

Proposed Name: “Universal Charger”

Proposed “Top level” Menu:

This is the top level menu: from here the user can run all the functions.

Profile select	Select the profile (between the 10 availables) for battery charge/discharge
Battery charge	Charge the battery with selected profile
Battery discharge	Discharge the battery with selected profile
Battery cycle	Discharge then charge the battery with selected profile
Change profile	Current profile management
PC management	Profiles and settings management via PC serial port
NiMh parameters	View the parameters for NiMh batteries
NiCd parameters	View the parameters for NiCd batteries
LiPo parameters	View the parameters for LiPo batteries
SLA paramaters	View the parameters for SLA batteries
Charger parameters	View the parameters for charger

Proposed “Profile select” menu:

From here the user can select a particular profile for battery charge/discharge.

Profile name 1	Profile number 1
Profile name 2	
Profile name 3	
Profile name 4	
Profile name 5	
Profile name 6	
Profile name 7	
Profile name 8	
Profile name 9	
Profile name 10	Profile number 10

Proposed “Battery charge”:

Display: Current/voltage and choice of (Time/capacity);

NiCD and NiMh

The charge is always performed using a constant current. After the start of charge the charger checks for the end of the charge, using the following rules:

1. After an initial period of inhibition (set by the user) the charger check for the peak voltage. When the voltage of the pack has a peak and decrease of a certain value (set by the user) the charge ends.
2. The charge ends when the charger cannot set the charge current (battery removed – insufficient input voltage – charge current too high)
3. The charge ends when the charger has passed to the batteries a specified amount of charge (Timeout – set by the user)
4. The charge ends for user break

LiPo and SLA

At the start of charge the charger will check on the number of batteries for LiPo and SLA. The battery voltage must be between cutoff voltage and maximum voltage (see tables). If the pack voltage is between $N_{\text{cells}} \cdot \text{cutoff}$ and $N_{\text{cells}} \cdot \text{Maxvoltage}$ the charge continue else terminates.

The charge is performed using a constant current (set by the user) until the battery pack voltage reach the value of $N_{\text{cells}} \cdot \text{Maxvoltage}$: after this point the charger switch to constant voltage and check for the charge end, using the following rules:

1. When in constant voltage mode, the charge is stopped when the current is a specified percentage of the initial current (set by the user)
2. The charge ends when the charger has passed to the batteries a specified amount of charge (Timeout – set by the user)
3. The charge ends for user break

Proposed “Battery discharge”:

Display: Current/voltage and choice of (Time/capacity).

The discharge is performed using a constant current. The discharge ends when the pack voltage is under a specified limit (set by the user).

Proposed “Battery cycle”:

Display: sequence of discharge and charge.

Proposed “Change Profile” Menu:

The user can change these parameters for each stored profile. All the “pack” parameters can be changed by the user also “on the field”.

Chemistry	Selection possible between: NiCd: Nickel Cadmium NiMh: Nickel Metal hydride LiPo: Lithium polymer SLA: Sealed Lead Acid
Capacity	Single cell capacity (or sum of paralleled element in case of LiPo or SLA): 100-25500 mAh, step 100mAh
N. of cells	Number of cells: from 1 to 19
Charge current	Charge current in function of capacity: 0.01C – 2.55C, step 0.01C
Discharge current	Discharge current in function of capacity: 0.1C – 25.5C, step 0.1C
Charge ends check inhibition	Inhibit the end-of charge detection for this time: 1-255 min, step 1min. Default 5min.
Name	Battery pack name, 16 characters

Proposed “PC management”:

Display: “EEProm updating” when in PC control

Techonology, chemistry and setup dependent parameters

The following menus allows the user to view the parameters for charge/discharge the battery packs. These parameters **cannot** be changed on the field (directly from the charger menus), but only connecting the charger to a PC and using a dedicated program (like the ADV one). This approach is useful because all these parameters are directly related to the cell technology or to the charger customization and not to a particular battery pack, and does not requires a change after the initial trimming. The LiPo related parameters are also very critical and must be “confirmed” by the user.

Proposed “View NiMh parameters” Menu:

Parameters for the NiMh cell chemistry. When the user select this chemistry for a battery pack, the charger will use these parameters.

Cutoff voltage	Stop the discharge when the cell voltage reach this limit. 0-2550mV, step 10mV. Default 800mV
Delta peak	Stop the charge when the cell voltage reach this limit below the maximum peak: 0-255mV, step 1mV. Default 5mV
Timeout	Stop the charge when the cell has been charged with this capacity: 0-255%, step 1%. Default 120%

Proposed “View NiCd parameters” Menu:

Parameters for the NiCd cell chemistry. When the user select this chemistry for a battery pack, the charger will use these parameters.

Cutoff voltage	Stop the discharge when the cell voltage reach this limit. 0-2550mV, step 10mV. Default 700mV
Delta peak	Stop the charge when the cell voltage reach this limit below the maximum peak: 0-255mV, step 1mV. Default 15mV
Timeout	Stop the charge when the cell has been charged with this capacity: 0-255%, step 1%. Default 120%

Proposed “View LiPo parameters” Menu:

Parameters for the LiPo cell chemistry. When the user select this chemistry for a battery pack, the charger will use these parameters.

Cutoff voltage	Stop the discharge when the cell voltage reach this limit. 2500-3010mV, step 2mV. Default 3000mV
Maximum voltage	Switch the charge from “constant current” to “constant voltage” when the cell reach this voltage: 4100-4355mV, step 1mV. Default 4250mV
Timeout	Stop the charge when the cell has been charged with this capacity: 0-255%, step 1%. Default 120%
Final current	Stop the charge when the current reaches this percentage of the initial current: 0-99%, step 1%. Default 5%.

Proposed “View SLA parameters” Menu:

Parameters for the SLA cell chemistry. When the user select this chemistry for a battery pack, the charger will use these parameters.

Cutoff voltage	Stop the discharge when the cell voltage reach this limit. 1500-2520mV, step 4mV. Default 2000mV
Maximum voltage	Switch the charge from “constant current” to “constant voltage” when the cell reach this voltage: 2300-2555mV, step 1mV. Default 2450mV
Timeout	Stop the charge when the cell has been charged with this capacity: 0-255%, step 1%. Default 120%
Final current	Stop the charge when the current reaches this percentage of the initial current: 0-99%, step 1%. Default 5%.

Proposed “View Charger parameters” Menu:

Parameters for the charger general management. If the user sets the parameters above these limits, the charger will clamp the values to the maximum limits.

Max. charge current	This parameter depends essentially from the external power supply: 0.0-25.5A, step 0.1A, default 4A
Max. discharge current	This parameter depends essentially from the cooler attached to the discharge Mosfets: 0-255A,step 1A. default 30A
R5	Sets the R5 value. Default 47K
R6	Sets the R6 value. Default 12K
Current sensitivity	Sets the pick up current to voltage parameter.in uV/A.for HV charger, LTS-25NP default: 25000 uV/A
Buzzer frequency	Sets the buzzer frequency: 0 – 5000 Hz, step 100Hz default 2000 Hz.