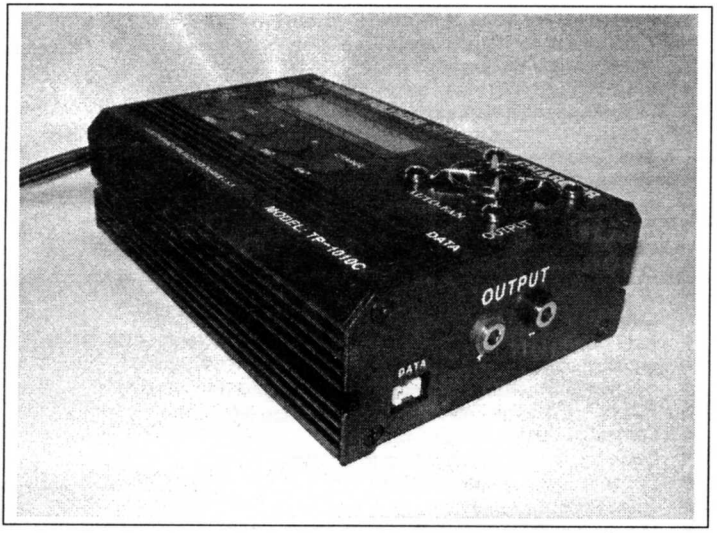
LI-POLYMER
CHARGER/DISCHARGER
USER'S MANUAL
TP-1010C



THUNDER POWER

Thunder Power USA

1. System Features
   - Hi-efficiency digital power system
   - Specially designed for safe Li-polymer charge algorithm
   - Backlit LCD
   - Balance charge capability(TP balancer required)
   - Individual cell over charge protect capability
   - Provided a data port to communicate to balancer
   - Automatic FAN control
   - Programmable 10 Memory charge parameter settings
   - Programmable various charge settings (Fast Charge /Full charge/storage charge and Li-on battery)
   - Discharge cut-off voltage selectable
   - Fast charge algorithm capability

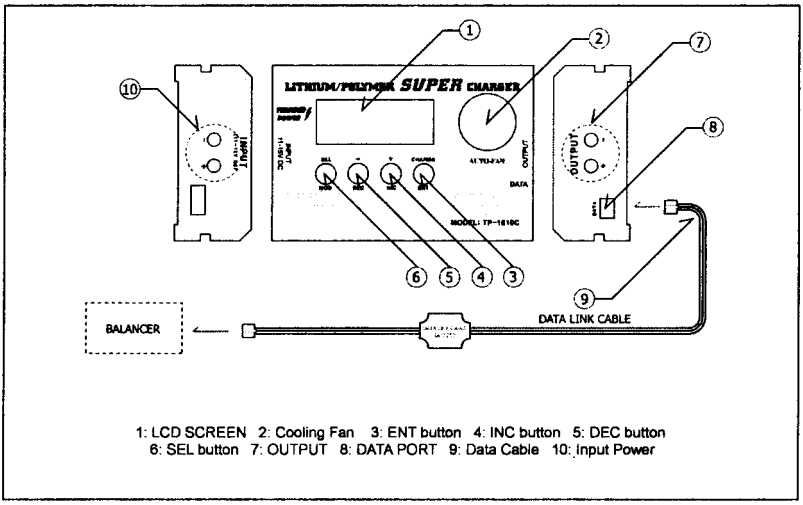
2. General Specifications
   - Input power capacity: 11V-15V DC 25Amp at maximum charge rating
   - Charge battery type: Lion or Li-polymer
   - Charge voltage: up to 10cell / 42V
   - Charge current: 0.25A to 10Amp
   - Charge Type :CC and CV
   - Charge termination: 5 types selectable
   - Over charge cutoff voltage:4.235V
   - Auto-balance charge current:300mA
   - Imbalance cut-off:0.2V
   - Auto-imbalance-current control active voltage:0.12V
   - Auto-current control reset imbalance voltage:0.01V
   - Discharge voltage:10Cell / 42V
   - Discharge power capability: up to 28 Watt
   - Capacity display:0----99999mAh
   - Timer display:0----10 hour
   - Display tolerance:+/- 0.25%
   - Display type: Backlit 2 x16 dot LCD
   - Charge power capability: up to 210Watt

****Important Note (Data Link Cable):**

The data cable (#DL-250) included is internally optical coupled to isolated connection between charge to balancer.

Do not make a direct connection by using any other cables. It may cause make a common ground and harmful hazards.

TP1010C charger face panel assignments



1: LCD SCREEN 2: Cooling Fan 3: ENT button 4: INC button 5: DEC button
6: SEL button 7: OUTPUT 8: DATA PORT 9: Data Cable 10: Input Power

LCD display abbreviations:

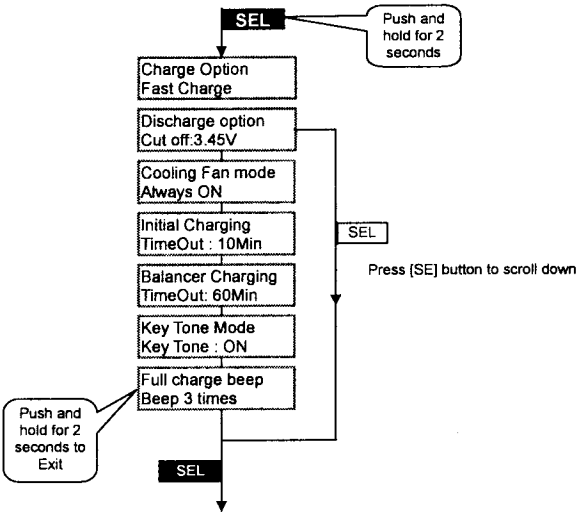
- **CC**: Constant current
- **CV**: Constant voltage
- **CHG**: Charge mode
- **DCH** :Discharge mode
- **Cx**: Higher voltage
- **Cy**: Lower voltage
- **C1--C10**: cell #1 ---Cell #10

1, Charger Option settings

You can select various charge options as shown table.
Push and Hold [SEL] button for 2seconds the screen appearing as below. Press [SEL] button to scroll I down.

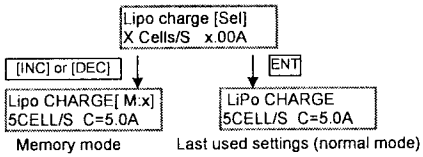
LCD Display	Function descriptions
CHARGE OPTION FastCharge	-Charge option settings Press **INC** or **DEC** select to: ● Fast charge ● Storage charge(3.85V top-off) ● Lion 4.1V charge ● Full charge 95% ● Full charge 100%

Discharge Option Cut-Off: 3.3V	Discharge cut-off voltage setting: ● 3.3V—3.45V—3.6V ● 3.85V(for storage discharge)
Cooling Fan Mode Auto	Cooling FAN operating mode: ● Auto or Always ON ● Auto mode: temperature or total power FAN control
Initial Charging TimeOut: 10Min	Initial charge timeout timer setting Press INC or DEC to desired time setting. 5 to 30minutes
Balancer charging Timeout: 60min	Balancer charge timeout timer setting When balancer detected imbalance 0ver 0.12V, charge current drops to 0.3A. This timer activated maximum time limited balance charging.(refer balance charging)
Key Tone Mode KetTone ON	Key Tone On/OFF
Full charge Beep Beep 3times	Full charge beep option Press **INC** or **DEC** to select full charge beep for 3time or 5miniutes.

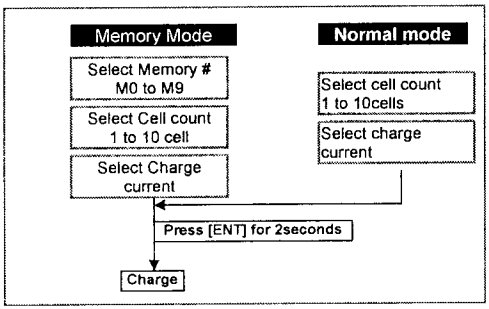


2, Charge

The charge setting mode can be selected either memory mode or normal mode.
Memory setting mode: Most frequently used 10 charge settings can be stored to M:0 to M:9.
Normal setting mode: The charge setting display the last used settings.
**This mode allows only when the charger power is up at once.
The shown below is how to select the buttons are used.



Modify charge settings;
You can charge settings either **memory** mode or **normal** mode. Press [ENT] button, the present variable setting begins flash. Press [INC] or [DEC] to change desired charge parameters, while flashing.
Please see the screen as shown below.



Note1: The changes are automatically updated to the present memory #0-to 9 when **MEMORY** mode selected.

Once begins charge process, following steps are described more detail of the functions.

1, **Cell count reconfirm**: If balance is not connected, you absolutely need a cell count reconfirm for the safety. This will occur when the voltage is out of the proper voltage range. **Press [INC] button if cell count is correct. (The display shown below)

2, **when not using balancer**: If screen shows "Balancer Checking" press [INC] to skip balancer checking mode. If not pressed the button automatically proceeding next charge step after 30 seconds.

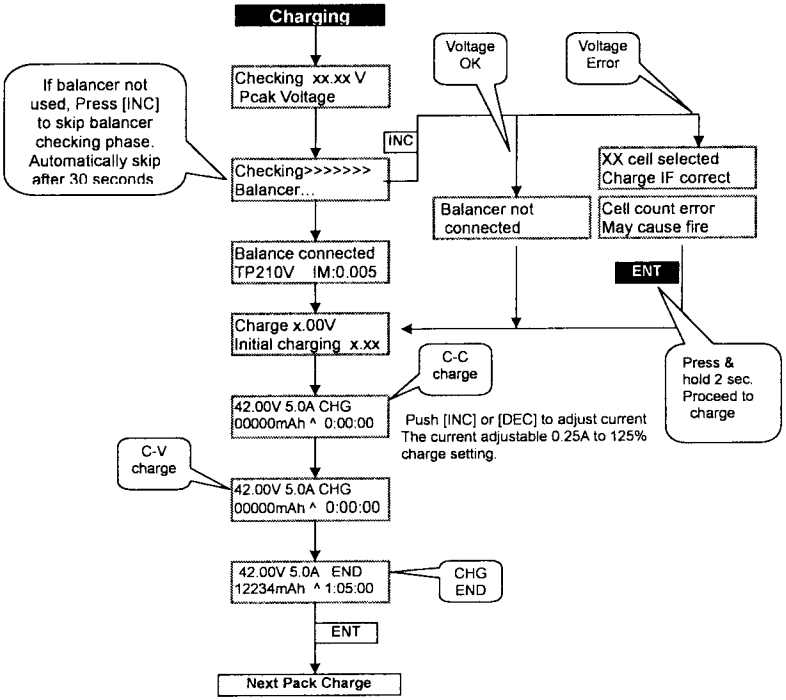
3, **Initial charge**: This charge mode limited current until the pack voltage equal or higher than 3.7V/cell. The initial charge time is also limited by it's time setting (See option setting) An error message occur when timeout. (Selectable 5 to 30minutes, default:10min.)

4. **CC charge (Constant current):** At this charge mode, the charge current can be adjustable 0.25A to +125% of the setting current.

5, CV charge (Constant voltage): At this phase the charge voltage should be locked and only the current should be ramp-down to the termination current (See option charge settings)

6, Charge complete: Beep alters 3 times or 10minnutes (See option charger settings)

<Charging sequences>



Safety functions if balancer connected while charging

1, Over charge protection: When any cell in the pack voltage over charged to 4.235V, charging will be interrupted and an error message occurs.

2. Imbalance charge current control: If the pack imbalance voltage reaches to 0.12V, the charge rate reduced to 0.3A (It'll only activate at the higher cell voltage reaches 3.85V). If the imbalance voltage not better than 0.03 for given the time setting (see option), a timeout error message occurs.

3. Over Imbalance voltage protection:

When the imbalance voltage greater than 0.2V, the charge will interrupted, and an error message displays (please do self balance if low cell voltage is still higher than 3.6V)

4, Cell count comparing with balancer data

The charger cell count will be compared with the balancer data information. If the cell count not equal, an error message occurs while charging.

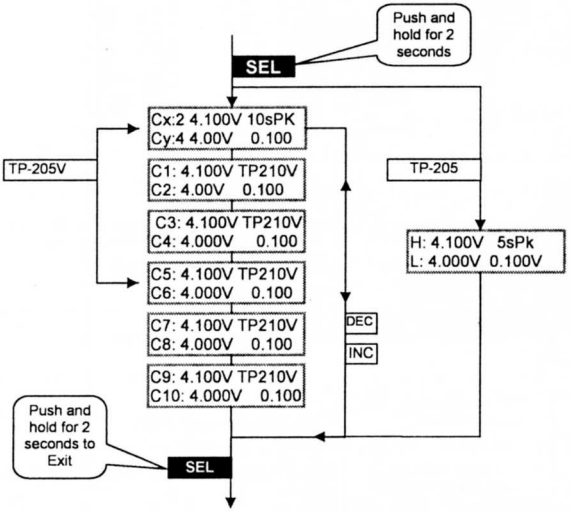
(Check cell count setting, charge again)

Balancer data display:

All individual cell conditions will be display as shown below.

When pressing [SEL] button longer than two seconds while charging, the LCD will display the entire individual cell's voltage, the balancer identity and imbalance voltage.

If any button no pressed longer 5 seconds the LCD display should be reverted.



Note1: Display not available at the "Initial charging".

Note2: A Balance data updates every 10 seconds period.

Niote3: Charge or discharge and "Balancer reading" are common used.

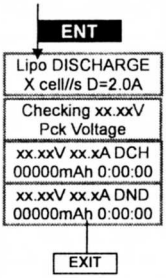
3, Discharge

1, Press **[SEL]** button, select to discharge-mode.
2. Press [ENT], the present cell count variable will begin flash.
3. Press INC or DEC to select cell counts.
   Press [ENT] again, the current variable will begin flash.
   Press Inc or DEC to select desired current.
   Press [ENT] for 2seconds to start discharge.

Note1: Be sure correct cell counts.

Note2: Be sure pack voltage over 3.85V/cell.

(Only discharge allows greater than 3.85V/cell)



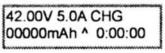
4, Data Link display

If the balancer data link successfully established, the [^] letter will appear as shown.

It also reflash every 10 seconds, when the balancer data updated.

Note: This sign will display while charge and discharge.

(Except at the "INITIAL CHARGING" mode)

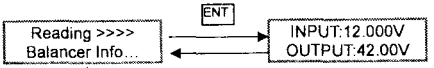


5, Reading Balancer data and other

1, Reading balancer data: This function allows to reads the balancer data-link (updated every 10 seconds interval time period)

2, Reading **INPUT** power source voltage and **OUTPUT** pack total voltage:

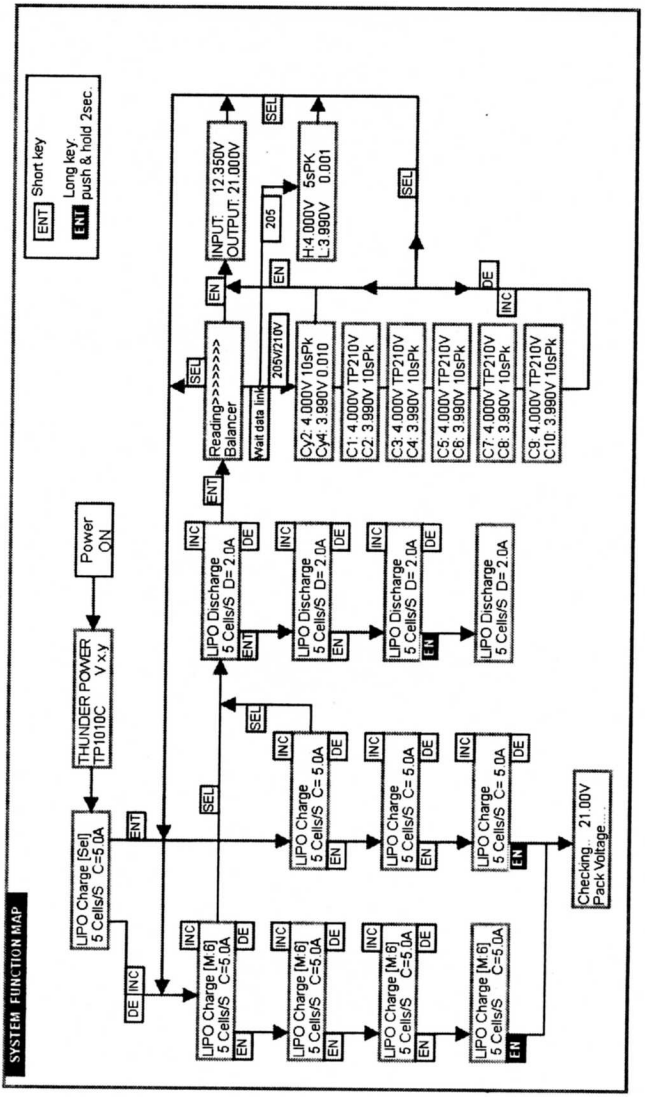
Pressing by ENT] button alternately display as shown below.



Note: See balancer data display section above

6, Error message

Code	Error Message	Description	Observations
#1	[1] Voltage Error OR Wrong Polarity	OUTPUT voltage error or wrong polarity	Check pack polarity and cell count.
#2	[2] Initial Charging Time Out	Initial charging timeout (see option settings)	Check pack voltage and cell count.
#3	[3] Wrong Cell with Balancer	Cell count not equal with balancer	Check charge cell count setting
#4	[4] Balancer See OverChg to 4.235V	One or more cell overcharged to 4.235V	Do 0.3A balance charge or reduce charge current setting.
#5	[5] Balancer See LowVoltage 3.3V	One or more cell over discharged	Do Cell balance.
#6	[6] Charging Incompleted!	Balancer charge timeout.	The charge is not completed *Do auto-self balance the pack and charge again.*
#7	[7] Failure Input Power	Input power voltage or capacity error	Be sure check voltage 11-15V while charging. The capacity required 25Amp source at 210W charge rating
#8	[8] Wrong Cell-count	Wrong Cell count	Check cell count setting
#9	[9] Failure Output circuit	Output wire short or connection problems	Check output connections.
#10	[10] Imbalance Over 0.2V	Pack imbalance voltage is over 0.2V	• Check individual cell voltage. • Do 0.3amp balance-charge.



SYSTEM FUNCTION MAP