



Emperor L702B Pro



Thank you for purchasing this Fusion Emperor L702B Pro charger. We are sure you will be pleased with its performance and features. In order to ensure that you obtain the maximum benefit from its operation, please read the instructions carefully.

OPERATING INSTRUCTIONS Please keep for Future Reference

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SPECIFICATIONS

MODE	TYPE	SPEC
Power Supply	DC Input	11-28V DC
Battery Types		NiCd, NiMH, LiPo, Lilon, LiFe, Pb
Operating Modes	NiCd, NiMH	Charge, Discharge, Cycle
	LiPo, Lilon, LiFe, Pb	Charge, Discharge, Store
Operation function	Charge (NiCd, NiMH)	Automatic charge
		Normal charge
		Linear charge
		RE-FLEX charge
	Charge (LiPo,Lilon,LiFe,Pb)	CC-CV charge
	Discharge	Automatic discharge (NiCd, NiMH)
		Normal discharge (NiCd, NiMH)
Linear discharge		
Store Mode	60% Capacity	
Number of Cells	NiCd, NiMH	1 ~ 18 Cell
	LiPo, Lilon, LiFe	1 ~ 7 Cell
	Pb	1 ~ 12 Cell
Charge Current	NiCd , NiMH	0.1A ~ 20.0A (max 300W)
	LiPo, Lilon, LiFe	0.1A ~ 20.0A (max 300W)
Discharge Current	NiCd , NiMH, LiPo, Lilon, LiFe, Pb	0.1A ~ 10.0A (max 50W)
Discharge Voltage	NiCd, NiMH	0.1 ~ 1.1V/cell
	LiPo, Lilon, LiFe	2.5 ~ 3.7V/cell
Trickle Current	NiCd, NiMH	Off ~ 500mA
		Auto Mode (Charge Current/20)
Cycle Mode	Cycle time	1~10 Cycles
	(NiCd/NiMH only) Cycle delay	1~30 min
	Cycle direction	C>D / D>C
Peak sensitivity	NiCd	5 ~ 25mV/cell
	NiMH	0, 3 ~ 15mV/cell
Temperature Sensor	Centigrade	10 ~ 60°C
	Fahrenheit	50 ~ 150°F
Max charge capacity (safety timer)	NiCd , NiMH	10 ~ 150%
	LiPo, Lilon, LiFe	10 ~ 120%
Start peak delay timer	NiCd , NiMH	1 ~ 20 min
Memory	Memory number	20 Memories (per channel)
Safety timer	NiCd , NiMH, LiPo, Lilon, LiFe, Pb	20 ~ 300mins & Off
Charge rate limit	LiPo, Lilon, LiFe	1 ~ 5C
TCS Capacity	LiPo, Lilon, LiFe	10 ~ 100%
TCS END action	LiPo, Lilon, LiFe	Continue, Stop

GENERAL OPERATION

OUTPUT BATTERY CONNECTIONS

The Emperor L702B Pro has two sets of outputs on the front of the charger, channel 1 is on the left and channel 2 on the right. Each channel has two 4mm banana sockets, a 7 cell balance port and a temperature sensor input.

You will need an appropriate charge lead to suit the specific connector on your battery. Connect this charge lead to the 4mm output sockets on the charger channel you want to use, with the positive (+) lead connected to the red socket and the negative (-) lead to the black socket.



Only connect the battery to the charge lead AFTER the charge lead has been connected to the charger, as the connectors on the charge lead could touch together and cause the battery to short circuit.

When charging a Lithium pack, make sure that the balance lead is connected to the charger. The charger has a 'JST-EH' type balance port, but also comes with balance adaptor boards for JST-XH and Flight Power/Thunder Power. To use an adaptor board, connect the supplied balance adaptor board lead to the charger and then connect the board that works with your battery balance connector. Optional adaptor boards for Polyquest & 4/2mm plug car packs are also available.

If the main battery power leads ONLY are connected to the output banana sockets, without connecting the balancing connector to the balancing port on the charger, the charger will charge or discharge the connected Lithium pack without balancing it.



We always recommend balancing a Lithium pack, because some cells may retain more capacity than others, so over time the pack can become unbalanced. If an unbalanced pack is then used, some of the cells will exceed their maximum voltage when charged and others their minimum voltage when discharged, which causes damage to the cells. When a Lithium cell is overcharged, it can cause damage and in extreme cases can cause a fire.

TURNING ON & SETTING THE INPUT POWER

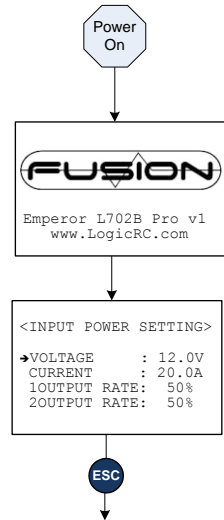
The input power leads on the Emperor are supplied with 4mm gold banana type connectors (with optional crocodile clips) that should be connected directly to a suitable 11-28V DC power source, ensuring that the black connector is connected to the negative (-) and the red to the positive (+).

When the charger is initially connected to a power source, it will ask you to confirm the maximum input power available from the power source and allow you to adjust the percentage of this power available to each output on the charger. This allows the Emperor L702B Pro to deliver the highest available power to each of the charger outputs (channels), without overloading the power source.

Each line is selected by pressing the 'Inc' and 'Dec' buttons to move the selection arrow up and down.

To edit a value press the 'Enter' button to highlight the selected value. To increase or decrease the highlighted value, press the 'Inc' or 'Dec' buttons. Once the desired value has been selected, press the 'Enter' button again to store this value.

Once the correct parameters have been entered press the 'Esc' button to continue to the main screens.



THE DISPLAY

The display is broken up into 2 halves. The top half of the display shows the first channel (Ch1) and the bottom shows the second (Ch2).

The selected channel is shown in normal text and the other in reversed out text.

Ch1 Selected

```
→11|LiPo 3S 2200mAh
CHG. : 2.1A 4.20V/C
DCHG. :10.0A 3.0V/C
STORE MODE START
→ 0|NiMH 6S 3300mAh
CHG. : 3.3A 5mV/C
DCHG. : 5.0A 0.8V/C
CYCLE : C→D 1X 10m
```



CH2 Selected

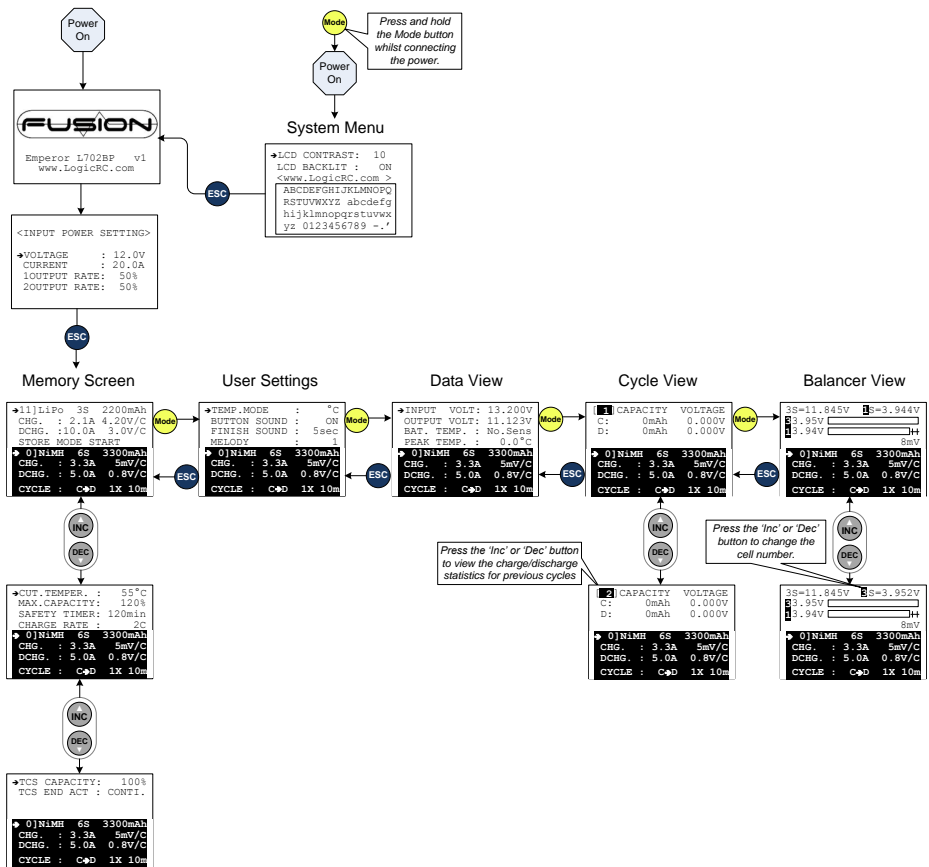
```
→11|LiPo 3S 2200mAh
CHG. : 2.1A 4.20V/C
DCHG. :10.0A 3.0V/C
STORE MODE START
→ 0|NiMH 6S 3300mAh
CHG. : 3.3A 5mV/C
DCHG. : 5.0A 0.8V/C
CYCLE : C→D 1X 10m
```

Pressing the 'Channel' button (at any time) selects the other channel (charger).

MENU STRUCTURE

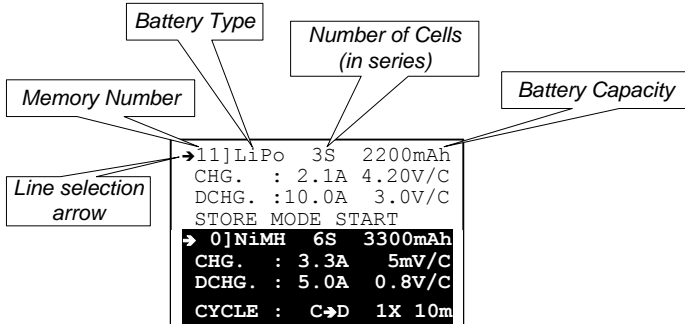
The menu system in the Emperor L702B is summarized in the flow chart below. To move around the screens press the buttons as shown on the flow chart.

Where a line selection arrow is shown on the left of a line, the 'Inc' and 'Dec' buttons can be used to move the selection arrow up or down. Pressing the 'Enter' button highlights each value on a line so that it can be changed. Pressing the 'Esc' button whilst a value is highlighted exits the editing and moves back to the line selection again.



BATTERY MEMORY SCREEN

The battery memory screen is the main functional screen for this charger. It is used to store specific battery, charge, discharge and safety parameters, as well as being used to initiate charging, discharging, cycling/store mode functions.



To edit the battery parameters, make sure the selection arrow is on the top line and press the 'Enter' button to highlight the memory number. Using the 'Inc' or 'Dec' buttons, the selected memory (0~19) can be changed. By default each memory is populated with a sample configuration, but these can be adjusted to suit your requirements.

Pressing the 'Enter' button again selects the Battery Type for the selected memory. The battery type can be changed using the 'Inc' and 'Dec' buttons.

The available battery types are:-

NiCd	Nickel Cadmium	(1.2V/cell)	NiMH	Nickel Metal Hydride	(1.2V/cell)
LiPo	Lithium Polymer	(3.7V/cell)	LiIo	Lithium Ion	(3.6V/cell)
LiFe	Lithium Ferrite	(3.3V/Cell)	Pb	Lead Acid	(2V/cell)

Pressing the 'Enter' button again highlights the number of cells (in series), which can be adjusted using the 'Inc' and 'Dec' buttons. If you are unsure of the number of cells in your battery pack, then this can be calculated by dividing the total battery voltage by the individual cell voltage.

Pressing the 'Enter' button again selects the battery capacity setting, then back to the line selection arrow.

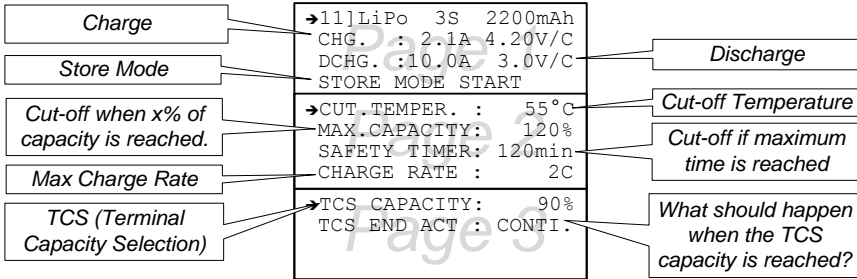


It is very important that the correct battery parameters are entered, as incorrect values could cause the charger to seriously damage your battery which could result in a fire!

Pressing the 'Dec' button whilst nothing is highlighted moves the line selection arrow down.

LITHIUM FUNCTIONS AND PARAMETERS

When a Lithium type battery is selected, the following functions and parameters are available. The 2nd and 3rd pages (shown below) are accessed by moving the line selection down arrow off the bottom of the page.



‘CHG.’ – CHARGE

This line shows the charge current and the maximum cell voltage which can be edited by press the ‘Enter’ button to highlight the parameter, then the ‘Inc’ and ‘Dec’ buttons to edit the value. The default charge current for a Lithium battery is set to 1C (1 x capacity), however this can be adjusted from 0.1 to 20 Amps.

N.B. For safety the charge current is limited to the capacity x charge rate (see Maximum Charge Rate setting). If you want to increase the charge current above 2C, you must first increase the maximum charge rate before you can increase the charge current.

Normally, the maximum cell voltage should be left at the default value (LiPo=4.2V, Lilo=4.1V & LiFe=3.7V), but in very cold weather a Lithium Polymer pack can be overcharged at 4.2V, so reducing the maximum charge voltage to 4.1V can increase the life of your pack.

Press the ‘Enter’ button for 2 seconds on this line to start the charge.

‘DCHG.’ - DISCHARGE

This shows the discharge current and the cut-off voltage per cell. Pressing the ‘Enter’ button for 2 seconds with this line selected will start the discharge.

STORE MODE START

It is recommended that Lithium batteries are not left in a fully charged or discharged state for long periods of time, especially when stored in a cold environment.

Therefore, store mode will charge or discharge your pack to around a 60% charged state to help extend the life of your packs.

CUT.TEMPER. - CUT-OFF TEMPERATURE

When used with the optional temperature sensor, a safety cut-off temperature can be set, so that charging or discharging is terminated automatically if the temperature sensor detects the battery temperature rising above the selected value.

'MAX. CAPACITY' – MAXIMUM CAPACITY

The maximum capacity setting is used to terminate a charge if the charger exceeds the selected percentage of the battery capacity.

SAFETY TIMER

The safety timer can be used to terminate a charge if it is not completed within the selected time period.

'CHARGE RATE' – MAXIMUM CHARGE RATE

The charge rate allows you to set the maximum charge rate for the pack being charged. The default is 2C, but some newer packs can allow up to 5C (5 x capacity), so increasing this value allows the user to select a higher charge current in the charge parameters.

TCS CAPACITY

TCS (Terminal Capacity Selection) allows the user to select a capacity at which the charger will beep or stop charging.

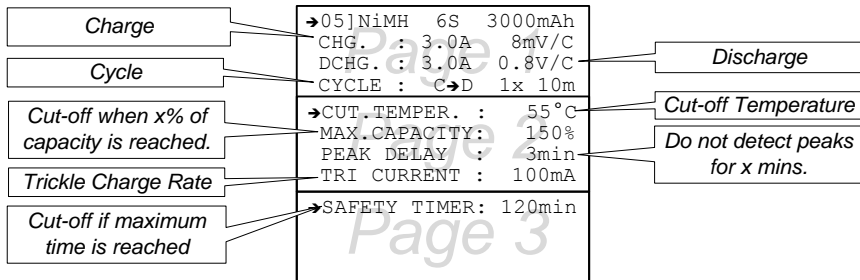
Lithium batteries are charged using a constant current then constant voltage (CC-CV), so when the cells reach their maximum voltage, the charge current is slowly reduced until the charge is complete. Because the charge current is being reduced, the last 10-30% of the charge takes proportionally longer than the first part.

Therefore, the TCS capacity can be set to warn the user when the selected capacity is reached, which can be useful if the user does not require a full charge in the battery, so it can be used sooner.

'TCS END ACT' – TCS END ACTION

When the selected TCS capacity is reached, the charger can be set to continue the charge and warn the user that the TCS capacity has been reached or the charger can stop the charge.

NICD/NIMH FUNCTIONS AND PARAMETERS



‘CHG.’ – CHARGE

This line shows the charge current and the delta-peak cut-off voltage. These values can be edited by pressing the ‘Enter’ button to highlight the parameter, then the ‘Inc’ and ‘Dec’ buttons to edit the value.

When charging NiCd and NiMH batteries, most chargers detect when the pack is fully charged by using a method called delta-peak. This monitors the voltage of the pack which increases as the pack becomes charged. When the pack is fully charged the pack starts to get warm and the voltage then starts to drop. The delta-peak cut-off voltage is the voltage drop (per cell) that is detected before the charger will stop the charge. The default delta-peak voltage setting for NiMH packs is 5mV/cell and for NiCd is 8mV/cell.

To start the charge function, press the ‘Enter’ button for 2 seconds with this line selected. The screen will then move to the charge type screen (see page 12).

n.b. The selected charge currents will not be used if ‘Automatic’ charge type is selected.

‘DCHG.’ - DISCHARGE

The discharge line shows the discharge current and the discharge cut-off voltage (per cell). The default cut-off voltage for NiCd/NiMH cells is 0.8V/cell.

Pressing the ‘Enter’ button for 2 seconds with this line selected will move to the discharge type selection screen.

n.b. The selected discharge current will not be used if ‘Automatic’ discharge type is selected.

CYCLE

The cycle mode allows the user to both charge and discharge a battery a number of times, in order to bring it back to peak performance.

Dependant on the final charge state required, you have the options to discharge then charge (D>C) or charge then discharge (C>D) the pack. In addition, the number of cycles and the delay between charging or discharging can be set.

n.b. When cycling a battery, the charger will use Automatic charge and discharge currents.

To start the Cycling you pack, hold the 'Enter' button down for 2 seconds.

'MAX. CAPACITY' – MAXIMUM CAPACITY

The maximum capacity setting is used to terminate a charge if the charger exceeds the selected percentage of the battery capacity.

'PEAK DELAY' – START PEAK DELAY

When charging a NiCd or NiMH type pack using delta-peak cut-off, the charger is looking for the pack voltage to peak and then drop off. However, some packs can give false peaks soon after the charge is commenced. Therefore, the start peak delay function overrides the peak detection for a selected number of minutes to stop any false peaks being detected. The default setting is 3 minutes.

'TRI. CURRENT' - TRICKLE CHARGE CURRENT

With NiCd and NiMH type batteries, it is recommended that the pack is trickle charged after the main charge has completed, so that the battery is kept fully charged and is ready to be used. Therefore, we suggest setting the trickle charge current to around 10% of the pack capacity.

SAFETY TIMER

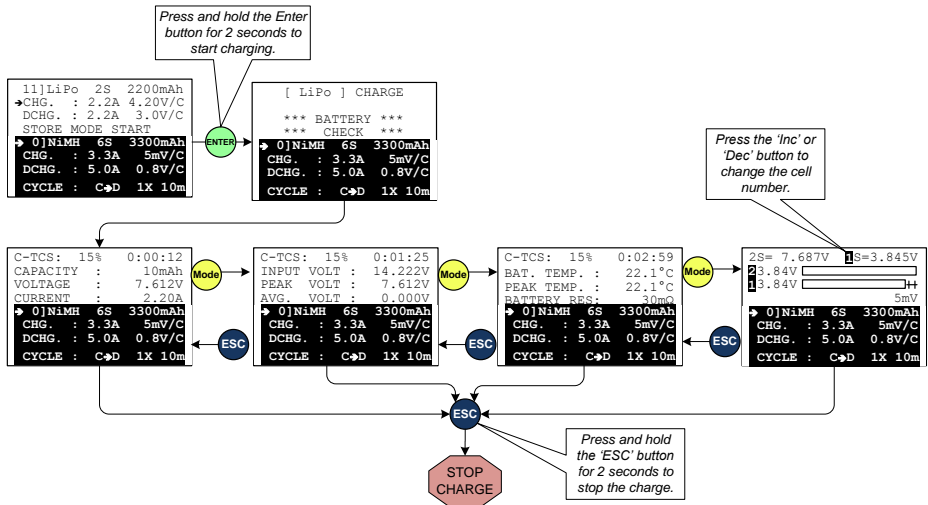
The safety timer is used to terminate a charge if it is not completed within the selected time.

CHARGING

With the selection arrow on the CHG line, select the correct charge rate and maximum cell/peak voltage for the battery being charged, then press and hold the

CHARGING A LITHIUM PACK

In the flow chart below, we have shown an example of how to charge a 2S (7.4V) 2200mAh LiPo pack at 2.2A.



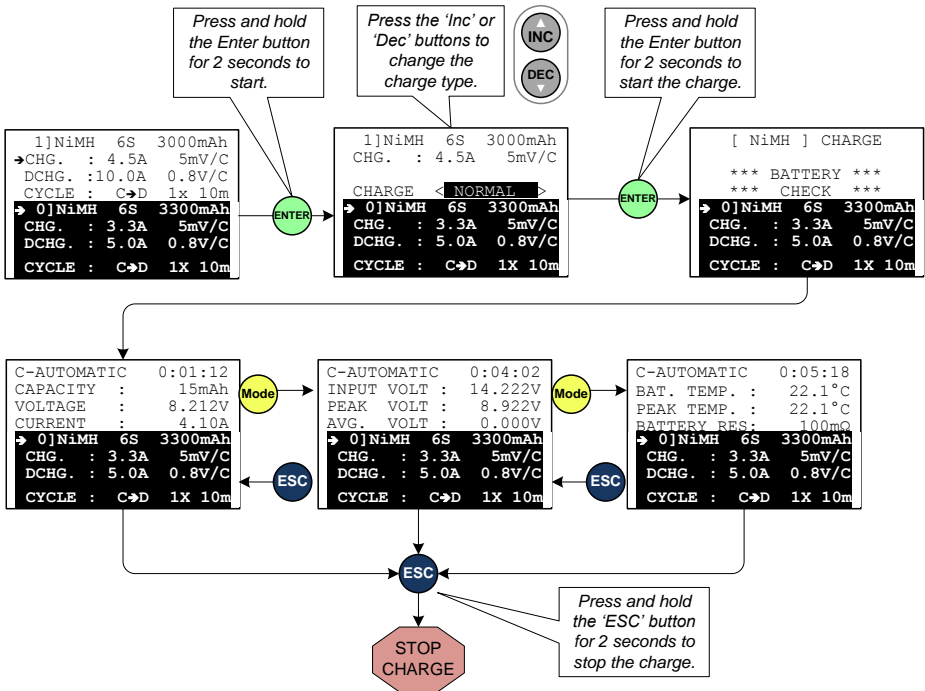
With the line selection arrow on the 'CHG.' line, check the correct charge current and cell voltage is selected, then press and hold the 'Enter' button for 2 seconds to start the charge.

As shown in the flow chart above, pressing the 'Mode' or 'Esc' buttons at any stage whilst charging moves through the different screens giving detailed information about the charge.

Pressing the 'Esc' button for 2 seconds at any stage will stop the charge.

CHARGING A NICD/NIMH PACK

In the flow chart below, we have shown an example of how to charge a 6 cell (7.2V) 3000mAh NiMH pack at 4.5 amps using a 'Normal' charge type.



After selecting charge for a NiCd or NiMH pack, you are given the option to select four different charge types. These are:-

Automatic	This is a fully automatic charge that will ignore the selected charge parameters. The charger will monitor the battery by stopping the charge for a few seconds every minute and then automatically adjust the charge current to make sure the best charge current is delivered to your pack.
Normal	The charger will charge the pack at the selected charge current, but will stop charging for five seconds every minute. This allows for better peak detection.
Linear	The selected current is maintained throughout the charge.
Re-Flex	Reflex (sometimes know as 'Burp' or 'reverse pulse') charging is where the charger applies a reverse charge of 4 times the charge current for 4/1000 of every second. Reflex charging is believed to help remove oxidizing gas bubbles from the cell plates in the battery, allowing it to charge more efficiently. Reflex charging is not always recommended for NiMH cells, so please check with your battery manufacturer first.

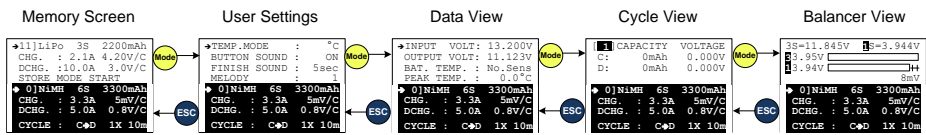
In this example a 'Normal' charge is selected and then the 'Enter' button is pressed for 2 seconds to start the charge.

As shown in the flow chart, pressing the 'Mode' or 'Esc' buttons at any stage moves through the different screens giving detailed information about the charge.

Pressing the 'Esc' button for 2 seconds at any stage will stop the charge.

OTHER SCREENS

As shown in the flowchart below, the other screens are accessed using the 'Mode' and 'Esc' buttons.



USER SETTINGS SCREEN

This screen is used to set the temperature mode and charger sounds for each charger channel. We recommend selecting a different melody for each channel (charger), so you can easily identify which channel has completed its operation.

```

    →TEMP.MODE : °C
    BUTTON SOUND : ON
    FINISH SOUND : 5sec
    MELODY : 1
    → 0|NiMH 6S 3300mAh
    CHG. : 3.3A 5mV/C
    DCHG. : 5.0A 0.8V/C
    CYCLE : C→D 1X 10m
  
```

DATA VIEW SCREEN

The data view screen shows both the input and output voltages, together with the current and peak temperature readings for each channel.

```

    →INPUT VOLT: 13.200V
    OUTPUT VOLT: 11.123V
    BAT. TEMP. : No.Sens
    PEAK TEMP. : 0.0°C
    → 0|NiMH 6S 3300mAh
    CHG. : 3.3A 5mV/C
    DCHG. : 5.0A 0.8V/C
    CYCLE : C→D 1X 10m
  
```

CYCLE VIEW

The cycle view screen shows the charge and discharge data for the most recent pack to be charged or discharged.

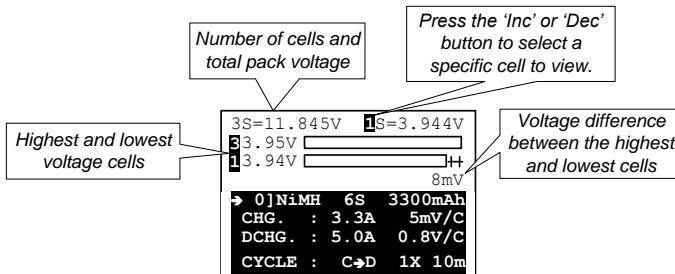
```

    [1] CAPACITY VOLTAGE
    C: 0mAh 0.000V
    D: 0mAh 0.000V
    → 0|NiMH 6S 3300mAh
    CHG. : 3.3A 5mV/C
    DCHG. : 5.0A 0.8V/C
    CYCLE : C→D 1X 10m
  
```

If the cycle function has been used (NiCd/NiMH only), then pressing the 'Inc' button shows the charge and discharge statistics for the previous 10 cycles.

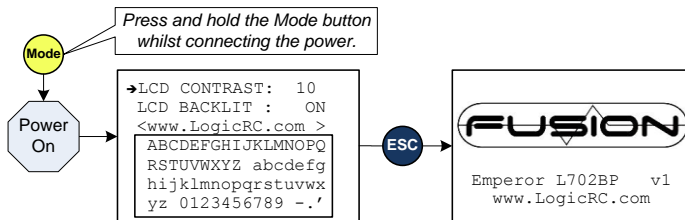
BALANCER VIEW

When a Lithium pack is connected to the charger, the balancer screen shows the balance statistics for the pack and allows the user to read off the individual cell voltages.



SYSTEM MENU

The system menu is accessed by holding down the 'Mode' button and connecting the power. In this menu you can adjust the LCD parameters and set the user name that appears on the welcome screen.



To edit the username, press the 'Dec' button to move down the line selection arrow to the username line. When on this line selection changes to character selection, so using the 'Inc' and Dec' buttons select the character to be changed, and then press the 'Enter' button to highlight the character. Using the 'Inc' and 'Dec' buttons to select the new character and press the 'Enter' button when finished. Continue this to change each character. When you have finished, press the 'Esc' key to exit this menu.

FACTORY SETTINGS

To reset the charger to the original factory settings, press and hold the 'Esc' button when connecting the power.

ERROR MESSAGES

The Emperor L702B Pro has a number of error and warning messages that are designed to advise the user of any problems.

When applicable, pressing the 'Esc' button clears the message.

SAFETY PRECAUTIONS

- **DO NOT** attempt to charge incompatible types of rechargeable batteries. This charger is designed to only charge and discharge Nickel-Cadmium, Nickel-Metal Hydride, Lithium-Ion, Lithium-Polymer, LiFePO4 and Lead-Acid batteries.
- Make sure you place the charger on a firm level surface for charging.
- **DO NOT** attempt to charge batteries at excessive fast charge currents. Check with your battery manufacturer for the maximum charge rate applicable to your battery.
- **DO NOT** use automotive type battery chargers to power the charger.
- **DO NOT** leave the charger unattended while charging. Disconnect the battery and remove input power from charger immediately if the charger becomes hot. Allow the charger or battery to cool down before reconnecting.
- **DO NOT** allow water, moisture or foreign objects into the charger.
- **DO NOT** place the battery or charger on or near a flammable object while in use. Keep away from carpets, cluttered workbenches, etc.
- **DO NOT** cover the air intake holes on the charger as this could cause the charger to overheat.
- Connect the charge lead to the charger **BEFORE** connecting to the battery.
- **DO NOT** disassemble the charger.
- This unit is **not intended** for use by young children or infirm persons unless they have been adequately supervised by a responsible person to ensure that they can use it safely.
- Young children should be **supervised** to ensure that they do not play with the charger.
- **DO NOT** attempt to charge non-rechargeable batteries.

- Lead-Acid batteries must be placed in a **well ventilated** area when charging.
- **DO NOT** attempt to charge whilst the input 12 volt battery is being charged, as the voltage supplied to the charger may be too high.

LITHIUM ION/POLYMER BATTERY - SAFETY WARNINGS

Ensure that the charger and battery are placed on a non-flammable surface whilst charging.

NEVER charge a Lithium ION/Polymer/Fe battery inside a vehicle whatever the circumstances.

ALWAYS ensure that the charger is correctly set for the battery being charged, checking both voltage and capacity. Be particularly careful if using a series/parallel battery pack, or if using packs of different specifications with the same charger.

NEVER charge at a rate higher than that recommended by the cell manufacturer, this can be very dangerous.

DO NOT leave Lithium ION/Polymer/Fe batteries unattended whilst they are charging. Monitoring the batteries during charging is very important.

ALWAYS monitor the temperature of the battery being charged every few minutes. If the battery becomes hot to the touch, disconnect it from the charger immediately and allow to cool. **DO NOT** recommence charging until the battery and charger have been checked for compatibility and the charger settings have been confirmed as being correct.

In the unlikely event of the Lithium ION/Polymer/Fe battery catching fire **DO NOT** use water to attempt to put the fire out, instead use sand or a fire extinguisher designed for electrical fires.

When used correctly, Lithium ION/Polymer/Fe battery packs are as safe as any other type of rechargeable battery pack. However they do require different charge regimes to the longer established Nickel Cadmium and Nickel Metal Hydride technologies and **have the potential of catching fire if severely mistreated.**

If Lithium Polymer battery packs are short-circuited or severely over-charged elemental Lithium may be deposited internally, and if the battery pouch is damaged this can escape from inside the battery. If this occurs a fire may be caused, as elemental **Lithium is highly reactive when exposed to water or moisture**, producing flammable hydrogen gas and corrosive fumes. Elemental Lithium is not produced

unless the battery pack is severely mistreated, so in normal usage there is no likelihood of explosion or fire.

Lithium Ion/Polymer battery packs must **NEVER** be discharged below 3 volts per cell (Li-Fe 2.0V) as this will result in damage to the cells. If the voltage is allowed to drop below 3 volts per cell the battery voltage may seem to recover following a charge, but the battery may not then give its full nominal capacity and a reduction in performance is likely – allowing the voltage to drop below 3 volts per cell will invalidate all warranty claims.

NEVER charge Lithium Polymer battery packs at greater than 4.2V per cell, Lithium Ion at 4.1V volts per cell or LiFe at greater than 3.7V per cell as this will cause irreversible damage to the cells and will invalidate all warranty claims.

NEVER charge Lithium battery packs above their maximum charge rate. This can damage the pack and can be dangerous. Generally, Lithium Polymer packs should not be charged above 2C (2 x Capacity). However, some newer packs do allow charging at up to 5C, but charging at these higher rates will reduce the life of the pack.
e.g Pack of 2500mAh capacity : 2C = 5000mAh = 5A max charge current.

DO NOT use discharge rates in excess of those specified with the battery pack as this will result in a significant drop in voltage under load and will dramatically reduce the number of charge/discharge cycles the battery pack will give.

If disposing of Lithium battery packs ensure that the pack is fully discharged by using a light bulb, electric motor or similar to completely discharge the pack.



DO NOT allow any Lithium battery pack to short-circuit as this is likely to result in a minor explosion and consequent fire.

BEFORE charging any Lithium battery packs they should be closely inspected for any damage, such as punctures in the sleeving or if the battery has swollen or expanded in size. If any such damage is detected **DO NOT** charge, even if the battery otherwise appears to be brand new.

Before commencing charging **ALWAYS** double check the settings on the charger to ensure it is set correctly for the battery pack to be charged. Using the wrong settings is likely to result in damage to the battery pack being charged and could result in the battery catching fire.

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