which Auto Boost is activated.
Battery 2 Boost Activation Current	Sets the Battery 2 current level at which Auto Boost is activated.
Boost Activation Delay	Sets the period that the Boost Activation Current must maintain before the charger switches to auto boost mode.
Boost Cut-out Ratio	Sets the voltage (as percentage of boost voltage) at which the boost mode is terminated, if this voltage is reached within the `Boost Cut-out Period'.
Boost Cut-out Period	Sets the period within which the boost is terminated if the Boost Cut-out Ratio is reached.

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Sub Menu 2 Alarm and Trip Settings

The following parameters are used for setting alarm and over/under voltage trip and delay times.

Hi Voltage Alarm	Sets activation voltage of the DC High alarm.
Hi Voltage Alarm Delay	Sets the delay time (seconds) between alarm detection and alarm indication.
Low Voltage Alarm	Sets activation voltage of the DC Low alarm.
Low Voltage Alarm Delay	Sets the delay time (seconds) between alarm detection and alarm indication.
Over Voltage Trip	Sets activation voltage of the Over Voltage Trip alarm and protection relay (optional).
Over Voltage Trip Delay	Sets the delay time (seconds) between alarm detection and alarm indication.
Under Voltage Trip	Sets activation voltage of the Under-Voltage Trip alarm and protection relay (optional).
Under Voltage Trip Delay	Sets the delay time (seconds) between alarm detection and alarm indication.
Charger Fail Delay	Sets the delay time (seconds) between alarm detection and alarm indication of the Charger Fail Alarm.
Battery Topping Temperature	Sets the battery temperature at which point the charging current is reduced by 50% to prevent overheating. This should be set to 250 if not used.
Battery Over Temperature	Sets the battery temperature at which point the charging is terminated. This should be set to 250 if not used.
Maximum Impedance Change	Percentage Change in the battery impedance value beyond which the battery is considered to be faulty.

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6.3.1 Sub Menu 3 Diode Dropper Settings

A Diode Dropper may be used to further regulate the load voltage.

(This feature is optional).

The following parameters are used for setting the switch-in and switch-out voltages for the diode droppers.
Note: The settings should be kept just beyond the maximum charger voltage if the diode dropper is not used.

Diode Dropper 1 On	Sets the voltage at which the first diode string will be switched in-line.
Diode Dropper 1 Off	Sets the voltage at which the diodes will be shorted.
Diode Dropper 2 On	Sets the voltage at which the second diode string will be switched in-line.
Diode Dropper 2 Off	Sets the voltage at which the diodes will be shorted.
Diode Dropper 3 On	Sets the voltage at which the third diode string will be switched in-line.
Diode Dropper 3 Off	Sets the voltage at which the diodes will be shorted.

6.3.2 Sub Menu 4 Battery Test Set up

(This feature is optional.)

The following set points are used for programming the manual and automatic battery test functions.

Batt Discharge Threshold	Sets the voltage at which the battery fail alarm will activate.
Battery Test Cycle	Sets how often an automatic battery test is activated. (1 to 99 days).
Battery Test Duration	Sets the period of the battery test (1 to 60 minutes).
Battery Disconnect Bypass	Enables/Disables battery disconnect test function.
High Discharge Test	Enables the impedance measurement test.
Cap. Test Level	Capacity test end voltage.

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Sub Menu 5 Latches and Inhibit Settings

The following set points program alarm latches and control selected alarm inhibits.

Earth Fault Inhibit	Inhibits the earth fault alarm.
Low Electrolyte Inhibit	Inhibits the low electrolyte alarm.
Temp Compensate Inhibit	Disables the battery temperature compensation function.
Boost Inhibit	Enables a total inhibit of boost mode operation.
Load Sense Boost Inhibit	Disables the boost function if a load is connected.
Battery Connection Pulse inhibit	Inhibits pulsing the battery to find out if it is connected to the system.
Muted-Alarm Trip	Sets the operational mode of the ***Mute*** key (see Operating Instructions).
Impedance Monitoring	Enables the Impedance Monitoring option.
Mains Fail O/P Latch On/Off	Sets the mains fail alarm output to latching.
Earth Fault O/P Latch On/Off	Sets the earth fault alarm output to latching.
Low Electrolyte O/P Latch On/Off	Sets the Low Electrolyte alarm output to latching.
Battery Discon. O/P Latch On/Off	Sets the battery disconnected alarm output to latching.
DC High O/P Latch On/Off	Sets the DC High alarm output to latching.
DC Low O/P Latch On/Off	Sets the DC Low alarm output to latching.
Charger Fail O/P Latch On/Off	Sets the charger fail alarm output to latching.
Battery Fail O/P Latch On/Off	Sets the battery fail alarm output to latching.

6.3.3 Sub Menu 6 Constant Current Charging Set up

The following set points are used to select and set the parameters for constant current battery charging. This is usually used for initial charging of a lead acid battery.

Constant Current Charging on/off	Enables constant current charging cycle to be activated.
Constant Current Time	Sets the period in which the charger will remain in constant current mode.
Constant Current Rate	Sets the constant current level.

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6.3.4 Sub Menu 7 Charger and Battery Definition Set up

Note: This menu is password protected. Adjustment should only be made in consultation with Magellan Powertronics.

The following set points are used to set the MCRII Controller to match the charger hardware (Charger and battery size and type).

Please refer to the RATING PLATE on the inside of the charger door for the values specific to this charger.

Serial Number	Serial Number of the Charger
Model Voltage	Identifies the charger nominal output voltage
Model Current	Identifies the charger maximum output current
Charger ID No	Identifies the charger for serial communications purposes when more than one charger is connected to the remote communication facility.
Dual Battery Enabled	Dual or Single Battery operation
Battery Type	Sets the type of battery to be charged by the charger. (Ni-Cad sealed or vented Lead Acid).
Temperature Compensation Factor	Sets the temperature compensation in mV/°C/Cell
No of cells	Sets the number of cells to be used in the battery bank.
Battery 1 Size	Sets the ampere hour capacity of the Battery bank 1.
Battery 2 Size	Sets the ampere hour capacity of the Battery bank 2.
New Security Code	The new value of the security code.

6.3.5 Sub Menu 8 Calibration

Note: This menu is password protected. Adjustment should only be made in consultation with Magellan Powertronics.

The chargers are factory calibrated and the calibration should not normally be changed. Automatic calibration is available with the Charger Monitoring Software.

The following set points are used to calibrate the LCD metering functions and the charger voltage control output. Follow the procedure given below to calibrate the metering using the LCD and Keypad.

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To calibrate each setting, it is necessary to connect a calibrated meter in circuit to measure the required meter function. The set point should then be adjusted by the front panel arrow keys, so the set point equals the external calibrated meter measurement. All set points, with the exception of the Reference Voltage O/P Calibration set point, can be adjusted up or down by the front panel arrow keys.

The Charger Control O/P set point (displayed on the LCD Display) will remain fixed, and the charger output voltage is adjusted up or down to match the setpoint by the front panel arrow keys.

Load Voltage Calibration	Calibrates the load voltage meter reading.
Battery 1 Voltage Calibration	Calibrates the Battery 1 volt meter reading.
Battery 2 Voltage Calibration	Calibrates the Battery 2 volt meter reading.
Charger Voltage Calibration	Calibrates the Charger voltage meter reading.
Charger Current Calibration	Calibrates the charger output current meter.
Charger Current Offset Calibration	Calibrates the charger output current offset.
Battery 1 Current Offset Calibration	Sets the zero point on the Battery 1 current meter.
Battery 2 Current Offset Calibration	Sets the zero point on the Battery 2 current meter.
Battery 1 Current Calibration	Calibrates the Battery 1 current meter.
Battery 2 Current Calibration	Calibrates the Battery 2 current meter.
Bridge Voltage Calibration	Calibrates the SCR bridge output voltage reading.
Charger Output Control Calibration	Calibrates the charger output control.
Temperature Offset Calibration	Calibrates the Battery temperature readings.

6.3.6 Sub Menu 9 Communications Set up

This sub menu is used to select and set the parameters for communication with the charger.

Details are given in the MCRII Remote Communications Manual supplied with the MCRII Remote Communications Package.

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6.3.7 Sub Menu 10 Diagnostic Set up

This sub menu is used to put the charger into a self-diagnostic mode.

Diagnostic Level 1	Setting to On enables the level 1 diagnostic.
Diagnostic Level 2	Setting to On enables the level 2 diagnostic.

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6.3.8 Sub Menu 11 Current Limit Set up

This sub menu is used to set the charger and battery current limits.

Note: This menu is password protected. Adjustment should only be made in consultation with Magellan Powertronics.

6.4 EARTH FAULT ALARM

Ensure that the earth fault alarm is not inhibited by the Micro-controller Board.

Connect an adjustable resistor in series with a multimeter capable of reading 0 to 50mA. Place the resistor/meter from earth to the charger output (+Ve). Adjust the resistor to obtain the required earth fault current reading on the multimeter. Then adjust P1 potentiometer on the Interface Board until the Earth Fault LED (D14 on the Interface board) comes On. Recheck the setting when the resistor/meter is connected from earth to charger (-Ve).

To inhibit this alarm, set the Earth Fault Inhibit set-point to ON in the Sub Menu 5, Latches and Inhibit Settings.

6.5 USER ADJUSTABLE SET POINT INSTRUCTIONS.

The following procedure should be employed when adjusting any set point.

1) Select the required set point from the programmable set point descriptions in Section 6.0 of this manual.
2) Follow the instructions contained in the User adjustable set point instructions flow chart on page 24 of this manual.
3) Once the set point has been adjusted and programming mode exited, it is a good idea to check the float and boost settings to ensure they have not been accidentally changed during set point adjustment.
   This should be done with a separate multimeter connected across the battery terminals.

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PROGRAMMING MODE SETTING

PRESS (-), (+) and MODE/ACK KEYS SIMULTANEOUSLY FOR 5 SECONDS. THE CPU BOARD WILL NOW SWITCH OVER TO PROGRAMMING/CALIBRATION MODE. PRESS (BACK) KEY TO REVERT TO NORMAL OPERATION ONCE PROGRAMMING IS COMPLETED.

FLOAT and BOOST CHARGING SETUP — ARROW KEYS (-) (+) — **VOLTAGE ALARM and TRIP POINT SETTINGS** — ARROW KEYS (-) (+) — **DIODE DROPPER SETTINGS** — ARROW KEYS (-) (+) — **BATTERY TEST SETUP** — ARROW KEYS (-) (+) — **LATCHES AND INHIBIT SETTINGS** — ARROW KEYS (-) (+) — **CONSTANT CURRENT CHARGING SETUP** — ARROW KEYS (-) (+) — **CHARGER AND BATTERY DEFINITION SETUP** — ARROW KEYS (-) (+) — **CHARGER METERING CALIBRATION** — ARROW KEYS (-) (+) — **COMMUNICATIONS SETUP** — ARROW KEYS (-) (+) — **DIAGNOSTICS SETUP** — ARROW KEYS (-) (+) — **CURRENT LIMIT SETUP**

SUB MENU 1

- PRESS MODE KEY
- FLOAT VOLTAGE
- PRESS MODE KEY
- BOOST VOLTAGE
- PRESS MODE KEY
- MANUAL BOOST TIMER
- PRESS MODE KEY
- AUTOMATIC BOOST TIMER
- PRESS MODE KEY
- BATT1 BOOST ACTIVATION CURRENT
- PRESS MODE KEY
- BATT2 BOOST ACTIVATION CURRENT
- PRESS MODE KEY
- BOOST ACTIVATION DELAY
- PRESS MODE KEY
- BOOST CUTOUT RATIO
- PRESS MODE KEY
- BOOST CUTOUT PERIOD
- PRESS MODE KEY
- AUTO BOOST PERIOD
- PRESS MODE KEY
- RETURN TO MAIN MENU

SUB MENU 2

- PRESS MODE KEY
- HI VOLTAGE ALARM
- PRESS MODE KEY
- HI VOLTAGE ALARM DELAY
- PRESS MODE KEY
- LO VOLTAGE ALARM
- PRESS MODE KEY
- LO VOLTAGE ALARM DELAY
- PRESS MODE KEY
- OVERVOLTAGE TRIP
- PRESS MODE KEY
- OVERVOLTAGE TRIP DELAY
- PRESS MODE KEY
- UNDERVOLTAGE TRIP
- PRESS MODE KEY
- UNDERVOLTAGE TRIP DELAY
- PRESS MODE KEY
- CHARGER FAIL DELAY
- PRESS MODE KEY
- BATT TOPPING TEMP
- PRESS MODE KEY
- BATT OVER TEMP
- PRESS MODE KEY
- MAX IMPEDANCE CHANGE
- PRESS MODE KEY
- BATT IMBAL. TRIP
- PRESS MODE KEY
- RETURN TO MAIN MENU

SUB MENU 3

- PRESS MODE KEY
- DIODE DROPPER # 1 ON
- PRESS MODE KEY
- DIODE DROPPER # 1 OFF
- PRESS MODE KEY
- DIODE DROPPER # 2 ON
- PRESS MODE KEY
- DIODE DROPPER # 2 OFF
- PRESS MODE KEY
- DIODE DROPPER # 3 ON
- PRESS MODE KEY
- DIODE DROPPER # 3 OFF
- PRESS MODE KEY
- RETURN TO MAIN MENU

SUB MENU 4

- PRESS MODE KEY
- BATTERY DISCHARGE THRESHOLD
- PRESS MODE KEY
- BATTERY TEST CYCLE
- PRESS MODE KEY
- BATTERY TEST DURATION
- PRESS MODE KEY
- BATT. DISCONNECT BYPASS
- PRESS MODE KEY
- HIGH DISCHARGE TEST
- PRESS MODE KEY
- CAP TEST LEVEL
- PRESS MODE KEY
- RETURN TO MAIN MENU

SUB MENU 5

- PRESS MODE KEY
- EARTH FAULT INHIBIT
- PRESS MODE KEY
- LOW ELECTRO/AUX INHIBIT
- PRESS MODE KEY
- TEMP COMPENSATE INHIBIT
- PRESS MODE KEY
- BOOST INHIBIT
- PRESS MODE KEY
- LOAD SENSE BOOST INHIBIT
- PRESS MODE KEY
- BATT CONN PULSE INHIBIT
- PRESS MODE KEY
- MUTE ALARM ALWAYS
- PRESS MODE KEY
- IMPEDANCE MONITORING
- PRESS MODE KEY
- MAINS FAIL O/P LATCH
- PRESS MODE KEY
- EARTH FAULT O/P LATCH
- PRESS MODE KEY
- LOW ELECTROLYTE /AUX LATCH
- PRESS MODE KEY
- BATTERY DISCONNECT O/P LATCH
- PRESS MODE KEY
- DC HIGH O/P LATCH
- PRESS MODE KEY
- DC LOW O/P LATCH
- PRESS MODE KEY
- CHARGER FAIL O/P LATCH
- PRESS MODE KEY
- BATTERY FAIL O/P LATCH
- PRESS MODE KEY
- RETURN TO MAIN MENU

SUB MENU 6

- PRESS MODE KEY
- *****WARNING*******
- PRESS MODE KEY
- CONSTANT CURRENT CHARGING
- PRESS MODE KEY
- CONSTANT CURRENT LEVEL
- PRESS MODE KEY
- CONSTANT CURRENT TIME
- PRESS MODE KEY
- RETURN TO MAIN MENU

SUB MENU 7

- PRESS MODE KEY
- SECURED MENU CODE
- PRESS MODE KEY
- SERIAL NUMBER
- PRESS MODE KEY
- MODEL VOLTAGE
- PRESS MODE KEY
- MODEL AMPERAGE
- PRESS MODE KEY
- DUAL BATTERY ENABLED = ON
- PRESS MODE KEY
- BATTERY TYPE
- PRESS MODE KEY
- TEMP COMPENSATION FACTOR
- PRESS MODE KEY
- NUMBER OF CELLS
- PRESS MODE KEY
- BATTERY 1 SIZE
- PRESS MODE KEY
- BATTERY 2 SIZE
- PRESS MODE KEY
- NEW SECURITY CODE
- PRESS MODE KEY
- RETURN TO MAIN MENU

SUB MENU 8

- PRESS MODE KEY
- SECURED MENU CODE
- PRESS MODE KEY
- LOAD VOLTAGE CAL
- PRESS MODE KEY
- BATTERY VOLTAGE CAL
- PRESS MODE KEY
- BATTERY2 VOLTAGE CAL
- PRESS MODE KEY
- CHARGER VOLTAGE CAL
- PRESS MODE KEY
- CHARGER CURRENT CAL
- PRESS MODE KEY
- CHARGER CURRENT OFFSET CAL
- PRESS MODE KEY
- BATTERY CURRENT OFFSET CAL
- PRESS MODE KEY
- BATTERY CURRENT CAL
- PRESS MODE KEY
- BATTERY2 CURRENT OFFSET CAL
- PRESS MODE KEY
- BATTERY2 CURRENT CAL
- PRESS MODE KEY
- BRIDGE VOLTAGE CAL
- PRESS MODE KEY
- CHARGER CONTROL O/P CAL
- PRESS MODE KEY
- TEMP OFFSET CAL
- PRESS MODE KEY
- TEMP2 OFFSET CAL
- PRESS MODE KEY
- RETURN TO MAIN MENU

SUB MENU 9

- PRESS MODE KEY
- SECURITY PASSWORD
- PRESS MODE KEY
- CHARGER ID NO
- PRESS MODE KEY
- DNP3 STATION ADDRESS
- PRESS MODE KEY
- Ethernet DHCP Enabled
- PRESS MODE KEY
- Local IP Address = 192.168.001.240
- PRESS MODE KEY
- Local IP Mask = 255.255.255.000
- PRESS MODE KEY
- Local MAC Address = 004.163.000.000
- PRESS MODE KEY
- Gateway IP Address = 192.168.001.001
- PRESS MODE KEY
- Client IP Address = 192.168.001.000
- PRESS MODE KEY
- Client IP Mask = 255.255.255.000
- PRESS MODE KEY
- RETURN TO MAIN MENU

SUB MENU 10

- PRESS MODE KEY
- DIAGNOSTICS LEVEL 1
- PRESS MODE KEY
- DIAGNOSTICS LEVEL 2
- PRESS MODE KEY
- RETURN TO MAIN MENU

SUB MENU 11

- PRESS MODE KEY
- SECURED MENU CODE

NOTE: Pressing (RESET) button for more than 30 seconds will restore the factory settings.

7.0 COMMISSIONING

7.1 START-UP

Before delivery the charger is factory adjusted in accordance with the test sheets. The actual Setpoints loaded are recorded in the test sheet.

The factory settings for float and boost rate charge volts are calculated to correspond with the number and type of battery cells.

***Note**:* Before testing the systems functions, the Commissioning Personnel should be familiar with the factory setting of each set point, including alarm delays and latching functions.

Check that the mains supply matches the supply requirements stated on the Ratings plate. Connect the mains power. Follow the start-up procedure.

7.2 CHECKING VOLTAGE LEVELS

Before making any adjustments and to obtain the correct set points of the charger, consult the Test Sheet. Ensure the battery is fully charged, this prevents unnecessary waiting time for the voltage to reach the boost level. When checking the voltage, check that the charger does not operate in current limit or without load. A good rule is to use a load current of between 5% and 80% of the nominal rated current.

7.3 CHECKING FLOAT VOLTAGE

With the charger set to float and batteries connected, connect a precision voltmeter across the output terminals X2 and take a reading.

If adjustment is required refer to the Adjustments section.

Note: With zero current the charger output voltage may be slightly different from the set Float voltage. Please take the readings with at least 5% load on the charger.

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7.4 CHECKING BOOST VOLTAGE

With the charger set to boost, connect a precision voltmeter across output terminals and take a reading. If adjustment is required refer to the adjustments section.

The following tests are optional and do not constitute the normal commissioning procedure.

7.5 CHECKING BATTERY CURRENT LIMITS

This test is to be carried out on one battery at a time.
Discharge Battery 1 for a while by switching the charger off and providing some DC load for a period of approx. 10 min. This time may vary depending on the size of the DC load compared to the battery capacity. When the battery has discharged sufficiently remove the load and switch charger on. The output current from the charger will now rise to the battery current limit level; check the current limit level. If adjustment is required refer to the Adjustments section.
Repeat for Battery 2.

Reconnect the load.

7.6 CHECKING CHARGER CURRENT LIMIT

Disconnect the batteries. Connect a load to draw more than the rated current of the charger at the float level. Switch charger on. The output current from the rectifier will now rise to the current limit level. Check the current limit setting on the ammeter on the front panel.

Reconnect the battery.

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7.7 TESTING MAINS FAIL ALARM

Simulate a mains failure by isolating the charger at the AC supply distribution board. After a delay the ***Mains Fail*** LED will be lit. Check that the mains fail relay on the Relay board A4 (if fitted) has de-energised and that its contacts (see Schematic Diagram) have changed over. Also check that the common alarm relay has de-energised and that buzzer is sounding. Ensure that the buzzer can be muted by pressing the ***Alarm Mute*** key. The mute function can be reset by pressing the ***Reset*** key.

Restore mains.

7.8 TESTING DC LOW ALARM

Disconnect the battery from the charger. Decrease the Float voltage (See User Adjustable Set Point Instruction Sheet) to a setting just below the DC Low level. The ***DC Low*** Alarm will be indicated on the LCD panel after the user programmable alarm delay has expired. Also check that the DC Low relay on the Relay board A4 (if fitted) has de-energised and that its contacts (see Schematic Diagram) have changed over, and check that the Common Alarm relay on the Interface Card has de-energised and that buzzer is sounding. Ensure that the buzzer can be muted by pressing the ***Alarm Mute*** key. The mute function can be reset by pressing the ***Reset*** key. Now adjust the Float voltage set point to 5 % above the DC Low alarm set point and ensure that the alarm can be reset.

Readjust the Float voltage to the level shown on the test report and reconnect the battery.

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7.9 TESTING DC HIGH ALARM

Disconnect all loads from the charger. Increase the Float voltage (See User Adjustable Set Point Instruction Sheet) to a setting just above the DC High level. The ***DC High*** Alarm will be indicated on the LCD panel after the user programmable alarm delay has expired. Also check that the DC high relay on the Relay board A4 (if fitted) has de-energised and that its contacts (see Schematic Diagram) have changed over, and check that the Common Alarm relay on the Interface Card has de-energised and that buzzer is sounding. Ensure that the buzzer can be muted by pressing the ***Alarm Mute*** key. The mute function can be reset by pressing the ***Reset*** key. Now adjust the Float voltage set point to 5 % below the DC High alarm set point and ensure that the alarm can be reset.

Readjust the Float voltage to the level shown on the test report.

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7.10 TESTING LOW ELECTROLYTE

Ensure the Low Electrolyte Alarm is not inhibited.
Remove the electrolyte probe (if fitted) and check for ***Low Electrolyte*** fault indication on the LCD panel. Check that the low electrolyte relay on the Relay board A4 (if fitted) has de-energised and that its contacts (see Schematic Diagram) have changed over. Also check that Common Alarm relay on the Interface Card has de-energised and that buzzer is sounding. Ensure that the buzzer can be muted by pressing the ***Alarm Mute*** switch. The mute function can be reset by pressing the ***Reset*** switch.

Replace the electrolyte probe

7.11 TESTING BATTERY FAIL

Disconnect the battery from the charger. Press the ***Battery Test*** switch and check that after the test period the ***Battery Fail*** LED lights up. Check that the battery fail relay on the Relay board A4 (if fitted) has de-energised and that its contacts (see Schematic Diagram) have changed over. Also check that the Common Alarm relay has de-energised and that buzzer is sounding. Ensure that pressing the Alarm Mute switch can mute the buzzer.

Reconnect the battery.

Note: In order to clear this alarm, the battery must be reconnected, and the Battery Test switch must be pressed to initiate another battery test cycle. The alarm will then clear if the battery passes the test.

8.0 RECOMMENDATIONS

- Magellan Powertronics recommend the use of anticorrosion gel on the batteries terminals after been installed, this is to prevent corrosion on the batteries terminals.

- For Ethernet connection use a right-angle RJ-45 connector as shown on the picture.

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Magellan Power Service Department

The Magellan Power Service Department has been formed to offer customers peace of mind when it comes to reliability of back-up power with presence in WA and Australia wide.

Magellan's service technicians are fully trained in all aspects of AC/DC repair and maintenance and bring the collective knowledge and experience of the entire Magellan Power design and manufacturing team.

Magellan provides preventative maintenance services for the following Magellan products and batteries:

- MCRI and MCRII DC UPS systems.
- Magellan AC UPS systems.
- Commercial UPS.
- VRLA, Lithium and NiCad batteries.

SERVICE AND COMMISSIONING

Magellan provides:

- Qualified in-house and certified electrical engineers specialising in Magellan Power products.
- Full service report provided.
- Comprehensive visual and mechanical inspection.
- Functional test.
- Full battery health check including battery capacity test.

Certifications and Insurance:

- Quality assurance: AS/NZS ISO9001:2015.
- Workers compensation insurance.
- Public liability insurance.
- Marine insurance

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