E460

AC BALANCE CHARGER/DISCHARGER

For LiPo/LiFe/LiHv/Lilo/NiMH/NiCd/Pb Batteries

USER'S OPERATING MANUAL

Thank you for purchasing the iRunRC E460 balance charger. This is a rapid charger/discharger with built-in balancer, computerised with microprocessor and specialised operating software. Please read this entire operating manual completely before use.

CONTENTS

1. FEATURES

OPTIMISED OPERATING SOFTWARE
When charging or discharging, the charger has an 'AUTO' function that sets the charge current automatically; especially for Lithium batteries. This prevents over-charging which can lead to an explosion of your battery. Every program in the unit is controlled with mutual links and communication for every possible error for maximum safety. These can be set in the user options. It also has a convenient balance charge port for Lithium batteries, with separated 2, 3 and 4 cell charge port; and external temperature sensor connection.

HIGH-POWER AND HIGH-PERFORMANCE CIRCUIT
The charger employs the circuit that has maximum output power of 60W. As a result it can charge or discharge up to 8 cells of NiCd/NiMH and 4 cells of Lithium batteries with maximum current of 6.0A. Furthermore the cooling system is so efficient that can hold such a power without any trouble of running the CPU or the operating program.

INDIVIDUAL VOLTAGE BALANCER FOR LITHIUM BATTERIES INSIDE
The charger has an individual-cell-voltage balancer inside.This does not require any extra balancer separately when charging Lithium batteries (Lilo/ LiHv/ LiPo/ LiFe) for cell voltage balancing.

BALANCE INDIVIDUAL CELLS ON DISCHARGE
It also can monitor and balance individual cells of the Lithium battery pack during the discharge process. If the voltage of any one cell varies abnormally, the process will be stopped with the error message.

ACCEPT VARIOUS TYPES OF LITHIUM BATTERIES
It can accept 4 types of Lithium batterles- Lilo, LiHv,LiPo and LiFe. They have different characteristics by their chemistry. You can select any one of them that you are going to process before the job. For their specifications, refer 'Warnings and safety notes' section.

LITHIUM BATTERY 'FAST' AND 'STORAGE' MODE
You can charge Lithium battery for special purposes. 'Fast' charge reduces the charging time o f Lithium battery and 'Storage' mode controls the final voltage of the battery to be suitable for long term storage.

MAXIMUM SAFETY

Delta-peak sensitivity: The automatic charge termination program works on the principle of the Delta-peak voltage detection (NiCd/NiMH).

Auto-charge current limit: When charging NiCd or NiMH at 'AUTO' current mode, you can set the upper limit of change current to avoid from high current charging. This is very useful when charging the low impedance and small capacity NiMH battery in 'AUTO' mode.

Capacity limit: The changing capacity is always calculated by multiplying the charging current and time. If the charging capacity exceeds the limit the process will be terminated automatically when you set the maximum value.

Temperature limit: The temperature of the battery on charging will rise by its internal chemical reaction. If you set the limit of temperature the process will be ended forcibly when the limit has been reached.

Processing time limit: you can also restrain the maximum process time to prevent from any possible defect.

Automatic cooling fan: The electric cooling fan comes into action automatically when the internal temperature of the unit is raised.

DATA STORE/LOAD

For user convenience it can store maximum data for 5 of each battery type. You can establish the data contains program setting of the battery to charge or discharge continually. This data can be called out at any time you need and the process can be executed without program setting.

CYCLIC CHARGING/DISCHARGING

Perform 1 to 5 cycles of charge＞discharge or discharge＞charge continually for battery refreshing and balancing.

AC Input
AC 100-240V

DEC(-)

INC(+)

LCD Display

Cooling fan

Stop/
Main Menu

Start/Enter

Balance lead
socket XH2.54 ports

Charging lead connector

Temperature sensor port
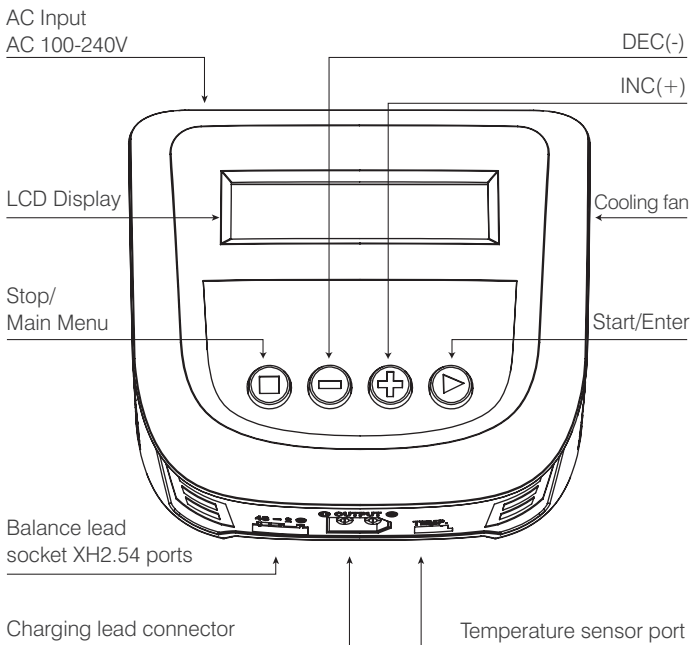
3. WARNINGS AND SAFETY NOTES

- Never leave the charger unsupervised when connected to power supply. If any malfunction is observed immediately terminate the process and refer to this manual.
- Keep away the unit from dust, damp, rain, heat, direct sunshine and vibration. Do not drop the unit or use after any major impact.
- The circuit of the unit is designed to be powered by a 100-240V AC only.
- This unit and the battery should be set up on a heat-resistant, non-flammable and non-conductive surface; we recommend using a LiPo safe bag. Keep all flammable volatile materials well away from operating area.
- Be sure to understand the information of the battery to be charged or discharged. If the program is set incorrectly the battery can be severely damaged.
- Especially Lithium battery can cause a fire or an explosion by over-charging.

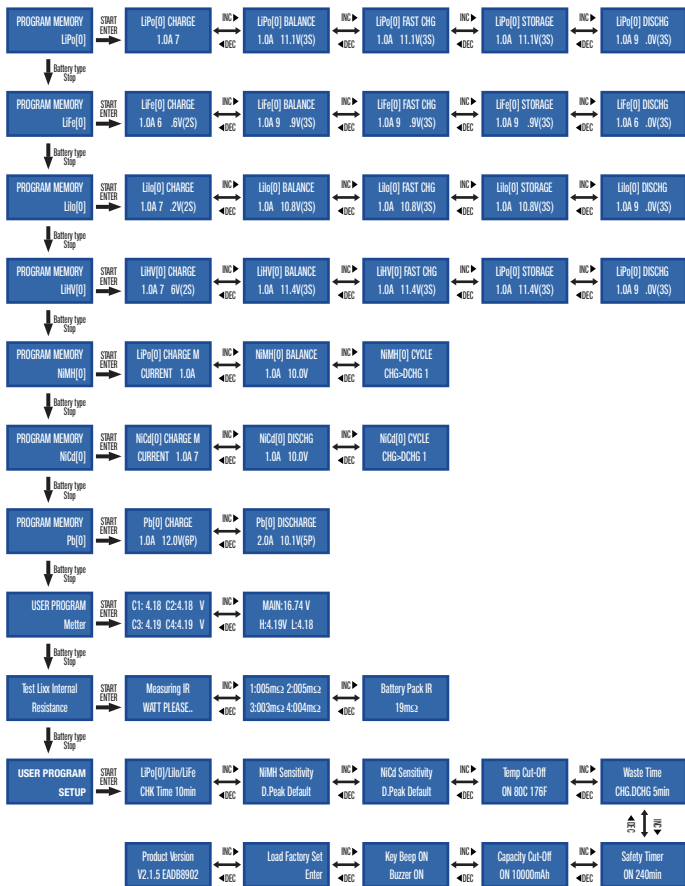|	
NiCd/NiMH	voltage level: 1.2V/cell allowable fast charge current: 1C∼2C depends on the performance of the cell discharge voltage cut off level min discharge voltage cut off: 0.85V/cell(NiCd), 1.0V/cell(NiMH)
LiIo	voltage level: 3.6V/cell max charge voltage: 4.1V/cell allowable fast charge current: 1C or less min discharge voltage cut off: 2.5V/cell or higher
LiPo	voltage level: 3.7V/cell max charge voltage: 4.2V/cell allowable fast charge current: 1C or less discharge voltage cut off: 3.0V/cell or higher
LiHv	voltage level: 3.8V/cell max charge voltage: 4.35V/cell allowable fast charge current: 1C or less min discharge voltage cut off: 3.0V/cell
LiFe	voltage level: 3.3V/cell max charge voltage: 3.6V/cell allowable fast charge current: 4C or less (e.g. A123M1) discharge voltage cut off level: 2.0V/cell or higher
Pb	voltage level:2.0V/cell max charge voltage: 2.46V/cell allowable fast charge current: 0.4C or less discharge voltage cut off level: 1.50V/cell or higher

- To avoid short-circuit between the charge leads, always connect the charge cable to the unit first and only then to the battery. Reverse this sequence when disconnecting. Short-circuiting either the battery or charger can cause permanent damage.
- It is important to verify the capacity and the voltage of the Lithium battery pack. It may be composed of parallel and series connection of cells. For parallel connection the capacity of the battery pack is multiplied by the number of cells but the voltage remains same. A voltage imbalance between cells caused by mixed connection of cells can cause fire or explosion during charge process. We recommend you compose the Lithium battery pack in series only.

DISCHARGE
- The typical purpose of discharge is to determine the residual capacity of the battery, or to lower the voltage of battery to a defined level. When you discharge the battery you must pay attention to the process the same as charging. To avoid the battery becoming deep-discharged, set the final discharge voltage correctly. Lithium batteries should not be deep-discharged to lower than the minimum voltage, as this leads to a rapid loss of capacity or a total failure. Generally, you do not need to discharge Lithium battery voluntarily.
- Some rechargeable batteries are said to have a memory effect. If they are partly used and recharged before the whole charge is drawn out, they 'remember' this and next time will only use that part of their capacity. This is a 'memory effect'. NiCd and NiMH batteries are said to suffer from memory effect; they prefer complete cycles. Fully charge then use until empty, do not recharge before storage - allow them to self-discharge during storage, NiMH batteries have less memory effect than NiCd.
- The Lithium battery prefer partial rather than a full discharge. Frequent full discharges should be avoided if possible. Instead, charge the battery more often or use a larger battery.
- A brand-new NiCd battery pack only uses part of its capacity until it has been subjected to 10 or more charge cycles. The cyclic process of charge and discharge will lead to optimised capacity of your battery pack.

These warnings and safety notes are extremely important. Please follow instructions for maximum safety; otherwise the charger and the battery can be damaged permanently. Improper use may cause fires and injury to yourself and your property.

4. PROGRAM FLOW CHART

| PROGRAM MEMORY LiPo[0] | START ENTER | LiPo[0] CHARGE 1.0A 7 | INC/DEC | LiPo[0] BALANCE 1.0A 11.1V(3S) | INC/DEC | LiPo[0] FAST CHG 1.0A 11.1V(3S) | INC/DEC | LiPo[0] STORAGE 1.0A 11.1V(3S) | INC/DEC | LiPo[0] DISCHG 1.0A 9 .0V(3S) |
| Battery type Stop |

| PROGRAM MEMORY LiFe[0] | START ENTER | LiFe[0] CHARGE 1.0A 6 .6V(2S) | INC/DEC | LiFe[0] BALANCE 1.0A 9 .9V(3S) | INC/DEC | LiFe[0] FAST CHG 1.0A 9 .9V(3S) | INC/DEC | LiFe[0] STORAGE 1.0A 9 .9V(3S) | INC/DEC | LiFe[0] DISCHG 1.0A 6 .0V(3S) |
| Battery type Stop |

| PROGRAM MEMORY LiIo[0] | START ENTER | LiIo[0] CHARGE 1.0A 7 .2V(2S) | INC/DEC | LiIo[0] BALANCE 1.0A 10.8V(3S) | INC/DEC | LiIo[0] FAST CHG 1.0A 10.8V(3S) | INC/DEC | LiIo[0] STORAGE 1.0A 10.8V(3S) | INC/DEC | LiIo[0] DISCHG 1.0A 9 .0V(3S) |
| Battery type Stop |

| PROGRAM MEMORY LiHV[0] | START ENTER | LiHV[0] CHARGE 1.0A 7 6V(2S) | INC/DEC | LiHV[0] BALANCE 1.0A 11.4V(3S) | INC/DEC | LiHV[0] FAST CHG 1.0A 11.4V(3S) | INC/DEC | LiPo[0] STORAGE 1.0A 11.4V(3S) | INC/DEC | LiPo[0] DISCHG 1.0A 9 .0V(3S) |
| Battery type Stop |

| PROGRAM MEMORY NiMH[0] | START ENTER | LiPo[0] CHARGE M CURRENT 1.0A | INC/DEC | NiMH[0] BALANCE 1.0A 10.0V | INC/DEC | NiMH[0] CYCLE CHG>DCHG 1 |
| Battery type Stop |

| PROGRAM MEMORY NiCd[0] | START ENTER | NiCd[0] CHARGE M CURRENT 1.0A 7 | INC/DEC | NiCd[0] DISCHG 1.0A 10.0V | INC/DEC | NiCd[0] CYCLE CHG>DCHG 1 |
| Battery type Stop |

| PROGRAM MEMORY Pb[0] | START ENTER | Pb[0] CHARGE 1.0A 12.0W(6P) | INC/DEC | Pb[0] DISCHARGE 2.0A 10.1V(5P) |
| Battery type Stop |

| USER PROGRAM Metter | START ENTER | C1: 4.18 C2:4.18 V C3: 4.19 C4:4.19 V | INC/DEC | MAIN:16.74 V H:4.19V L:4.18 |
| Battery type Stop |

| Test Lixx Internal Resistance | START ENTER | Measuring IR WATT PLEASE.. | INC/DEC | 1:005mΩ 2:005mΩ 3:003mΩ 4:004mΩ | INC/DEC | Battery Pack IR 19mΩ |
| Battery type Stop |

| USER PROGRAM SETUP | START ENTER | LiPo[0]/LiIo/LiFe CHK Time 10min | INC/DEC | NiMH Sensitivity D.Peak Default | INC/DEC | NiCd Sensitivity D.Peak Default | INC/DEC | Temp Cut-Off ON 80C 176F | INC/DEC | Waste Time CHG.DCHG 5min |

| Product Version V2.1.5 EADB8902 | INC/DEC | Load Factory Set Enter | INC/DEC | Key Beep ON Buzzer ON | INC/DEC | Capacity Cut-Off ON 10000mAh | INC/DEC | Safety Timer ON 240min |

5. INITIAL PARAMETER SET UP (USER'S SET UP)

When used for the first time the charger will operate according to the preset value. You can modify parameters in the Settings column for the second time use. The screen displays the following information in sequence and the user can change the value of parameter on each screen.

When you want to change the parameter values in the program, press **Start/Enter** key to make it blink, then change the value with **INC** or **DEC** key. The value will be stored by pressing **Start/Enter** key once.

The units recognises the cell count of a Lithium battery automatically at the beginning of charge or discharge process, to avoid erroneous settings by user. Fully discharged batteries may be perceived incorrectly. To prevent this error, you can set the time term to verify the cell count by the processor.

Normally 10 minutes is enough to view the cell count correctly. For a larger capacity battery, you may extend the time term. Be careful not to set the time term too long for a battery of smaller capacity, the charge or discharge process can finish within the time term with an erroneous cell count. This may cause permanent damage to the battery. If the processor recognises the cell count incorrectly at the beginning of charge or discharge process, you may extend the time.
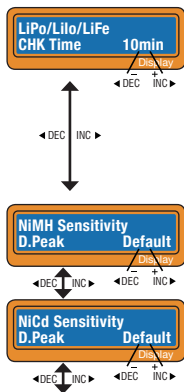
This shows the trigger voltage for automatic charge termination of NiMH and NiCd battery. The effective value ranges from 5 to 20mV per cell. If the trigger voltage is set higher, there is a danger of overcharging the battery. If it is set lower, there is a possibility of premature termination. Please refer the technical specification of the battery (NiCd default: 12mV, NiMH default: 7mV).

Temp Cut-Off
ON   80C   176 F
Display
◄DEC INC►   ◄DEC INC►
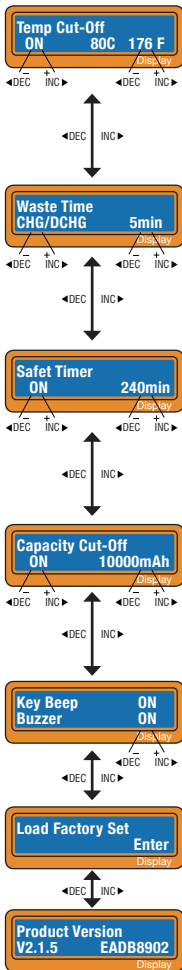
You can set the maximum temperature at which the charger should allow the battery to reach during charge, If a battery reaches this temperature during charging, the process will be terminated to protect the battery.

◄DEC INC►

Waste Time
CHG/DCHG   5min
Display
◄DEC INC►   ◄DEC INC►

A battery on the cyclic process of charge and discharge can often become warm after charge or discharge period. The program can insert a time delay to occur after each charge and discharge process to allow the battery adequate time to cool down before being subjected to the next process. The value ranges from 1 to 60 minutes.

◄DEC INC►

Safet Timer
ON   240min
Display
◄DEC INC►   ◄DEC INC►

When you start a charge process the integral safety timer automatically starts running at the same time. This is programmed to prevent overcharging the battery if it proves to be faulty, or if the termination circuit cannot detect the full battery. The value for the safety timer should be generous enough to allow a full charge of the battery.

◄DEC INC►

Capacity Cut-Off
ON   10000mAh
Display
◄DEC INC►   ◄DEC INC►

This program sets the maximum charge capacity that will be supplied to the battery during charge. If the delta-pack voltage is not detected or the safety timer expired by any reason, this feature will automatically stop the process at the selected capacity value.

◄DEC INC►

Key Beep   ON
Buzzer   ON
Display
◄DEC INC►

The beep sounds every time you press a button to confirm your action. The beep or melody will sound at various times during operation to alert different mode changes. These audible sounds can be turned on or off.

◄DEC INC►

Load Factory Set
Enter
Display

Press Enter for 3 seconds to restore factory setting (default).

◄DEC INC►

Product Version
V2.1.5   EADB8902
Display

This program shows the current software version number and hardware ID number.

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6. LITHIUM BATTERY(LILO/LIPO/LIFE/LIHV)PROGRAM

Use these programs only when charging a lithium battery (Lilo/LiPo/LiHV/LiFe) with a nominal voltage of 3.6V, 3.7V, 3.8V or 3.3V per cell, respectively.

The charge current going into the battery will vary depending on the chemistry type so it is VERY IMPORTANT that you select the correct type for your battery.

The ending voltage of the charge is also important as it varies for all four types; 4.1V for Lilo, 4.2V for LiPo, 4.35V for LiHV and 3.6V for LiFe. The charge current (how many Amps you are putting into the pack) and nominal voltage (proper voltage for the cell count of the battery you are charging) must be correct for the battery to be charged.

To change these settings, press the **Start/Enter** key to make the selected value blink. Using the increase and decrease buttons, set you desired amperage, then press **Start/Enter** to save the setting. You will then be asked to select your nominal voltage/cell count. Again, use the increase/decrease buttons to reach your desired setting and press the **Start/Enter** button to confirm and save.

When you wish to change a parameter value in the program, press **Start/Enter** key to make it blink then change the value with **INC** or **DEC** key. The value will be stored by pressing **Start/Enter** key once.

6.1 CHARGING A LITHIUM BATTERY
The left side of the first line shows the type of battery you select at the users setting. The value on the left side of second line sets a charge current, and the value on the right side second line sets the voltage of the battery pack.
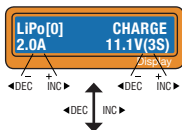
After setting the current and voltage press **Start/Enter** key for more than 3 seconds to start the process (Charge current 0.1~6.0A, Voltage; 2~4S).
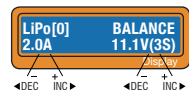
```
R:3SER      S:3SER
CONFIRM (ENTER)
                    Display
```

This shows the number of cells you set up and the processor detects. 'R:' shows the number of cells found by the charger and 'S:' is the number of cells selected by you at the previous screen. If both numbers are identical you can start charging by pressing **Start/Enter** button. If not, press **Batt Type/Stop** button to go back to previous screen. Then carefully check the number of cells of the battery pack to charge again.

START
ENTER

```
Li3S    2.0A    12.59V
CHG     022:i3   00682
                    Display
```
number of cells | charge time | charge current | battery voltage | charged capacity

The screen shows the present situation during charge process, To stop charging press **Batt Type/Stop** key once.

6.2 CHARGING A LITHIUM BATTERY IN BALANCE MODE

This is for balancing the voltages of the cells of the battery park to be charged. The battery pack to be charged should be connected to the balance port at the front of the charger. You also need to connect the battery output plug to the main output of charger. In this mode, the charging process will be different from ordinary charging mode. The internal processor of the charger will monitor the voltages of each cell of the battery pack and controls charging current that is feeding to each cell to normalise the voltage. The value on the left side of second line sets a charge current and the value on the right side of second line sets the voltage of the battery pack.

```
LiPo[0]      BALANCE
2.0A        11.1V(3S)
                    Display
◄DEC  INC►    ◄DEC  INC►
```
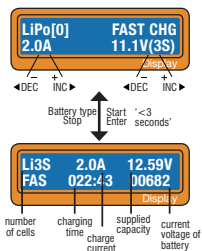Battery type Stop | Start Enter '<3 seconds'

After setting the current and voltage press **Start/Enter** key for more than 3 seconds to start the process (Charge current: 0,1~6,0A, Voltage: 2-4S).

```
R:SER        S:3SER
CONFIRM (NETER)
                    Display
```
Start Enter

This shows the number of cells you set up and the processor detects. 'R:' shows the number of cells found by the charger and 'S:' is the number of cells selected by you at the previous screen. If both numbers are identical you can start charging by press **Start/Enter** button. If not, press **Batt Type/ Stop** button to go back to previous screen, then carefully check the number of cells of the battery pack to charge again.

```
Li3S    1.2A    12.59V
BAL     022:i3   00682
                    Display
```
number of cells | charge time | charge current | battery voltage | charged capacity

The screen shows the present situation during charge process, To stop charging press Batt type/Stop key once.

6.3 'FAST' CHARGING LITHIUM BATTERY

The charging current usually gets smaller as the charging process nears completion. To finish charging process earlier, this program eliminates certain CV and balancing processes. Under this charging method when the charge current goes down to 1/5 of the initial value the charging process is finished. Under this situation the charging capacity may smaller than the charging capacity under normal balance charging, but with a reduced charging time.

```
LiPo[0]    FAST CHG
2.0A       11.1V(3S)
                Display
◄DEC  INC►    ◄DEC  INC►
```

Battery type Stop / Start Enter '<3 seconds'

```
Li3S  2.0A   12.59V
FAS   022:43  00682
               Display
```

number of cells | charging time | charge current | supplied capacity | current voltage of battery
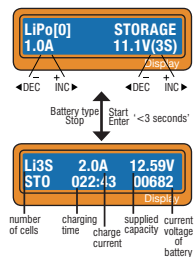
You can set the charging current and the voltage of the battery pack being charged. As you press **START/ENTER** button the voltage confirmation will be displayed. If you confirm the voltage and current, press **START/ENTER** button again to start charging.

This shows the present state of 'FAST' charging. To stop charging arbitrarily, press **Batt Type/Stop** key once.

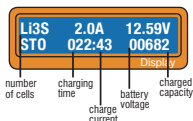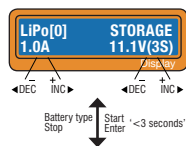## 6.4 'STORAGE' CONTROL LITHIUM BATTERY

This is for charging or discharging Lithium battery not to be used for the time being. The program will determine to charge or discharge the battery to the certain voltage depending on the voltage of the battery at its initial stage. This is different for each type of the battery, 3.7V for Lilo, 3.8V for LiPo, 3.85V for LiHv and 3.3V for LiFe per cell. If the voltage of battery at its initial stage is over the voltage level to storage, the program will start to discharge.

```
LiPo[0]    STORAGE
1.0A       11.1V(3S)
                Display
◄DEC  INC►    ◄DEC  INC►
```

Battery type Stop / Start Enter '<3 seconds'

```
Li3S  2.0A   12.59V
STO   022:43  00682
               Display
```

number of cells | charging time | charge current | supplied capacity | current voltage of battery

You can set up the current and the voltage of the battery pack to be charged. The current will be used for charge or discharge the battery to reach the 'storage' level of voltage.

The screen shows the present situation during charge process. To stop charging press **Batt Type/Stop** key once.

6.5 DISCHARGING LITHIUM BATTERY

```
LiPo[0]      STORAGE
1.0A         11.1V(3S)
                        Display
◄DEC   +  INC►   ◄DEC   +  INC►
```

Battery type / Stop   Start Enter '<3 seconds'

```
Li3S   2.0A   12.59V
STO    022:43  00682
                     Display
```

number of cells | charging time | charge current | battery voltage | charged capacity

The value of discharge current on the left side of the screen may not exceed 1C for maximum safety. The discharge current ranges from 0.1 to 2.0A and the final voltage on the right should not be under the voltage level that is recommended by the battery manufacturer to avoid deep discharging.

To start the discharge, press **Start/Enter** key for more than 3 seconds.
This shows the present state of discharge. To stop discharging press **Batt Type/Stop** key once.

6.6 VOLTAGE BALANCING AND MONITORING DURING DISCHARGE

The processor monitors the voltage of individual cells during 'storage-mode' and 'discharge' of Lithium battery pack. It tries to normalise the voltages to be equal. For this feature, the balance plug of the battery pack should be connected to the balance port of the charger.

If the voltage of any one or more cells varies abnormally during the procedure it terminates the process forcibly with the error message. If this happens, the battery pack contains a bad cell, or there is bad connection of the cable plug. You can easily know which one cell is bad by pressing INC button at time of showing the error message.

```
BATTERY   VOL   ERR
CELL      LOW   VOL
                   Display
```

↓ INC ►

```
C1: 3.71    C2: 3.72V
C3: 2.56    C4: 0.00V
                     Display
```
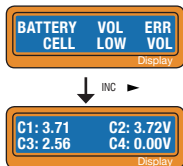
The processor found that the voltage of one of the cells in the Lithium battery pack is too low.

In this case, the 3rd cell is bad. If there is a connection-break of the cable or plug, the voltage value may show zero.

7. NIMH/NICD BATTERY PROGRAM

These programs are for charging or discharging NiMH (Nickel-Metal- Hydride) or NiCd (Nickel-Cadmium) batteries. To alter the value at the display, press **Start/Enter** key to make it blink then change the value using **INC** or **DEC** key. The value will be stored by pressing **Start/Enter** key once.

To start the process, press **Start/Enter** button for more than 3 seconds.

7.1 CHARGING NICD/NIMH BATTERY

◄DEC   INC►

| NiMH[0]   CHARGE   A |
| CUR LIMIT   6.0A |

◄DEC   INC►
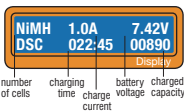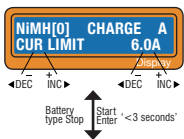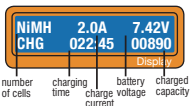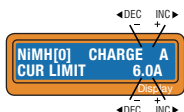
This program simply charge the battery using the current you set. In 'A' - Auto mode, you need to set the upper limit of charge current to avoid from higher feeding current that may damage the battery. Some batteries of low impedance and small capacity can lead to the higher charge current by the processor at automatic charge mode. But in 'M' - Manual mode it will charge the battery with the charge current you set at the display. Each mode can be switched by pressing **INC** and **DEC** button simultaneously when the current field is blinking.

| NiMH   2.0A   7.42V |
| CHG   022:45   00890 |

number   charging   charge battery charged
of cells   time   current voltage capacity

The screen displays the current state of charging . To stop the process, press **Batt Type/Stop** key once. The audible sound indicates you the end of process.
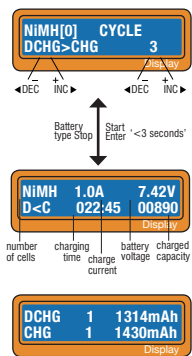
7.2 DISCHARGING NICD/NIMH BATTERY

Set discharge current on the left and final voltage on the right. The discharge current ranges from 0.1 to 2.0A and the final voltage ranges from 0.1 to 16.0V). To start the process, press **Start/Enter** key more than seconds. The screen displays the current state o f discharge. You can alter the discharge current by pressing **Start/Enter** key during the process. Once you change the current value, store it by pressing **Start/Enter** button again.

| NiMH[0]   CHARGE   A |
| CUR LIMIT   6.0A |

◄DEC   INC►   ◄DEC   INC►

Battery   Start
type Stop   Enter   '<3 seconds'

| NiMH   1.0A   7.42V |
| DSC   022:45   00890 |

number   charging   charge battery charged
of cells   time   current voltage capacity

To stop discharging press **Batt Type/Stop** key once.

The audible sound indicated you at the end of process.

7.3 CYCLING NIMH ' NICD BATTERIES

```
NiMH[0]   CYCLE
DCHG>CHG      3
                 Display
◄DEC  +   ► ◄DEC  +   ►
     INC         INC
```

Battery type Stop   Start Enter '<3 seconds'

```
NiMH  1.0A   7.42V
D<C   022:45  00890
                 Display
```
number of cells | charging time charge current | battery voltage | charged capacity

```
DCHG  1   1314mAh
CHG   1   1430mAh
                 Display
```

Set the sequence on the left and the number of cycle on the right. You can use this function for balancing, refreshing and to break-in the battery. To avoid rising temperture of the battery, there will be a brief cool-off period that is fixed at 'User setting' after each charge and discharge process. The cycling number ranges from 1 to 5.

To stop the process, press **Batt Type/Stop** key once. You can change the discharge or charge current by pressing **Start/Enter** key once during the process. The audible sound indicates the end of process.
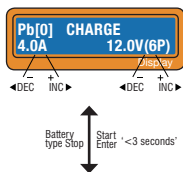
At the end of the process, you can see charged or discharged electric capacities of the battery at each cyclic process. By pressing **INC** or **DEC** button, the screen shows the result of each cycle in order.

# 8. PB (LEAD-SULPHURIC ACID) BATTERY PROGRAM

This is programmed for charging Pb (lead-sulphuric acid) battery with nominal voltage from 6 to 12V. Pb batteries are totally different from NiCd or NiMH batteries. They can only deliver releatively low current compared to their capacity, and similar restrictions definitely apply to charge. The optimal charge current will be 1/10 of the capacity. Pb batteries must not be charged rapidly. Always follow the instruction is supplied by the manufacturer of battery.

If you wish to alter the parameter values in the program, press **Start/Enter** key to make it blink then change the value with **INC** or **DEC** key. The value will be stored by pressing **Start/Enter** key once.

```
Pb[0]   CHARGE
4.0A    12.0V(6P)
                 Display
◄DEC  +   ► ◄DEC  +   ►
     INC         INC
```

Battery type Stop   Start Enter '<3 seconds'
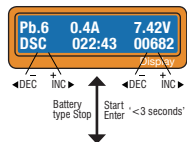
8.1 CHARGING PB BATTERY

Set up the charge current on the left and the nominal voltage of the battery on the right. The charge current ranges from 0.1 to 6.0A and the voltage should be matched with the battery being charged. Start the charge process by pressing **Start/Enter** key for more than 3 seconds.

number of cells • charging time • charge current • battery voltage • charged capacity
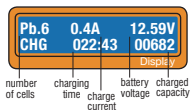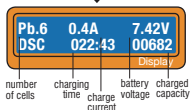
The screen displays the state of charging process. To stop charging forcibly, press **Batt Type/Stop** key once. The audible sound indicates the end of the process.

8.2 DISCHARGING PB BATTERY

Set discharge current on the left and final voltage on the right. The discharge current ranges from 0.1 to 2.0A.

◄DEC INC►   ◄DEC INC►

Battery type Stop • Start Enter '<3 seconds'

To start the process, press **Start/Enter** key for more than 3 seconds.

number of cells • charging time • charge current • battery voltage • charged capacity

The screen displays the current state of discharge. You can alter the discharge current by pressing **Start/Enter** key during the process. Once you change the current value, store it by pressing **Start/Enter** button again.

To stop discharging press **Batt Type/Stop** key once. The audible sound indicates the end of the process.

9. BATTERY INTERNAL RESISTANCE TESTING SYSTEM

Lithium battery internal resistance is an important indicator of battery discharge capacity and efficiency. We can know battery performance and the matching of each battery by getting the battery resistance value. The lithium battery internal resistance value tested by this charger is relative (not absolute), which is tested under the testing voltage. But it can also know the battery performance and matching through the relative value. If you want more battery performance comparison, you had better put them under the same voltage to detect. For example, to compare two 3-cells batteries, you should ensure that the total voltage is consistent. Testing in the single voltage of 4.2V, the test data is smaller the performance better and the data more close to the battery the better matching nature.

Start Enter

Interface of the Internal Resistance Testing.

Measuring IR Wait Please
Display
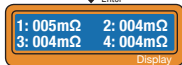
Press **Start/Enter** to enter into it.
Show the data of Battery Pack IR.

↓ Start/Enter

1: 005mΩ 2: 004mΩ 3: 004mΩ 4: 004mΩ
Display

Press **INC** to check the total data of the Battery Pack IR
(Press **INC** again to show the data of the single cell IR)

10. SAVE/LOAD DATA PROGRAM

Under the battery type interface, press **INC** or **DEC** key to select storage number for quick operation.

Press **Start/Enter** to enter. Users can set and storage common data. Set values will be automatically saved to corresponding storage number.

PROGRAM MEMORY LiFe [0]
Display

◀DEC   INC▶

Users can store 5 sets common data for each battery type, [0]-[4].

11. VARIOUS INFORMATION DURING THE PROCESS

You can check various information on LCD screen during charging or discharging process. When you press **DEC** button the charger shows the set user settings. You can also monitor the voltage of individual cell by pressing **INC** button when the balance connection cable is linked to the Lithium battery being processed.

End Voltage 12.6V(3S)
Display

◀ DEC ↓
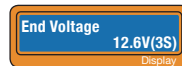
Displayed nominal voltage when the program ended.

Capacity Cut-Off ON   10000mAh
Display

◀ DEC ↓

Displayed capacity cut-off function is turned on and the setting value of capacity.

Safety Timer ON   240min
Display

◀DEC ↓

Displayed safety timer is turned on and duration of time in minutes.

18
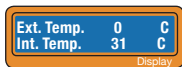
Temp Cut-Off **ON 80C 176F** Display	Displayed temperature cut-off function is turned on.
◄ DEC ↓	
Ext. Temp. 0 C **Int. Temp. 31 C** Display	The external temperature is displayed when the temperature probe is used. Int temperature displayed is the internal temperature of changer.
◄ DEC ↓	
C1: 3.75 C2:3.75 V **C3:3.76 C4:3.76 V** Display	When the battery is connected with a balance cable you can check voltage of each cell in the battery pack. When the cable is connected with the ports on the charger, the program will display voltage of up to 4 cells.

12. WARNING AND ERROR MESSAGES

The unit incorporates various functions of protective and monitoring the system to verify functions and the state of its electronics. In the case of an error, the screen displays the cause of error as listed below and an audible sound.

REVERSE POLARITY Display	Incorrect polarity connected.
CONNECTION BREAK Display	Battery connection is interrupted.
SHORT ERR Display	Short-circuit of the output termination.
VOL SELECT ERR Display	The voltage of the battery pack has been selected incorrectly.
BREAK DOWN Display	The charger has malfunctioned for some reason. Seek professional advice.
BATTERY CHECK **LOW VOLTAGE** Display	The voltage is lower than which is set. Please check the number of cells in the battery pack.
BATTERY CHECK **HIGH VOLTAGE** Display	The voltage is higher than which is set. Please check the number of cells in the battery pack.

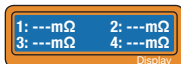| Display	Description
BATTERY VOLTAGE **CELL LOW VOL**	Voltage of one cell in the battery pack is too low; please check the voltage of each cell.
BATTERY VOLTAGE **CELL HIGH VOL**	Voltage of one cell in the battery pack is too high; please check the voltage of each cell.
BATTERY VOL ERR **CELL CONNECT**	Wrong connection of the connector detected; please check the connector and cable.
TEMP OVER ERR	The internal temperature of the unit goes too high, switch off all power and allow the unit to cool down.
CONTROL FAILURE	The processor cannot control the feeding current, please repair it.
Battery Pack IR **0mΩ**	The battery pack internal reistance is too low.
1: ---mΩ 2: ---mΩ **3: ---mΩ 4: ---mΩ**	The battery balance port or the power line connection is incorrect.

13. SPECIFICATIONS

Operating voltage range: . . . . 100-240 V AC
Circuit power: . . . . max.60W for charging
. . . . .max.10W for discharging
Charge current range: . . . . 0.1~6.0A
Discharge current range: . . . . 0.1~2.0A
Current drain for balancing Li-Po: 300mAh/cell
NiCd/ NiMH battery cell count: 6-8S
Lithium battery cell count: 2-4S
Pb battery voltage: . . . . 6V(3P)-12V(6P)
Weight: 302g
Dimension: . . . . 115×112×55mm

WARRANTY

	Test Standards	Title	Result
RCM	AS/NZS 60335.2.29:2004＋A2	Household and similar electrical appliances - Safety - Part 1: General requirements: Amendment 2	Conforms
	AS/NZS 60335.1:2011＋A2	Household and similar electrical appliances - Safety - Particular requirements for battery chargers: Amendment 2	Conforms