



**SPECIFICATIONS**

- Lilon/LiPo/LiFe : 1~6 cells    ● NiCd/NiMH : 1~15 cells    ● Lead acid (Pb) : 2~20V
- Charge rate : 5A Max    ● Discharge rate : 1A    ● Cycle time : 1~5 times
- Battery data memory : 5 models    ● Input voltage : 10~18V DC
- Max charge : 50W    ● Max discharge : 5W

**AVANT™**

INPUT  
DC10-18V TEMP

**AVANT™**

ENTER

PRESS

SELECT

CE

**SPECIFICATIONS**

Lilon/LiPo/LiFe : 1~6 CELLS  
 NiCd/NiMH : 1~15 CELLS    LEAD ACID (Pb) : 2~20V    CHARGE RATE : 5A MAX  
 DISCHARGE RATE : 1A    CYCLE TIME : 1~5 TIMES    BATTERY DATA MEMORY : 5 MODELS

**MULTI FUNCTION**

USER MANUAL

**BALANCE CHARGER**

www.batteryoption.com

REVERSE DISPLAY  
OR ENTER

**PATENT PENDING**

# AVANT Batteries CHARGER / BALANCER Operation Manual

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## 1.Introduction

**AVANT** is a battery charger and balancer equipped with high performance micro-processor which works with battery types including Li-Ion, Li-Polymer, LiFe, NiCd, NiMH and Pb battery types. It performs charging, discharging and cell balancing for battery packs which are used in electric-driven models. It supports:

- 1-6 cell Li-Ion (LiIo) / Li-Polymer (LiPo) / LiFe (Li-Iron) battery packs
- 1-15 cell NiMH / NiCd battery packs
- 2-20V Pb battery packs

**AVANT** is expandable in functionality with our self-developed high performance micro-processor smart chip. The MCU is programmable and Battery Option Limited (BOL) provides ROM update through dealers.

**AVANT** clear LCD display and simple connection procedures facilitate user-friendly operation, and what is more is its exquisite outlook and compact size which enhances portability.

### 1.1.Product Function Objectives

This product offers charging, discharging and balancing functions for Airsoft and RC battery packs, which includes:

- Charging, discharging and cell balancing functions for various types and specifications of battery packs;
- Convenient operation with clear LCD display and simple connection way;
- Modern design, prominent style; compact in size enhances portability;
- Self-developed intelligent chips of micro-processor with high performance, offers functional expandability.

## 2.Hardware Specifications

Physical Dimensions	135mm (L) x 80mm (W) x 25mm (H)
Main Body Material	Aluminium alloy case facilitates heat dissipation of electrical circuits
Surface Treatment	Chromed surface with silk-screen printing.
Display	LCD display with white backlight of 16 x 2 Graphic display for English alphabets, displaying status and information of operation.
Dial-knob Switch Control	Instead of pressing buttons, single digital dial-knob switch is applied, providing convenient multi-function control
Inverted Operation	Operating direction button "REVERSE DISPLAY" or "ENTER" provided on the panel. User can set the LCD display and dial-knob switch control at 180 degrees inverted operation, according to the main unit placement, providing ease of use under various positions. User can also set up the button as "ENTER"
Intelligent Fan	Interior temperature sensor, detecting interior temperature and control the operation of ventilation fan.



Heat Dissipating	Operates mainly under discharging. Main unit offers two heat dissipating modes: One is through the fan installed on top of the main unit, channeling heat from inside the unit; the other is by placing heat generating parts at the base of main unit with heat dissipating stickers. Case of the main unit acts as a heat-sink. Sufficient space and height is provided for the base of the main unit to avoid direct contact to the surface.
Warning Alert	Interior buzzer provides warning alarm and push button alert.
Power Input	Provides DC power input with crocodile clips connecting cables. DC socket for DC 10.0 – 18.0V, minimum 50W power adapter input. Crocodile clips cables are for direct connection to Pb lead-acid batteries.
External Thermal Detect	This is an optional function: temperature sensing connection point (3 Pin, 2.54mm Molex port), connecting DS18B20 digital temperature sensor in order to monitor the temperature of battery pack for cut off
Battery +/- Output	+ and – output ports are composed of two banana connectors, connecting to both ends of batteries. Matching different connection cables, linking receivers, transmitter and battery starter. Crocodile clip cables are provided for connecting to various battery types.
Balancing Output	Specially for LiPo, Lilo and LiFe batteries, providing charging, discharging and balancing functions. Balancing socket is connected to different number of cells by 2 – 6 Pin 2.54mm Molex socket.3.

### 3. Descriptions of Functions

This chapter provides detailed elaboration on the operation of the main unit and requirement for charging and discharging various types of batteries.

#### 3.1. Basic Functions:

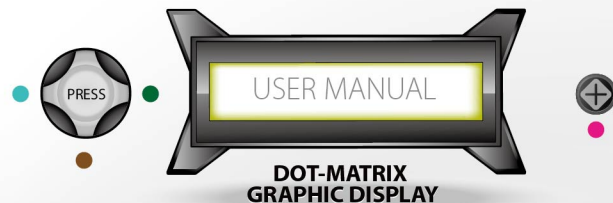
Charging & Discharging Modes	Equipped with various charging & discharging modes for various types of batteries. User can select the most suitable mode according to various needs of batteries. User can also depend on their actual needs, adjust various modes and values for charging and discharging at any time.
Charging & Discharging in Cycles	User can select charging & discharging in cycles to resume battery capacities or re-organize voltage of individual cell.
Storing sets of Parameters	Support storage for five sets of parameters (operation mode of each battery type is regarded as one set of figure).
Battery-safe Functions	Provides the following battery safety mechanism: <ul style="list-style-type: none"> <li>-Time limit preventing over-charge</li> <li>-Capacity limit preventing over-charge</li> <li>-Battery temperature limit preventing over-heat (this is an optional item)</li> <li>-Polarity detection</li> </ul>
Self-protective Functions	Provides various self-protection functions: <ul style="list-style-type: none"> <li>-Save parameters protection: Built-in data protection and resuming functions, to prevent loss of set data due to system or human faults, which could be harmful to the data output and safety of batteries.</li> <li>-WATCH DOG protection: When main unit stops operation due to internal failure, CPU will be re-started and all output switched off, to ensure the safety of batteries.</li> <li>-Input Voltage protection: Continuous monitoring the quality of input power. Operation will be stopped when abnormal situation arises.</li> <li>-Output protection: Built-in monitoring functions to monitor and adjust voltage and current output, prevent faulty output from causing dangers.</li> <li>-Main unit temperature protection: With Interior thermistor, when reaching over 60°C, all operation will be stopped by the main unit with buzzer giving alarm. (This is an optional function)</li> </ul>
Intelligent Diagnose Function	Prior to any mode of operation, main unit will conduct self-diagnosing once, to ensure safety of battery charging and discharging.
Complete Fault Alert	When abnormal situation arises, main unit will stop all operations and display relevant messages, provide user a complete message on faults encountered.

## AVANT Batteries CHARGER / BALANCER 3.1.1. DIAL-KNOB AND BUTTON OPERATION

- The circular switch on the left is a rotatory dial knob control which can rotate clockwise and anti-clockwise to SCROLL up and DOWN the FUNCTION menu.
- The centre of the rotatory dial knob control is a press-button which allows users to confirm selection by pressing on it.

- Upon pressing the "Reverse Display" button, the display will be upside down / inverted. This feature facilitates users' viewing the screen from any angle when **AVANT** is connected with cables and difficult to be moved.

- User can also interchange button function from "REVESE DISPLAY" to "ENTER" (refer user setting )



- **PRESS**
- **CLOCKWISE**
- **ANTI-CLOCKWISE**

- **REVESE DISPLAY/ ENTER**
- ★ **BACK TO FIRST STEP**

User can use the dial-knob to control the display. When reaching the relevant execution mode, press the centre of the dial-knob (for less than 3 seconds **3+**) to enter edit mode. In the above diagram, white wordings on black background represent adjustable parameters. Use the dial-knob to increase or decrease the figures. When reaching the appropriate figures, press the centre of the dial-knob to confirm selection. If figures are found incorrect after confirmation, simply press the dial-knob centre again for re-entering edit mode, and adjust the figures.



### 3.2. Various Batteries Parameters:

	LiPo	Lilo	LiFe	NiCd	NiMH	Pb
Nominal Battery Voltage	3.7V/cell	3.6V/cell	3.3V/cell	1.20V/cell	1.20V/cell	2.0V/cell
Max. Charging Voltage	4.2V/cell	4.1V/cell	3.6V/cell	1.60V/cell	1.60V/cell	2.45V/ cell
Fast-Charge Current	< 1C	< 1C	< 4C	1C - 2C	1C - 2C	< 0.4C
Discharge Delta Peak Voltage	> 3.0V/cell	> 2.5V/cell	> 2.0V/cell	> 0.85V/cell	> 1.0V/cell	> 1.75V/cell
Mode of Charging	Balance, normal, fast	Balance, normal, fast	Balance, normal, fast	Auto, manual	Auto, manual	Auto
Cut-off Condition	Fast at 0.5A, normal at 0.1A, balance at max. voltage of battery	Fast at 0.5A, normal at 0.1A, balance at max. voltage of battery	Fast at 0.5A, normal at 0.1A, balance at max. voltage of battery	Full	Full	Full
Mode of Discharge	Normal	Normal	Normal	Normal	Normal	Normal
Cyclic Charge & Discharge	5 Cycle	5 Cycle	5 Cycle	5 Cycle	5 Cycle	NIL
Battery Saving	Adjust to listed voltage of battery automatically	Adjust to listed voltage of battery automatically	Adjust to listed voltage of battery automatically	Adjust to listed voltage of battery automatically	Adjust to listed voltage of battery automatically	Adjust to listed voltage of battery automatically
Unit Terminating Criteria	Time, capacity, temperature	Time, capacity, temperature	Time, capacity, temperature	Time, capacity, temperature	Time, capacity, temperature	Time, capacity, temperature

### 3.3. Charging & Discharging of Li-Ion/Li-Polymer/LiFe Batteries (1-6 cells)

#### Normal Charge

Charge at constant current (CC) preset by user. When reaching maximum voltage of battery charging, proceed to constant current voltage charging (CV). Current gradually drops and charging stops when reaching below 1/10 of set current.

#### Fast Charge

Charge at constant current (CC) preset by user. When reaching maximum voltage of battery charging, proceed to constant voltage charge (CV). Current gradually drops and charging stops when reaching below 1/5 of set current. Compare to Normal Charge, termination current is greater under Fast Charge, charging period is thus shorter. Charging capacity is the same.

#### Balance Charge

This mode can help to eliminate the voltage unbalance of individual cells in a battery pack. Balance Charge cable must be connected with the balance plug of the battery pack, to the **BALANCE PORT** at the right of the main unit. Different from ordinary modes of charging Lithium batteries, main unit monitors voltage of individual cells in a battery pack under Balance Charge, in order to maintain the maximum charging voltage (e.g LiPo battery within 4.2V), in order to avoid over-charge or under-charge of individual cells.

#### Discharge

Lithium battery is discharged at constant current (CC) preset by user. Discharge stops when voltage reaches Delta Peak Voltage. (Discharge Delta Peak Voltage = Discharge Delta Peak Voltage of cell x number of cells). Adjustable minimum discharge Delta Peak Voltage of cell:

- LiPo battery 3.00V/cell
- Lilo battery 2.50V/cell
- LiFe battery 2.00V/Cell

When connecting **BALANCE PORT**, main unit monitor voltage of each cell. Discharge stops when voltage of each cell is below cut-off voltage.

#### Cycle Charge & Discharge

Set at Cyclic direction: CHG -> DCHG (charge to discharge); DCHG -> CHG (discharge to charge). Charging can be set at: "Auto Charge"; "Manual Charge". Cyclic charge proceeds according to preset data. Cyclic discharge functions according to "Discharge Mode" settings. Maximum 5 cycles.

#### Saving

▲ When lithium battery is not used for long period, it is recommended to save the voltage of battery at:

- Lilo battery 3.75V/Cell
- LiPo battery 3.85V/Cell
- LiFe battery 3.3V/Cell

Main unit proceeds to charge or discharge, according to voltage of battery packs. Discharging to be commenced when voltage is above saved voltage; charging to be commenced when voltage is below saved voltage.

### 3.4. Charging & Discharging of NiMH, NiCd Batteries (1-15 cells)

Auto Charge	Main unit automatically charges the battery at 100mA at the beginning, gradually increase at 100mA/second, and intelligently charge at the current of 1C of the capacity of the battery concerned, or at the maximum current set by user. Charging is paused for 5 seconds every 90 seconds, until "Peak Voltage" reaches preset condition, representing completion of charging.
Manual Charge	Charge at current set by user. Charging is paused for 5 seconds every 90 seconds, until "Peak Voltage" reaches preset condition, representing completion of charging.
Discharge	Discharge at current set by user. Discharge stops when voltage of each cut-off voltage.
Cycle Charge & Discharge	Set at Cyclic direction: CHG -> DCHG (charge to discharge); DCHG -> CHG (discharge to charge). Charging can be set at: "Auto Charge"; "Manual Charge". Cyclic charge proceeds according to preset data. Cyclic discharge functions according to "Discharge Mode" settings. Maximum 5 cycles.

### 3.5. Charging & Discharging of Pb Lead-Acid Batteries


Charge	Select the number of cells and charging current. Battery will be charged at constant current (CC) preset by user. When reaching maximum voltage of battery charging (2.45V/Cell), proceed to constant voltage charging (CV). Current gradually drops and charging stops when reaching below 1/5 of set current.
Discharge	Select number of cells and charging current. Battery will be discharged at constant current (CC) preset by user. Discharge stops when voltage reaching Delta Peak Voltage. (Discharge Delta Peak Voltage = Discharge Delta Peak Voltage of cell x number of cells).

## 4. Specifications



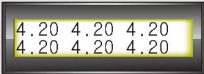


Power Input	Input Voltage Range Input Current Range	10.0 – 18.0VDC > 5A
Voltage Detection	Voltage Detection Range Delta Peak Voltage Voltage Accuracy	0.10 – 25.2V 0.1V / Set Up +/- (0.3% + 10 mV)
Power Output	Charging Current Adjustable Range Charging Current Resolution Charging Current Accuracy Discharge Current Adjustable Range Discharge Current Resolution Discharge Current Accuracy	0.1 – 5.0 A 0.1A / Step-up +/- (2% + 20 mA) 0.1 – 1.0A 0.1A / Step-up +/- (2% + 20 mA)
External Temperature Input	Temperature Detection Range/Internal Operation Temperature Range	-10°C - +85°C -55°C - +125°C
Power Range	Charging Power Discharging Power	< 50W < 5W
Balance Function	Balance Current Balance Accuracy	< 300mA < 10mV
Compatible Battery Type	LiPo / Lilo / LiFe Battery NiCd / NiMH Battery Pb Lead Acid Battery	1 – 6 cells in series 1 – 15 cells in series 2 – 20V (1 – 10 cells)






## 5. Operating by Control Panel (LEVEL 1)

Single digital dial-knob switch is applied, providing convenient multi-function control. All the operations are simplified into three steps:

- Clockwise turn: Performing two functions: Firstly, for downward scrolling through the Menu; At the interface of reference figures setting, clockwise turn is for decreasing the value of the parameter.
- Anti-clockwise turn: For upward scrolling through the Menu; At the interface of reference figures setting, anti-clockwise turn is for increasing the value of parameter.
- Push at centre: For confirmation of selection or entering the next level Menu. When confirming several key operations, such as starting the charging or discharging of batteries, dial-knob must be pressed for over 3 seconds  for the main unit to start executing the command.

When power is connected, main unit immediately enters operation status. In the first few seconds, main unit performs Initialization and self-Diagnosis, ensuring every functions are in order. "SELECT MENU" will be shown at the LCD display for user to select the operation. There are 7 Menus from the main unit. The following table illustrates functions of each Menu.

Menu	Item	LCD Display	Functions
1	Display upon switching on the <b>AVANT</b> charger		The following three items will show on the screen for 3 seconds: company name model name version
2	Battery Initial Voliage	 	The battery total and cell voltage will show on 2 screen Before enter function menu.
3	Lithium battery charging & discharging		For charging and discharging the set Lithium battery type, providing: Selection of different charging & discharging modes Directly initiate charging & discharging Adjust charging & discharging reference figures
4	NiMH battery charging & discharging		For charging and discharging NiMH battery, providing: Selection of different charging & discharging modes Directly initiate charging & discharging Adjust charging & discharging reference figures

Menu	Item	LCD Display	Functions
5	NiCd battery charging & discharging		For charging and discharging NiCd battery, providing: - Selection of different charging & discharging modes - Directly initiate charging & discharging - Adjust charging & discharging reference figures
6	Pb lead-acid battery charging & discharging		For charging and discharging Pb battery, providing: - Selection of different charging & discharging mode - Directly initiate charging & discharging - Adjust charging & discharging reference figures
7	Charging & discharging settings saving		Main unit provides storage of 5 sets of figures settings. User can set the battery specifications and preference on charging & discharging, according to battery types, and save the information in the main unit for convenient use in future. If settings are not saved after modifications, the original settings will be retrieved after restarting the charger
8	Loading settings		Loading the saved battery specifications and preference on charging & discharging for direct charging and discharging.
9	User setup		User can set the main unit operation figures according to his/her needs and battery types.

## 5.0. Charger Start Up Battery Voltage Checking

User can check the battery pack status without enter any function mode.  
The first screen is battery pack total voltage and the second screen is individual cell voltage for battery packs with balance plug

★ Figure 5.0.1

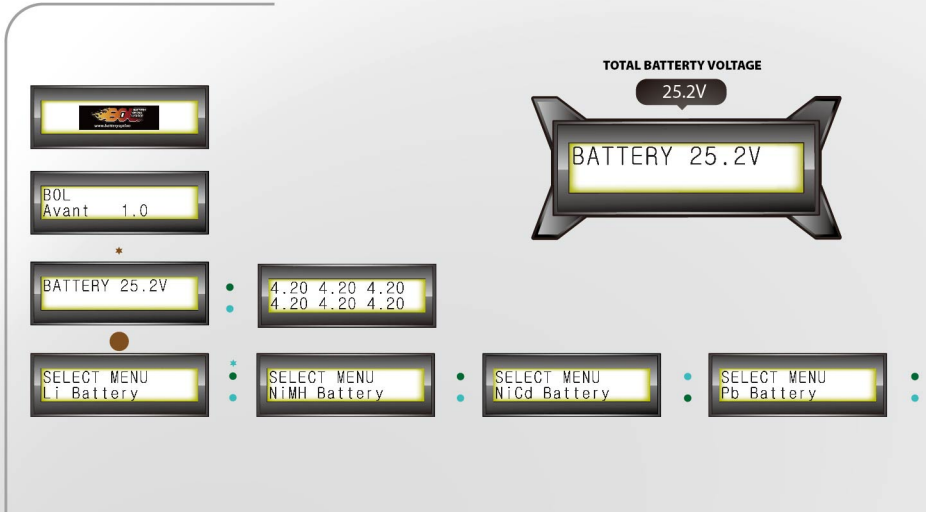
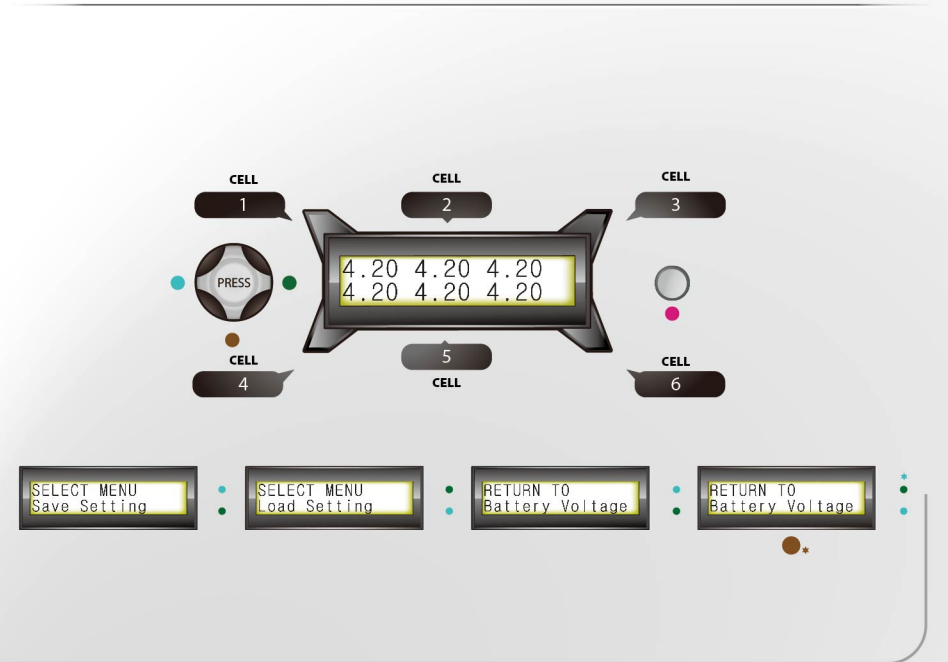


Figure 5.0.1

REFER 3.1.1 FOR OPERATION

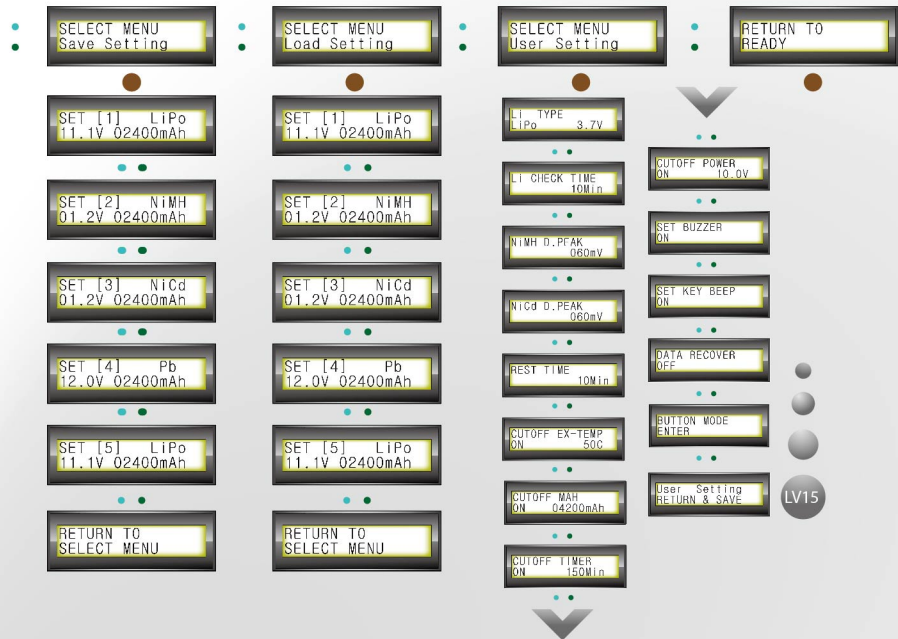






# Below diagram shows the items and main functions in each Menu:LEVEL

REFER 3.1.1 FOR OPERATION



## 5.1 Lithium Battery Setting

The diagram below shows the operation flow of setting Lithium Battery. Types of Lithium batteries (Lilo, LiPo, LiFe) are to be set under "User Setting". Settings cannot be changed after entering the operation interface of Lithium battery. Hence, after user recognizing the type of Lithium battery, should firstly proceed to "User Setting" and select "Li TYPE" for setting Lithium battery type, then return to the operation interface for Lithium battery for charging & discharging.

★ Figure 5.1.1

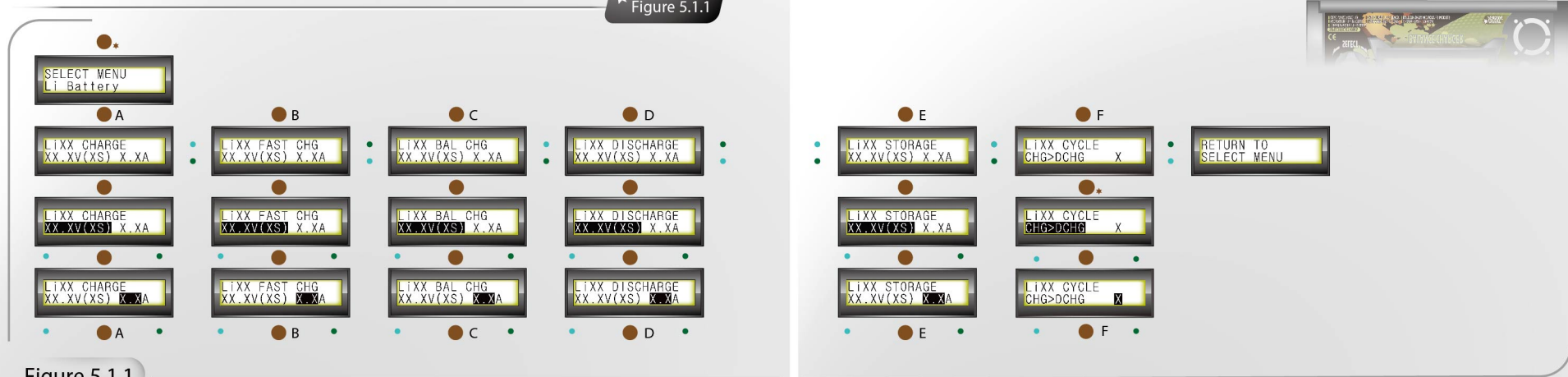


Figure 5.1.1




REFER 3.1.1 FOR OPERATION

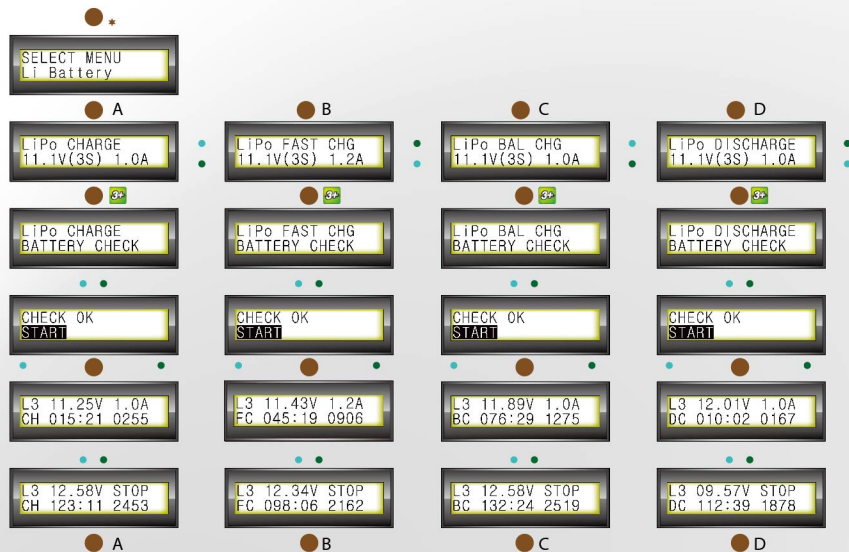


REFER 3.1.1 FOR OPERATION

## 5.2. Lithium Battery Operation

User must confirm execution mode when in the operation mode for Lithium battery, by using the dial-knob to control and confirm command. User must press the dial-knob centre and hold for over 3 seconds  for main unit to start executing the command. You'll enter edit mode if the dial-knob centre is pressed for less than 3 seconds.

★ Figure 5.2.1



REFER 3.1.1 FOR OPERATION



Figure 5.2.1

When charging or discharging Lithium battery, LCD display shows the current status as below:

★ Figure 5.2.2

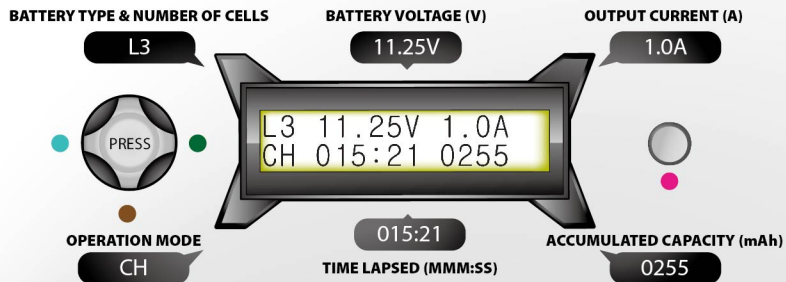
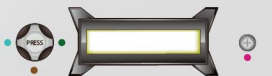


Figure 5.2.2

The table below shows the contents of LCD display:

Battery type & number of cells in series	L - Represents Lithium battery as the currently engaged battery type 3 - Figure represents number of cells in series
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Battery voltage (V)	Shows current battery voltage. When the whole operation is completed, this space shows the final voltage of the battery. Unit in Volt.
Output current (A)	Shows the current of operation with unit in Amp. When the whole operation is completed, "STOP" appears in this space.
Operation mode	The 2-letter abbreviation represents the current operation mode. They are: CH – Normal Charge FC – Fast Charge BC – Balance Charge DC – Normal Discharge ST – Storage Mode
Time lapsed (MMM:SS)	Shows the time lapsed for current operation. When the whole operation is completed, total time lapsed will be shown in the form: MMM : SS (minutes : seconds)
Accumulated capacity (mAh)	Shows the accumulated charged or discharged capacity at the moment. When the whole operation is completed, total capacity will be shown in unit mAh.



REFER 3.1.1 FOR OPERATION



During testing of Lithium battery, user can obtain information like the “cut-off condition” by observation of the rotation of the dial-knob. Simultaneously, the operation status will be shown on the LCD screen:

★ Figure 5.2.3

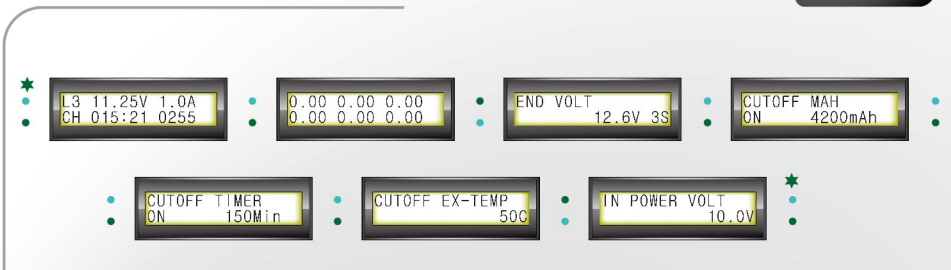


Figure 5.2.3

When the whole operation is completed, user can press dial-knob and return to the interface of relevant operation mode of corresponding Lithium battery.

At any time during operation, user can stop operation by pressing dial-knob for over 3 seconds **3+**. Main unit will switch off all output and return to the interface of relevant operation mode of corresponding Lithium battery, pending further commands from user.

REFER 3.1.1 FOR OPERATION



### 5.3. Ni-MH Battery Setting

Below diagram shows the operation flow of setting Ni-MH Battery. Interval between Delta Voltage Peak and Cyclic Charging / Discharging of Ni-MH battery is Rest Time, which can be set under "User Setting". Settings cannot be changed after entering the operation interface of Ni-MH battery. Hence, after recognizing the type of Ni-MH battery, user should firstly proceed to "User Setting" and select "Ni-MH D. PEAK" and "REST TIME" values, then return to the operation interface for Ni-MH battery for charging & discharging. Note: Ni-MH battery and Ni-Cd battery apply the same "REST TIME" value.

User can use the dial-knob to control the display. When reaching the relevant execution mode, press the centre of the dial-knob (hold for 3 seconds **3+**) to enter edit mode. In the below diagram, white words in black background represent changeable parameters. Use the dial-knob to increase or decrease the figures. When reaching the appropriate values, press the centre of the dial-knob to confirm selection. If figures are found incorrect after confirmation, simply press the dial-knob centre again for re-entering edit mode, and adjust the values.

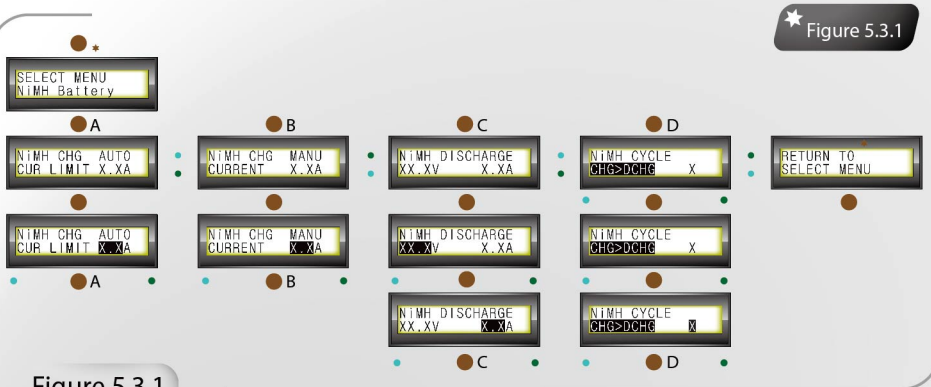


Figure 5.3.1

REFER 3.1.1 FOR OPERATION

### 5.4. Ni-MH Battery Operation

User must confirm execution mode when in the operation mode for Ni-MH battery, by using the dial-knob to control and confirm command. User must press the dial-knob centre and hold for over 3 seconds **3+** for main unit to start executing the command. Edit mode will be entered if the dial-knob centre is pressed and held for less than 3 seconds **3+**.

★ Figure 5.4.1

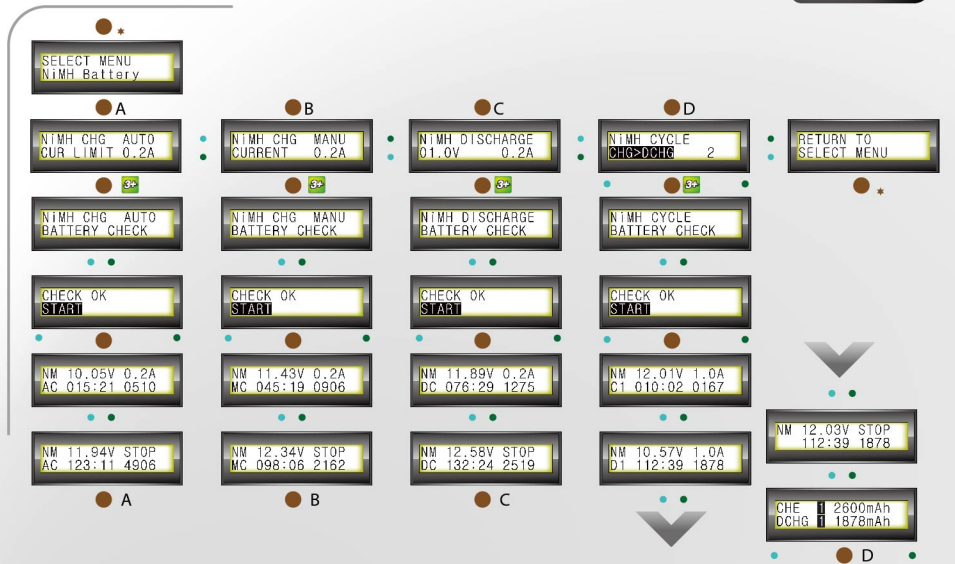


Figure 5.4.1

When instruction of initiation is identified, main unit will execute self-diagnosis once to ensure the safety of charging and discharging battery. Items to be diagnosed are the same as that of Lilo/LiPo/LiFe battery, EXCEPT “comparison of individual cell voltage” and “identify number of cells”.

After self-diagnosis, main unit will recommend user to proceed execution or not according to results. User can follow instructions and press dial-knob to stop or continue executing the selected instructions. User can also commence mandatory execution, by turning dial-knob to START or ABORT operation.

When charging or discharging Ni-MH battery, LCD display shows the current status as below:

★ Figure 5.4.2

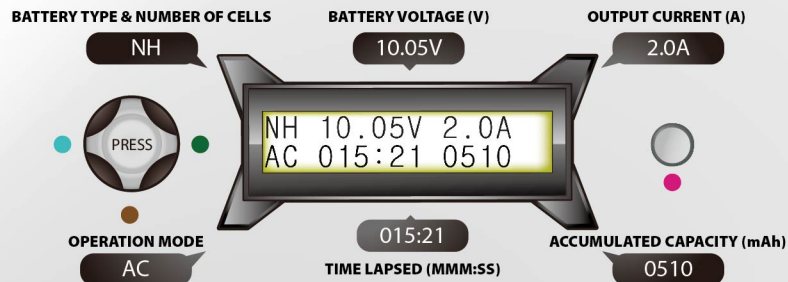


Figure 5.4.2



Below table shows the contents of LCD display:


Battery type	NH – Represents Ni-MH battery as the currently engaged battery type
Battery voltage (V)	Shows current battery voltage. When the whole operation is completed, this space shows the final voltage of the battery. Unit in Volt.
Output current (A)	Shows the current of operation with unit in Amp. When the whole operation is completed, “STOP” appears in this space.
Operation mode	Double-alphabet represents the current operation mode. Alphabetical representations are: AC – Auto Mode Charge MC – Manual Mode Charge DC – Normal Discharge Cn – The n-th cycle under Cycle-Charge Dn – The n-th cycle under Cycle-Discharge
Time lapsed (MMM:SS)	Shows the time lapsed for current operation. When the whole operation is completed, total time lapsed will be shown in the form: MMM : SS (minutes : seconds)
Accumulated capacity (mAh)	Shows the accumulated charged or discharged capacity at the moment. When the whole operation is completed, total capacity will be shown in unit mAh.

During testing of Ni-MH battery, user can obtain information like the “cut-off condition” by observation of the rotation of the dial-knob. Simultaneously, the operation status will be shown on the LCD screen:

★ Figure 5.4.3



Figure 5.4.3

When the whole operation is completed, user can press dial-knob and return to the interface of relevant operation mode of corresponding Ni-MH battery. At any time during operation, user can stop operation by pressing dial-knob and hold for over 3 seconds . Main unit will switch off all output and return to the interface of relevant operation mode of corresponding Ni-MH battery, pending further commands from user.

★ Figure 5.4.4

For cyclic-charging and cyclic-discharging of Ni-MH battery, after the whole cycle operation is completed, main unit will show the charging or discharging capacity of each cycle as below

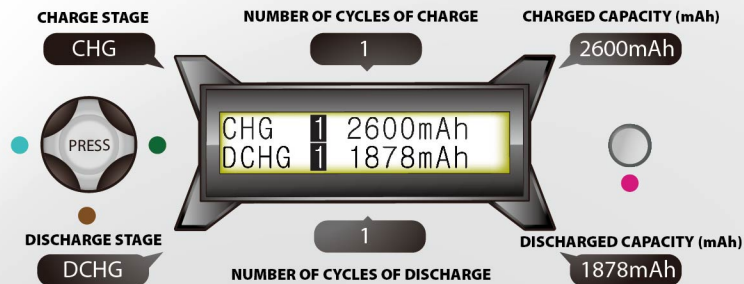


Figure 5.4.4

By switching the dial-knob, user can check charged or discharged capacity of each cycle. User can compare the difference in capacity between charging and discharging, and determine if the battery is aging.

When the whole operation is completed, user can press dial-knob and return to the interface of relevant operation mode of corresponding Ni-MH battery.

REFER 3.1.1 FOR OPERATION





## 5.5. Ni-Cd Battery Setting

The diagram below shows the operation flow of setting Ni-Cd Battery.

★ Figure 5.5.1

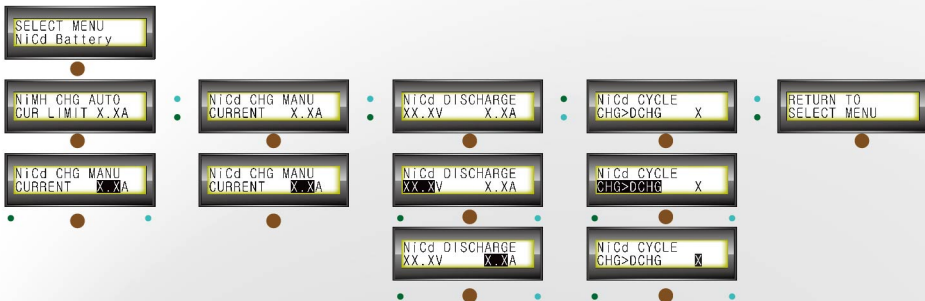


Figure 5.5.1

Interval between Delta Voltage Peak and Cycle Charging / Discharging of Ni-Cd battery is Rest Time, which can be set under "User Setting". Settings cannot be changed after entering the operation interface of Ni-Cd battery. Hence, after recognizing the type of Ni-Cd battery, user should firstly proceed to "User Setting" and select "Ni-Cd D. PEAK" and "REST TIME" values, then return to the operation interface for Ni-Cd battery for charging & discharging. Note: Ni-MH battery and Ni-Cd battery apply the same "REST TIME" value.

User can use the dial-knob to control the display. When reaching the relevant execution mode, press the centre of the dial-knob (and hold for less than 3 seconds) to enter edit mode. In the above diagram, white words in black background represent changeable parameters. Using the dial-knob to increase or decrease the values. When reaching the appropriate values, press the centre of the dial-knob to confirm selection. If values are found incorrect after confirmation, simply press the dial-knob centre again for re-entering edit mode, and adjust the values.

## 5.6. Ni-Cd Battery Operation

User must confirm execution mode when in the operation mode for Ni-Cd battery, by using the dial-knob to control and confirm command. User must press the dial-knob centre and hold for over 3 seconds **3s** for main unit to start executing the command. You will enter Edit mode if the dial-knob is pressed and held for less than 3 second.

★ Figure 5.6.1



Figure 5.6.1

REFER 3.1.1 FOR OPERATION



Instruction of initiation is identified, main unit will execute self-diagnosis once to ensure the safety of charging and discharging battery. Items to be diagnosed are the same as that of Lilo / LiPo / LiFe battery, EXCEPT “comparison of individual cell voltage” and “identify number of cells”.

After self-diagnosis, main unit will recommend user to proceed execution or not according to results. User can follow instructions and press dial-knob to stop or continue executing the selected instructions. User can also commence mandatory execution, by turning dial-knob to START or ABORT operation.

★ Figure 5.6.2

When charging or discharging Ni-Cd battery, LCD display shows the current status as below:

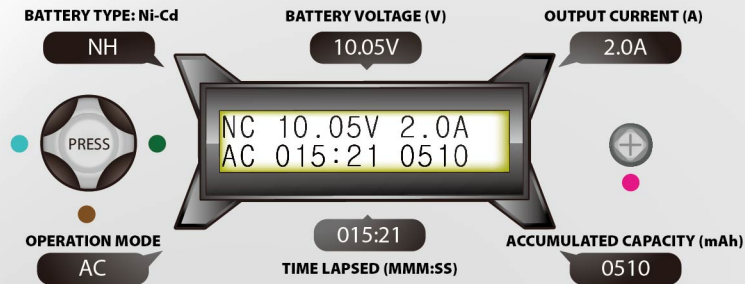


Figure 5.6.2

Below table shows the contents of LCD display:

Battery type	NC – Represents Ni-Cd battery as the currently engaged battery type
Battery voltage (V)	Shows current battery voltage. When the whole operation is completed, this space shows the final voltage of the battery. Unit in Volt.
Output current (A)	Shows the current of operation with unit in Amp. When the whole operation is completed, “STOP” appears in this space.
Operation mode	The 2-letter abbreviation represents the current operation mode. They are: AC – Auto Mode Charge MC – Manual Mode Charge DC – Normal Discharge Cn – The n-th cycle under Cyclic-Charge Dn – The n-th cycle under Cyclic-Discharge
Time lapsed (MMM:SS)	Shows the time lapsed for current operation. When the whole operation is completed, total time lapsed will be shown in the form: MMM : SS (minutes : seconds)
Accumulated capacity (mAh)	Shows the accumulated charged or discharged capacity at the moment. When the whole operation is completed, total capacity will be shown in unit mAh.

During testing of Ni-Cd battery, user can obtain information like the “cut-off condition” by observation of the rotation of the dial-knob. Simultaneously, the operation status will be shown on the LCD screen:

★ Figure 5.6.3



Figure 5.6.3

REFER 3.1.1 FOR OPERATION



User can use the dial-knob to control the display. When reaching the relevant execution mode, press the centre of the dial-knob (for less than 3 seconds) to enter edit mode. In the above diagram, white wordings on black background represent changeable reference figures. Using the dial-knob to increase or decrease the figures. When reaching the appropriate figures, press the centre of the dial-knob to confirm selection. If figures are found incorrect after confirmation, simply press the dial-knob centre again for re-entering edit mode, and adjust the figures.

When the whole operation is completed, user can press dial-knob and return to the interface of relevant operation mode of corresponding Ni-Cd battery.

At any time during operation, user can stop operation by pressing dial-knob and hold for over 3 seconds **3+**. Main unit will switch off all output and return to the interface of relevant operation mode of corresponding Ni-Cd battery, pending further commands from user.

For cyclic-charging and cyclic-discharging of Ni-Cd battery, after the whole cycle operation is completed, main unit will show the charging or discharging capacity of each cycle as below:

★ Figure 5.6.4

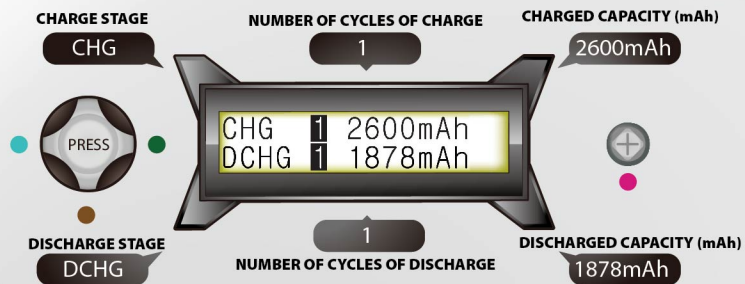


Figure 5.6.4

By switching the dial-knob, user can check charged or discharged capacity of each cycle. User can compare the difference in capacity between charging and discharging, and determine if the battery is aging.

When the whole operation is completed, user can press dial-knob and return to the interface of relevant operation mode of corresponding Ni-Cd battery.

REFER 3.1.1 FOR OPERATION



## 5.7. Pb Battery Setting

The diagram below shows the operation flow of setting Pb Battery.

★ Figure 5.7.1

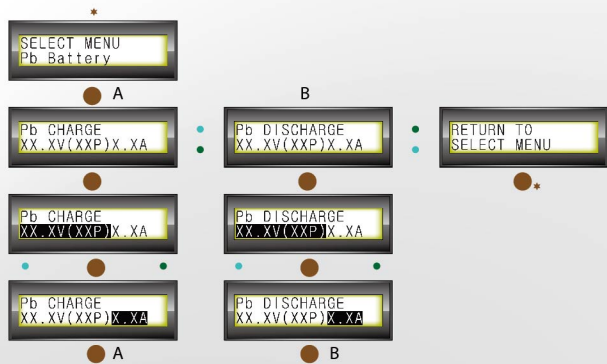


Figure 5.7.1

User can use the dial-knob to control the display. When reaching the relevant execution mode, press the centre of the dial-knob and hold for less than 3 seconds to enter edit mode. In the above diagram, white words in black background represent changeable parameters. Using the dial-knob to increase or decrease the figures. When reaching the appropriate values, press the centre of the dial-knob to confirm selection. If values are found incorrect after confirmation, simply press the dial-knob centre again for re-entering edit mode, and adjust the values.

## 5.8. Pb Battery Operation

User must confirm execution mode when in the operation mode for Pb battery, by using the dial-knob to control and confirm command. User must press the dial-knob centre and hold for over 3 seconds for main unit to start executing the command. You will enter Edit mode if the dial-knob centre is pressed for less than 3 seconds.

★ Figure 5.8.1

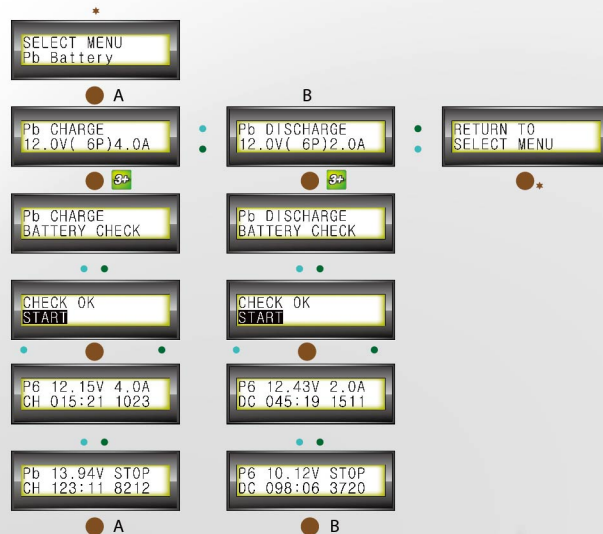


Figure 5.8.1

REFER 3.1.1 FOR OPERATION





When instruction of initiation is identified, main unit will execute self-diagnosis once to ensure the safety of charging and discharging battery. Items to be diagnosed are the same as that of Lithium battery, EXCEPT "comparison of individual cell voltage" and "identify number of cells".

After self-diagnosis, main unit will recommend user to proceed execution or not according to results. User can follow instructions and press dial-knob to stop or continue executing the selected instructions. User can also commence mandatory execution, by turning dial-knob to START or ABORT operation.

When charging or discharging Pb battery, LCD display shows the current status as below:

★ Figure 5.8.2

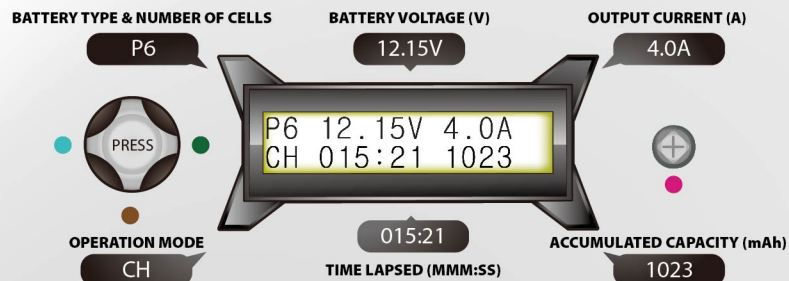


Figure 5.8.2

Below table shows the contents of LCD display:

Battery type & number of cells	P – Represents Pb battery as the currently engaged battery type. 6 – Figure represents current number of cells.
Battery voltage (V)	Shows current battery voltage. When the whole operation is completed, this space shows the final voltage of the battery. Unit in Volt.
Output current (A)	Shows the current of operation with unit in Amp. When the whole operation is completed, "STOP" appears in this space.
Operation mode	The 2-letter abbreviation represents the current operation mode. They are: CH – Normal Charge DC – Normal Discharge
Time lapsed (MMM:SS)	Shows the time lapsed for current operation. When the whole operation is completed, total time lapsed will be shown in the form: MMM : SS (minutes : seconds)
Accumulated capacity (mAh)	Shows the accumulated charged or discharged capacity at the moment. When the whole operation is completed, total capacity will be shown in unit mAh.

REFER 3.1.1 FOR OPERATION



During testing of Pb battery, user can obtain information like the "cut-off condition" by observation of the rotation of the dial-knob. Simultaneously, the operation status will be shown on the LCD screen:

★ Figure 5.8.3

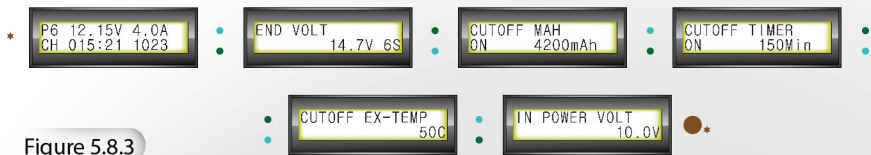


Figure 5.8.3

When the whole operation is completed, user can press dial-knob and return to the interface of relevant operation mode of corresponding Pb battery.

At any time during operation, user can stop operation by pressing dial-knob and hold for over 3 seconds. Main unit will switch off all output and return to the interface of relevant operation mode of corresponding Pb battery, pending further commands from user.

REFER 3.1.1 FOR OPERATION



## 5.9. Settings Saving

Main unit provides storage for saving up to 5 sets of figures. User can set battery specifications and preferred charging & discharging mode, according to various battery types, and save in the database of the main unit for convenient use in future. Hence, "Settings Saved" provides different interfaces according to different types of battery. User must confirm the battery types and characteristics, in order to input battery data. The diagram below explains the flow of Settings Saving:

★ Figure 5.9



Figure 5.9

User can use the storage space for 5 sets of setting in the main unit and save five types of battery characteristics. By pressing the dial-knob centre and hold for less than 3 seconds, you will enter the edit mode of that saved location.

Special note: types of Lithium batteries (Lilo, LiPo, LiFe) is set under "User Setting". No changes can be made after entering input interface of "Saved Settings". Hence, Settings cannot be changed after entering the operation interface of "Saved Settings". Hence, after recognizing the type of Lithium battery, user should firstly proceed to "User Setting" and select "Li TYPE", then return to the operation interface for "Saved Settings" to input settings of interface.

After entering the edit mode of corresponding saved locations, user must first select battery type: Li – Lithium battery, Ni-MH – Ni-MH battery; Ni-Cd – Ni-CD battery or Pb battery. Main unit provides various input interface according to the type selected by user. The followings illustrate the interface for input of values of various battery types.

REFER 3.1.1 FOR OPERATION



### 5.9.1. Input of Setting for Lithium (Li) Battery for storage

After entering the edit mode for input of Lithium battery saved settings, the first interface shows the three basic characteristics of the battery (battery type, voltage and capacity). User must input or adjust settings according to the actual status of the battery. Other operation modes are similar to that for Lithium battery.

★ Figure 5.9.1



Figure 5.9.1

REFER 3.1.1 FOR OPERATION



## 5.9.2. Saving Setting for Ni-MH Battery

After entering the edit mode for input of Ni-MH battery saved settings, the first interface shows the three basic characteristics of the battery (battery type, voltage and capacity). User must input or adjust settings according to the actual status of the battery. Other operation modes are similar to that for Lithium battery.

★ Figure 5.9.2



Figure 5.9.2

REFER 3.1.1 FOR OPERATION





### 5.9.3. Saving Setting for Ni-Cd Battery

After entering the edit mode for input of Ni-Cd battery saved settings, the first interface shows the three basic characteristics of the battery (battery type, voltage and capacity). User must input or adjust settings according to the actual status of the battery. Other operation modes are similar to that for Lithium battery.

★ Figure 5.9.3

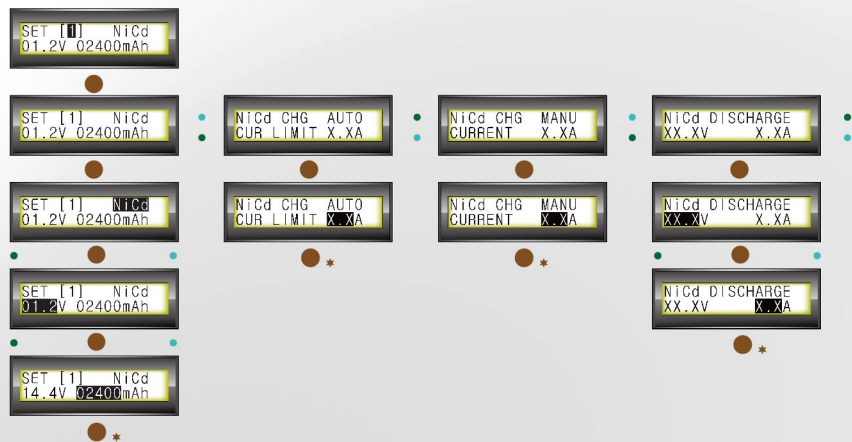


Figure 5.9.3



REFER 3.1.1 FOR OPERATION



### 5.9.4. Saving Setting for Pb Battery

After entering the edit mode for input of Pb battery saved settings, the first interface shows the three basic characteristics of the battery (battery type, voltage and capacity). User must input or adjust settings according to the actual status of the battery. Other operation modes are similar to that for Lithium battery. Figure 5.9.4

Input of Saved Setting for Pb Battery

★ Figure 5.9.4



Figure 5.9.4

### 5.10. Loading Settings

User can load the five saved settings at any time. The diagram below shows the flow of saving settings. When controlling the display with the dial-knob, user can load particular battery settings saved at certain position by pressing the dial-knob centre (over 3 seconds) at the relevant saved position.

★ Figure 5.10.1



Figure 5.10.1

REFER 3.1.1 FOR OPERATION



## 5.11. User Settings

User can adjust the settings to meet individual needs and preferences:

Type of Settings	Items of Settings	Display	Details
Lithium Battery Related	Lithium Battery Type		Three types of Lithium battery selection and individual cell operation voltage: LiIo: 3.7V LiPo: 3.6V LiFe: 3.3V
	Lithium Check Time		Maximum time for Lithium battery self-diagnosis
Ni-Cd & Ni-MH Battery Related	Ni-MH Battery Voltage Delta Peak		Ni-MH battery Voltage Delta Peak setting
	Ni-Cd Battery Voltage Delta Peak		Ni-CD battery Voltage Delta Peak setting
	Rest Time Between Cycles		Setting duration for cyclic-charge and discharge, rest time between each cycle. User can set as CHG>DCHG and DCHG>CHG rest time.







Type of Settings	Items of Settings	Display	Details
General Cut-off Criteria	External Temperature		Setting if cut-off is determined by external temperature, and set the value of max. external temperature.
	Cut-off Capacity		Setting if cut-off is determined by max. capacity and set the value of max. capacity of each cycle.
	Cut-off Time		Setting if cut-off is determined by max. duration and set the value of max. duration of each cycle.
	Power Monitor		Setting if cut-off is determined by external power supply and set the value of min. power supply.
Auxiliary Settings	Internal Buzzer		Internal buzzer on / off.
	Key Beep		Key beep on / off.
Data saving	Data recovery		All settings and data resume to default.
	Saving setting		Saving the setting and parameters
Mode Botton	Enter		Enter Mode
	Reverse		Reverse Dispcay Mode

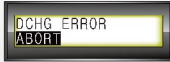



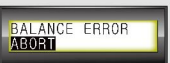


REFER 3.1.1 FOR OPERATION

## 6. Self Diagnosis Trouble Shooting

When initializing instruction is identified, main unit will execute self-diagnosis once to ensure the safety of charging and discharging battery. Items to be diagnosed include:

Diagnose Items	Details	Display	Recommended Action
Battery temperature diagnosing	If user connected external temperature sensor, main unit will examine the battery temperature to determine if it is in good condition for further operation		Abort operation
Open circuit diagnosing	Check if battery is connected		Abort operation
Polarity diagnosing	Confirm if polarity connection is correct		Abort operation
Battery voltage diagnosis	Main unit diagnoses the voltage of the battery according voltage set by user. If voltage appears different, main unit stops operation.		Abort operation
Short circuit diagnosis	Inspect if short circuit exists in connection		Abort operation
Charging diagnosis	Short period, low current charging can ensure the basic charging of batteries in order.		Abort operation

Diagnose Items	Details	Display	Recommended Action
Discharging diagnosis	Short period, low current charging can ensure the basic discharging of batteries in order.		Abort operation
Normal	After self-diagnosis, no irregular situation.		Continue operation
Battery high voltage comparison	When charging is selected, main unit compares the battery voltage. If battery is at high voltage, main unit stops operation.		Abort operation
Battery low voltage comparison	When discharging is selected, main unit compares the battery voltage. If battery is at low voltage, main unit stops operation.		Abort operation
Comparison among individual cells' voltages	For operation of LiLO/LiPO/LiFe battery, <b>AVANT</b> will balance out the voltage difference between cells under "Balance Charge Mode", while under other modes, unstable voltage value will be neglected. If there is voltage wiring connecting individual cell in a pack with the main unit, it will detect the voltage of cells prior to charging & discharging. Stop operation message and alarm will be issued to stop operation, should significant difference exists.		Abort operation

REFER 3.1.1 FOR OPERATION



END