SERIES BTS

HIGH PRECISION BATTERY TESTING SYSTEM

USER'S MANUAL

VERSION 5.3 (SERIAL PORT VERSION)

Preface

- Thanks for using the series NEWARE BTS (Battery Testing System).
- Please read the manual carefully before using the system to give full scope to the functions of system.
- Our company devotes to providing range of battery testing systems, battery formation & grading systems,Our products have been passed through strict internal test procedures and are certified by the national quality inspection authority. With five years' continuous renovation, our products are rewarded as mature technology, stable quality and leading performance and widely accepted by both domestic & overseas customers.
- Our company registered trademark is "NEWARE". Company's management strategy is "technological innovation, sincere service". The company attaches great importance on constantly pursues the most superior performance price compared and consummation post-sale service to satisfy our customers various requests.
- Want to see more details of our company and software downloading, please visit http://www.neware.com.cn

Products introduction

1.1 Summarization

The series NEWARE BTS is a rang of high precision battery testing system, which designed primarily for Li-polymer, Li-ion, Ni-Cd,Ni-MH Lead acid etc. batteries combine capability tests; This system provides many applications in battery testing fields such as materials research, small-scale battery formation, capability grading, battery pack and the notebook computer battery testing and so on.

Characteristics:

1. Steady and reliable hardware system, each channel has an independent constant-current and a hardware constant-voltage source.
2. Every channel can establish work-step independently, in order to increase the specialty work-step setup plan; it also has the function of "connection" after "stop" at any time (including outage).
3. Fast data acquisition. Precisely grasps the vary details of voltage and current, has log function. With powerful data and curve processing, report function. Data and curve can be imported into EXCEL, WORD, which can edit processing too.
4. All kinds of clamps are designed to meet different type of electric chip, button batteries and assembly batteries testing.

5. All kinds of types are custom manufactured for a range of current from 1mA to 1000A, a range of voltage from 5V to 500V to meet customers special needs, also can increase negative voltage.
6. This system can be used off-line, testability temperature and internal resistance and the function of notebook battery SMbus. (Here refer to internal resistance and temperature model).
7. We send additional current and voltage precision calibration software, which is used to alter cabinet's number and varies ranges.
8. Serial port, Network and USB link as an option. Use C/S model, remote control.

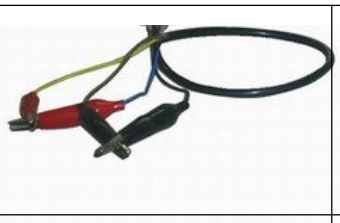
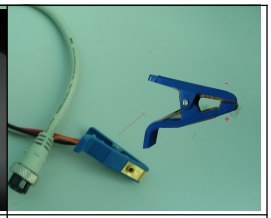
2. System structure and installation

2.1 Schematic diagram for front panel

1. Power and status indicator lamp
2. Power ON/OFF
3. Channel working status indicator lamp

4. Communication port outlet

2.2 Battery clamp

			
a. Test cylinder battery b. Height adjustable by set screw c. 8 independent channels in total d. Upper to positive and lower to negative, or vise versa.	Alligator clip one big red (current+) one small red(voltage+) one big black(current-) small black(voltage-)	Polymer cell clamp	Button cell clamp

2.3 Software operation environment

- PII/266 PC computer or higher
- 128MB Memory or higher
- 1GB free Disk Space or higher
- Microsoft Windows 2000/XP /seven Operation System
- One effective RS232 Communication Port

2.4 Software installation

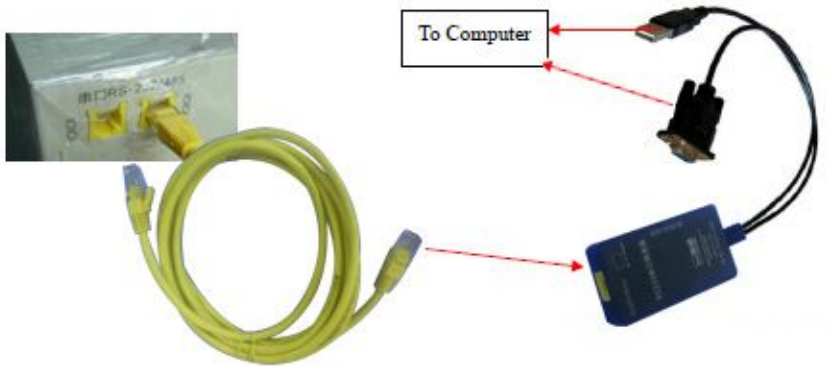
Find TC53 directory in optical disc and run SETUP.EXE document in this directory.

2.5 Connect with computer

Insert the disc to your computer disc-driver, find TC53.exe, note that you must copy it to the hard drive with a **NTFS** file system, to check it, double click "Computer"---right click any of your hard drive---"properties", a window would pop up:

Tips: For most PC, the OS hard driver (usually is C) is NTFS, just copy the folder to your desktop and then enjoy the software; please delete/uninstall the older version of TC before installing the new one.

Use RS232 + USB to connect the device to your computer..



3 The control software BTS TestControl (TC) instruction

3.1 Software function summarize

The series BTS TestControl software is a range of control system in NEWARE BTS batteries testing system, it only be used after connecting to batteries testing cell.

This software suite aim at the batteries testing system, it is consist of nine applications:

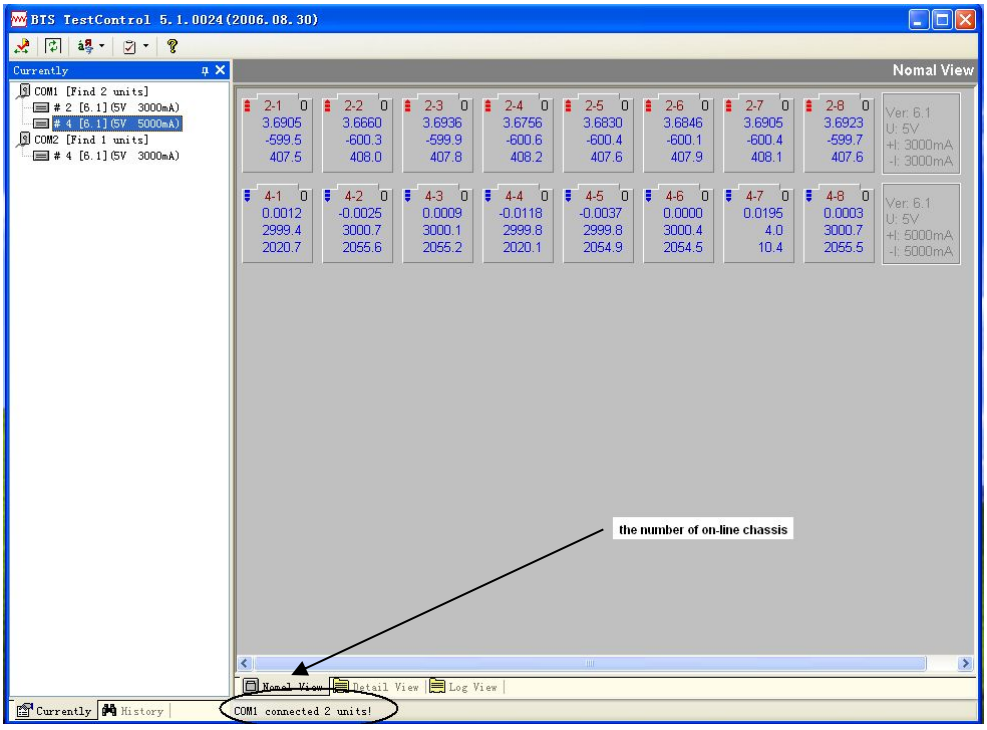
- **Boost up:** Sets step to the battery channel, the channel will work immediately according to the work-step after starting. The step includinge constant current charge, constant voltage charge,constant current and voltage charge, constant current discharge, constant Power Discharge, rest, cycle, stop.
- **Stop:** When one channel is working, it will stop automatically after completes all step. At the some time, users can stop it forcibly as necessary.

- **Connection:** For some channels which have stopped (including stop by users, safe stop) can use “connection” function to restore the original test process and maintain the data connection.
- **Jump:** The running step can be stopped forcibly by users to jump to the assigned step to continue.
- **Work-step migration**
- **Reset step**
- **Copy step**
- **Channel information:** Inquiring the condition of channel which is working.
- **Open data:** Users can open the recording data to process.
- **Auxiliary channel:** (In perfection)

3.2 Software startup

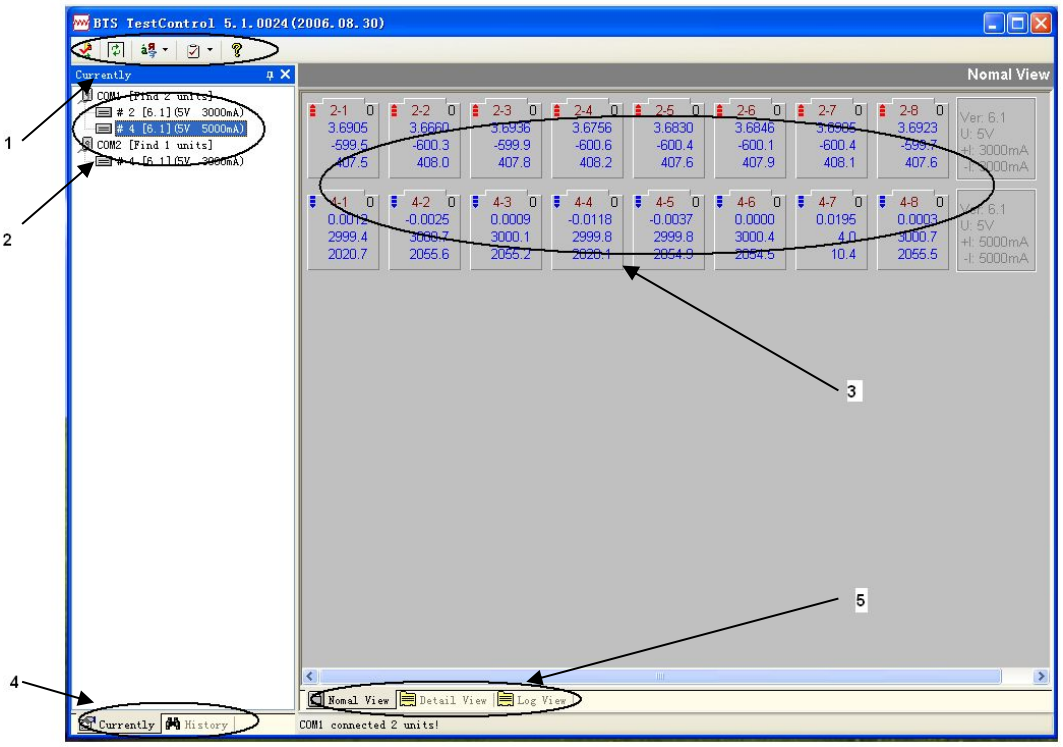
After installing, finds 

in the desktop. Double-clicks then can start the testing system control procedure. BTS TestControl will detect automatically whether all modules are on line in the battery testing system. (The number of on-line chassis is listed as below)



3.2.1 Software interface specification

The following chart will be shown after you start this software (Notice: before start, the cell equipment and PC computer must be connected via a serial-port online)



In the graph, where the numbers pointed to has respectively means:

1. The fundamental equipment

Normal direction flow: Chassis number search set, equipment search, select language, show/hide set and help.

Chassis number search set: You can set the search maximum chassis number.

Language select: You can select the language you want to use. (Chinese simplified, Chinese Traditional, English. It is effective only be restarted next time.)

Show/hide set: You can set the display status of left side column.

Help: Help you solve the questions you met when you use this system.

2. The fundamental information of chassis number

Here display the number of current online chassis, hardware version and type.

3. The status display of each channel; Last one is some basic information of testing system.

4. Left side column

You can search and view the historical information here. Left side column is floating.

5. Select display mode

Systems are custom displayed the content of information according to different needs.

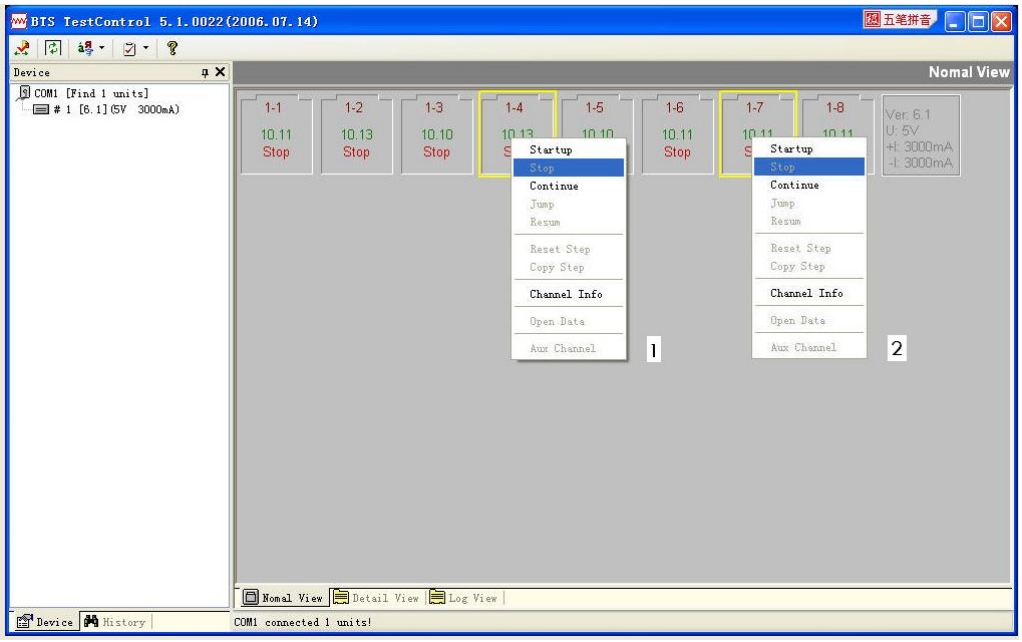
[**The right key of mouse**]

BTS TestControl frequently uses the right key of mouse, clicks with the right key of mouse at different positions of the interface to pop out different floating menu, and complete all operation which needs.

3.3 Control operation

3.3.1 Look over operation

1. Normal view



Here, only view channel number for has not worked channel, like 2-1 would represent the second box in one channel, simultaneously, outline of batteries inferior fovea. For has stopped or the protective channels which only display channel number, date and status, simultaneously, outline of batteries inferior fovea; For the channels which are working, besides displaying channel number, it also display cycle times (in the top right corner), voltage(V), current(mA),capacity(mAh) from the top down take turns. If it is in charge condition, the top left-hand corner will dynamic display a downward blue arrow. If in discharge condition, then the top left-hand corner will dynamic display an upward red arrow. If in stewing condition (not charge and discharge), there will no arrow.

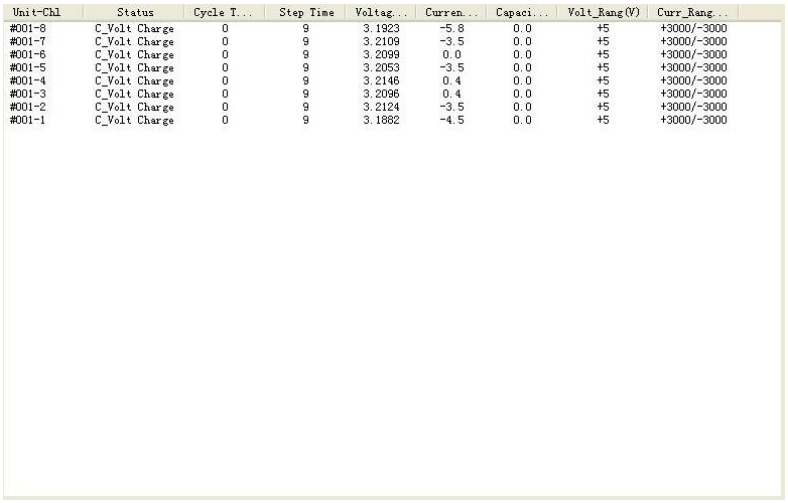
As the chart shows, it will pop out two kinds of floating menus, if click with the right key of mouse in the different condition channels (one and two projects are grayed is different), by now, if all channels which are chosen is working, it can carry out the operations of stop, jump, reset step and so on; If the chosen channels which are not working, it can carry out start. In addition, if only chosen one channel which is working, it also can carry out the operations of channel information, open data and so on; if the channel is in off condition, it can carry out the operation of open data.

[How to choose channel]:

Clicks the battery outline of channel with the left key of mouse to appear a yellow frame, which would mean this channel has been selected. If need to select several

channels which are discontinuity, presses **Ctrl** key and selects one channel after another with the left key of mouse. If need to select several channels which are continuous, at first using the left key of mouse to take the first one and press **Shift** key then it will be possible to achieve many channels of continual selection; Or holds down the left key of mouse to drive in the scope which is needed.

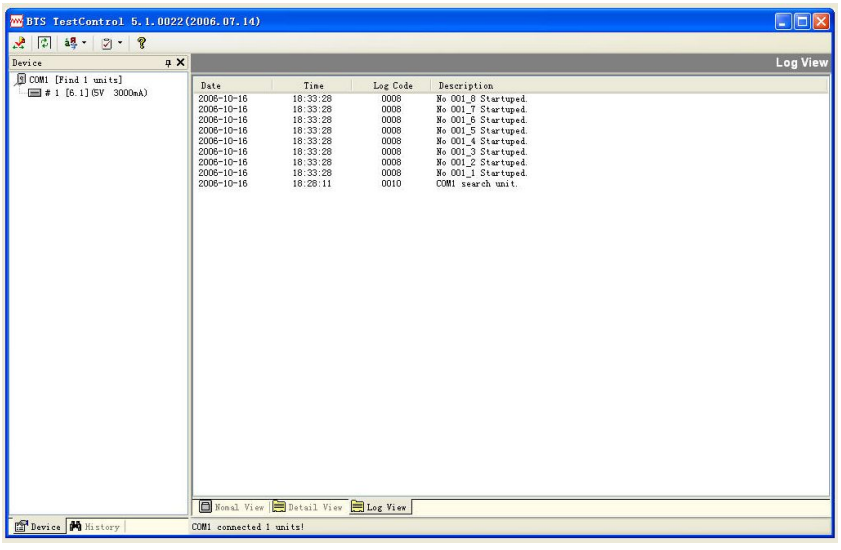
2. Detail view



Unit-Chl	Status	Cycle T...	Step Time	Voltag...	Curren...	Capaci...	Volt_Rang(V)	Curr_Rang...
#001-8	C_Volt Charge	0	9	3.1923	-5.8	0.0	+5	+3000/-3000
#001-7	C_Volt Charge	0	9	3.2109	-3.5	0.0	+5	+3000/-3000
#001-6	C_Volt Charge	0	9	3.2099	0.0	0.0	+5	+3000/-3000
#001-5	C_Volt Charge	0	9	3.2053	-3.5	0.0	+5	+3000/-3000
#001-4	C_Volt Charge	0	9	3.2148	0.4	0.0	+5	+3000/-3000
#001-3	C_Volt Charge	0	9	3.2096	0.4	0.0	+5	+3000/-3000
#001-2	C_Volt Charge	0	9	3.2124	-3.5	0.0	+5	+3000/-3000
#001-1	C_Volt Charge	0	9	3.1882	-4.5	0.0	+5	+3000/-3000

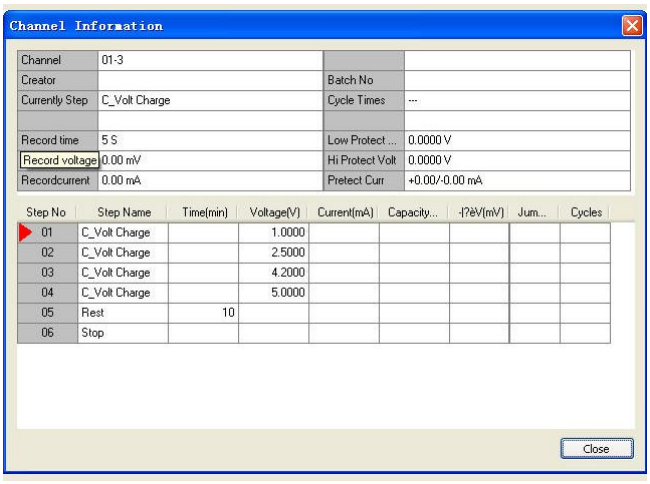
3. Log view

Some operating records and each channel movement details can be viewed if click log view.



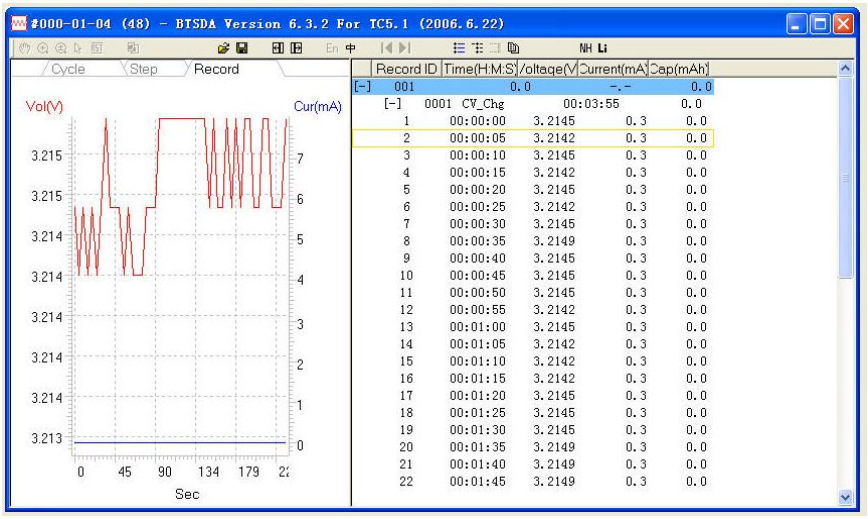
4. Channel information

In normal view condition, clicks channel with the right key of mouse. Choose “Channel information” in the pop out menu. It will appear this dialog box as below. In which red arrowhead would mean executing step.



5. Open data

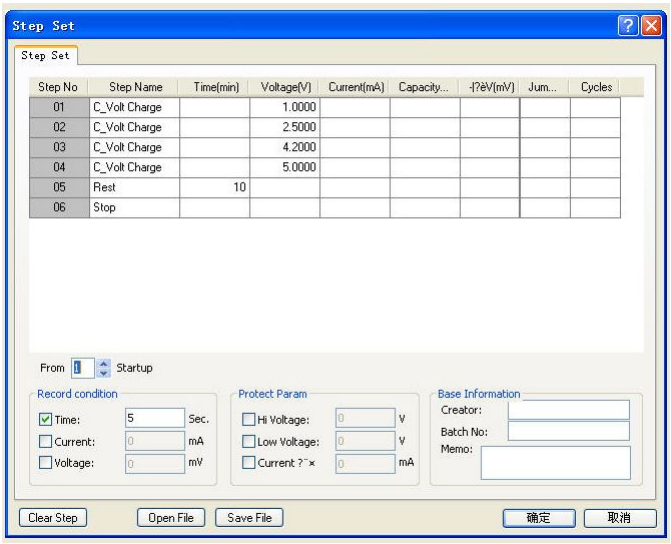
Right-clicks channel in the normal view condition, selects “open data” in the floating menu, it will appear this window as below.



Want to see related data operations, please reading BTSDA.

3.3.2 Startup

Designates one or more channels which don't work, single-clicks with the right key of mouse, chooses startup in the appearing menu to enter into the dialog box of step set. After completing the set so can establish that we have completed the start and the channel which is selected starts to run according to your establishment.



In the step set dialog box, users can set the flow of work and edit the parameter of each step, also can set from ☐ startup, in which each work step can set corresponding limit conditions according to the different work mode, which can be constant current charge, constant current discharge, constant voltage charge, static, circle and stop, etc. The limit condition "current" must be set to the constant current charge, constant voltage charge. Others only establish one or simultaneously designate several "constant voltage charge" must be established, and "current" refers to cut off current in the constant voltage charge. Speaking of the limit condition, it express does not use this limit condition if fill in data by mistakes. If has used many limit conditions for some steps, the relation of them is "**logic or**"

There are three options: time interval voltage interval and current interval are included in the data record condition after setting step, It is effective when choose several simultaneously. The relation of each recording condition is l**ogic or**, records the data if the random item is satisfied. The data profile can be lost as small as possible if select recording condition appropriately and not omit the key data, also can enhance the speed of data processing.

The content of basic information can be log to data document automatically to prepare to query and print.

"Safe protective" is mainly aim at abnormal channel which is for battery current, voltage sampling in the testing procedure to protect hardware.

Take the lithium battery for example: it discharge voltage is 2.75V, charge voltage is 4.20V, and safe protection parameter boundary voltage can be reference set as 2.5~4.3V. This system defines charge current as "+", discharge as"-". Must pay more attention when set safe protection, for example set charge and discharge current as 700mA, the data of current ranges ± in safe protective must be higher than 700mA, not the current deviation.

When execute save file (S),open file (O) command, all files of step can save and open to convenient for later work. Each flow can set 64 steps .It will stop automatically after executing the last step. In normal view, the battery symbol will display the completed

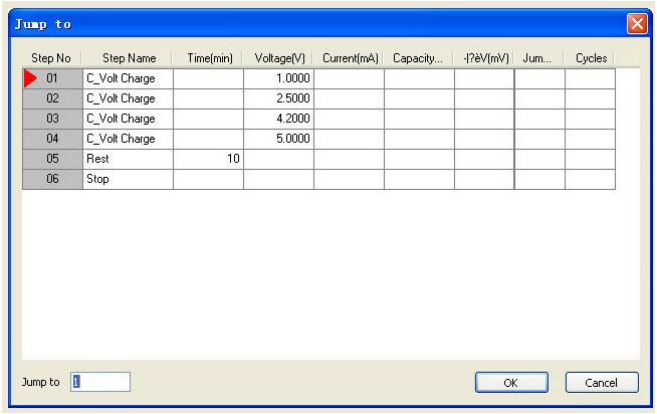
wording. If there is a problem before establishing the step, it must be reset, then click clear step to reset.

3.3.3 Stop

Selects one or more channels which are working, single-clicks with the right key of mouse, chooses stop in the pop out menu, so you can carry out the stop operation in the selected channels.

3.3.4 Jump

Selects one or more channels which are working, single-clicks with the right key of mouse, chooses jump in the pop out menu to enter into the jump to dialog box, the chart shows as below:



In this dialog box, click some row in the step column or enter the number of step which will jump to in the bottom left corner then jump to the appointed step after establishment.

3.3.5 Connection

For the channels which used to work, present is at the stop status, clicks with the right key of mouse, and selects "connection" in the pop out menu to restore the original testing work in the designated channels, the data maintenance connection.

[**Note**] Cooperate to use "stop" and "connect" functions to achieve the suspension and restore in the testing channel work. The channels which are complete the test and deletion condition information can't connect. After the procedure withdraw or power off forcefully, it will restart and system can continue automatically.

3.3.6 Other operations will be added gradually

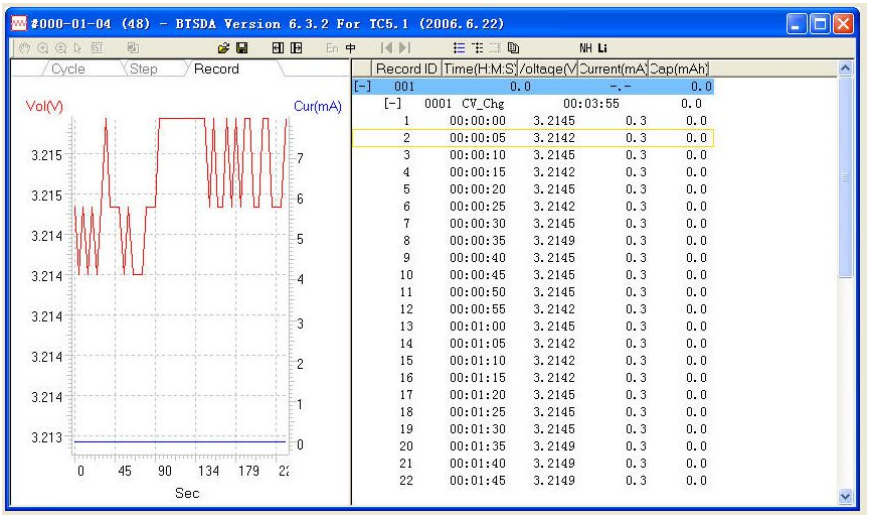
4. BTS DataAnalyzer(DA) instruction

The functions of data processing and data output including:

- **Text data display**: Display time, current, voltage, battery internal resistance and capacity.Etc.
- **Curve chart display**: Display the coordinate curves which are custom by users, such as voltage—time, current—time, capacity—time, capacity—-voltage, specific capacity—voltage, cycle index—charge and discharge efficiency diagram. Etc.
- **Data and curve processing**: This system can induct data directly to application software such as: EXCEL, WORD and so on, also can duplicate graph or the related data directly to the correlative application software.
- **Set view region**: Can set view region of curve according to users' needs and data report will demonstrate the corresponding data.
- **Other functions**: The cursor tracks curve region, curve—date—operate record connection, view log information, etc. The data and curve support print and print preview.

4.1 Software startup

In TC normal view right-clicks in some channel which is predetermined. Selects open data in the pop out menu to enter into the DA data processing. If has not started TC and want to process the previous data, can enter into the installation directory and find out DA.EXE to double click, it will pop up file select dialog box, finds the related data file with an extension of nda, clicks to open, appears the data which will be processed, seeing below for software interface.



In the picture, left is the display of picture, right is the display of file data. Seen from the picture, there are three display methods: cycle layer, step layer, record layer. Clicks them will appear corresponding curve chart.

Curve—data—run record associative:

Double-clicks the left key of mouse in the left graph area and the corresponding

clause in the right text data area will be highlighted, in this way users can view the accurate data value corresponding to the right point.

In the same way, double-clicks the left key of the mouse in the text data in the right

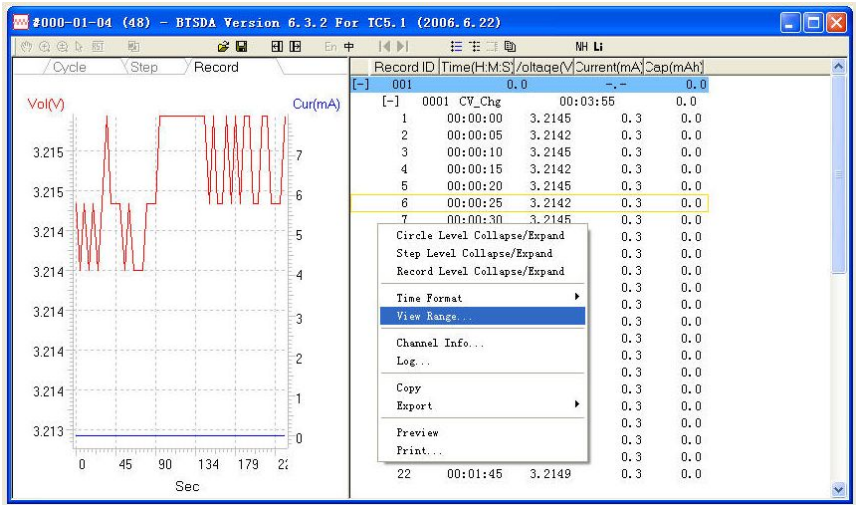
side and the corresponding point in the left side area will be highlighted too. If the data is beyond the demonstration scoop, it will be automatic tumbled to obvious mark.

Clicks the "operating record" in the clause and the corresponding point in the left side curve area will be highlighted too, the corresponding clause in the right side text data area also be highlighted too.

4.2 Software function

- Data view: Including all kinds of circle collapse and expand, clause collapse and expand,, set the ranges of display circle, etc.
- Data processing: Data can be directly led to the Excel software or save as text format (.TXT)
- Channel information: Viewing the information of the testing channels and the work procedure.
- View log: Viewing the accident in the channel testing periods (such as power off, safe stop, etc.), forcibly operate by users (forcibly switch, stopped by users) or communication mistake records and so on.
- Language switch: Different language can be switched by users.

4.3 Text data view



In the text data, the data arranges in turns according to each process, here is an example give the means of data as below.

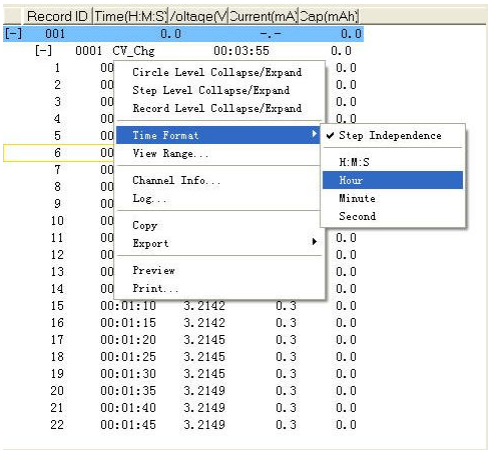
4.3.1 Data collapse/expand

Including circle/step/record collapse and expand. The collapse and expand can be achieved through using the right key of mouse, if previously is collapse, click to

expand, if previously is expand, click to collapse.

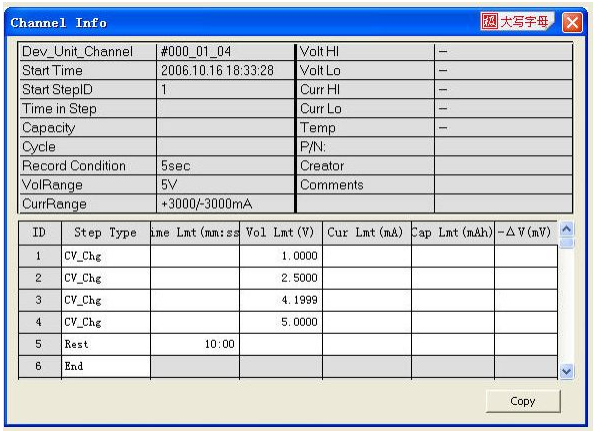
4.3.2 Time format

This operation including independent step, user-defined time record (with H:M:S, Hour, Minute and Second for recording ways as an option)

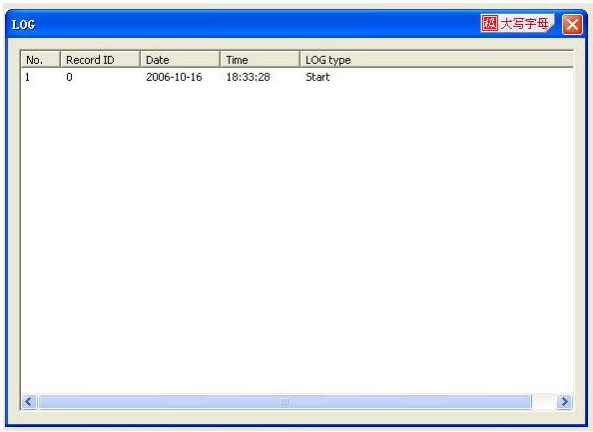


4.3.3 Channel information

Be used to view the information of instrument range, start time, record condition and the installing work flow, etc.

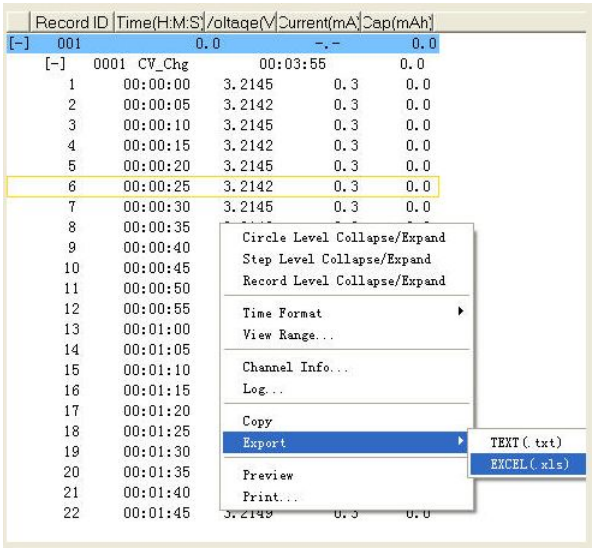


4.3.4 View log



In it records the Time, Record ID and LOG type of incidents that occurred in the testing process. Moreover, it is possible to appear this mark wording: <continued from last time>, <power down>, etc. In which <continued from last time> represents when exit it also have channels which are still working, the software temporariness stop when exit or power off, the current software self-recovery and connect the data in the run conditions, <power down> represents that a power failure or exit unusual in the running condition. (For example: exit forcefully by pressing Ctrl + Alt + Del.).

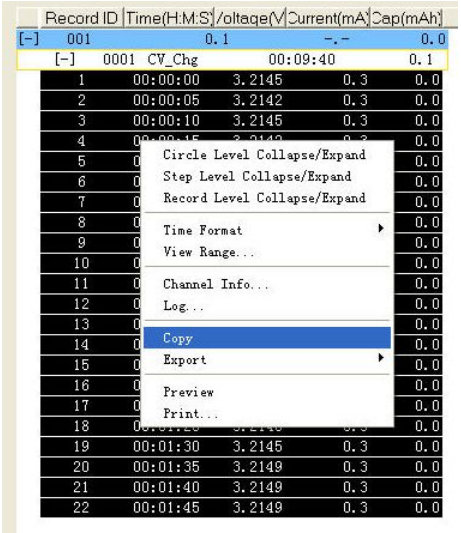
4.3.5 Export data



Can export TEXT or EXCEL file is convenient for saving and analyzing data.

4.3.6 Copy data

Users can designate the correlative duplication projects to "copy" according to needs, then use "paste" in application software of EXCEL, WORD, etc.



Presses the right key of mouse directly when copy the curve, selects “copy curve”,

similarly with other operations.

[Note]

The designated project refers to click the corresponding project fence, and marked the content that to be copied; the curve copied and recombination imported to the data of application software such as EXCEL, WORD and so on to make to all types of reports.

4.3.7 Print and print preview

This system supports the print of the designated ranges of page number.

4.4 Curve processing

4.4.1 View curve

After open the data file, this software will display curve chart and text data automatically, the curve operation status column is as below:

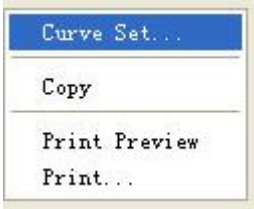
From left to right are move, enlargement and dynamic zoom, etc. operations.

[Note]

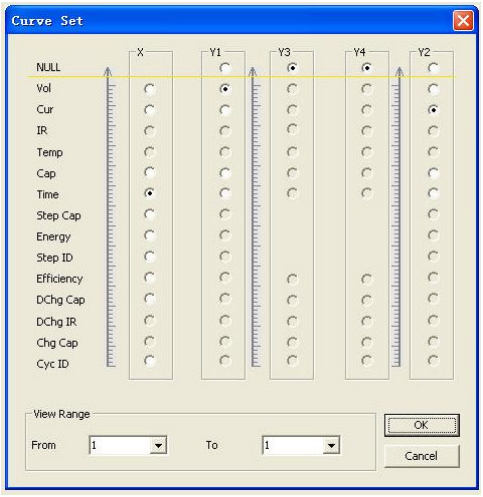
The curve view including the operations of dynamic zoom, move, selective enlargement, reset and so on. Though those operations can change the size of the curve, define the ranges of coordinate. Also can select different types of reports according to customers’ need, complete graph is adaptive to the batteries report needs of Li-EI, Ni-Hydride, etc.

4.4.2. Curve set

Press the right key of mouse in the curve zone to pop out a floating menu.

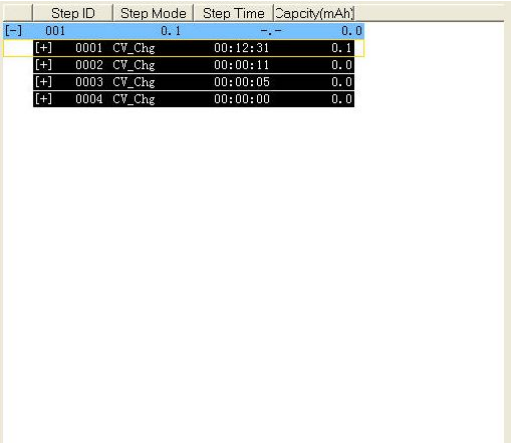


Clicks curve set in the floating menu with the left key of mouse to display curve set dialog box.



Here, curve coordinate can be defined, curve display ranges is optional (text data also change according to change.).

4.4.3 Report



This report is composed of Li-El, Ni-Hydride and complete graph. Collapse, expand is similarly to data file, can achieve though using the right key of mouse and "+/-" on the left side. This report function contains the circulation master list and the detail; automatic record parameters of constant charge, constant voltage charge, the total of charges, discharge capacity, efficiency, fixed-point capacity, fixed-point time, discharge average voltage, energy indicator and so on.

NOTE:The function discussed may little vary a little in different versions.