

## < ECO CHARGE >

A Top - of - The Art Technology, Only One in The World  
Environment Friendly For Battery Recovery, Charge,  
Discharge, Multifunctional Battery Test Equipment



ECJapan Co., LTD

## < Context >

### 1. 4 Characteristics of Echo Charge

1-1. “SULFATION” can be removed more than 95%

1-2. “On-Off-Constant Current Charge System”

1-3. High Recovery Rate

1-4. After-Service

### 2. JIS

### 3. Academic – Industrial Collaboration Research

## . 4 CHARACTERISTICS OF “ECO CHARGE”

1. 80 % OF BATTERIES ARE BROKEN DOWN BY “**SULFATION**.”

**ECO CHARGE** CAN REMOVE MORE THAN 95% OF THE **SULFATION**.

- **SULFATION** ? THE PHENOMENON OF **PHENOL SULFATE** CRYSTALLIZES ON THE NEGATIVE ELECTRODE SURFACE, WHICH DEEPLY DAMAGES A DISCHARGE CHARACTERISTICS OF BATTERY BECAUSE THE SURFACE AREA FOR CURRENT IS DECREASED.
- JIS (JAPANESE INDUSTRIAL STANDARD) STANDARDIZED THE DESIGN FOR DURABILITY OF 10 YEARS. BUT CURRENTLY, BATTERY LIFE IS 2-4 YEARS AND DISPOSED. SULFATION OCCURS THROUGH THE PROCESS OF CHEMICAL REACTION FROM THE USE IN **VARIOUS EXTREME RUNNING OPERATION** (BIG FLUCTUATION OF OUTPUT CURRENT, BIG CURRENT FLOW FOR LONG

TIME), OR TEMPERATURE CHANGE .

-3-

- BATTERY DURABILITY IS REGULATED TO DESIGN FOR 10 YEARS BY JIS. ONCE SULFATION IS REMOVED (RECOVERED), IT CAN BE CONTINUOUSLY UTILIZED, WHICH IS ECONOMICALLY REASONABLE METHOD.

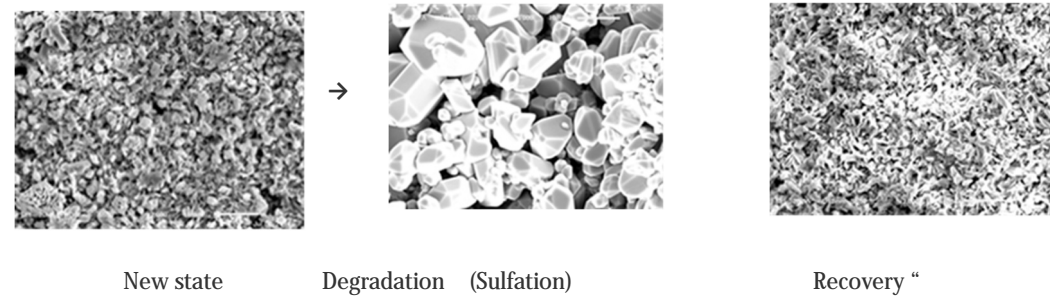
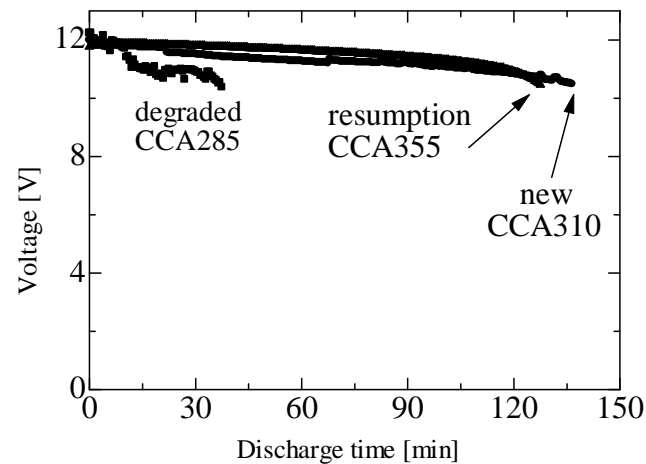


Figure1 (a) Recovery example of the engine-starter battery Note: CCA value is a degradation index for engine-starter battery

## *2 . "ON-OFF CONSTANT CURRENT CHARGE SYSTEM" LOAD TO PROTECT THE POLE PLATE.*

· ECO CHARGE II IS ADOPTED THE NEWLY DEVELOPED PATENTED TECHNOLOGY OF '*ON-OFF CONSTANT CURRENT CHARGE SYSTEM*' (PATENT APPLICATION NO. 2014-054093).

ECO CHARGE II RECOVERY TECHNOLOGY WITHOUT HIGH VOLTAGE PULSE SUPERIMPOSED AND PROGRAM using the patented technology but also recovers the batteries by measuring the voltage and current.

*THIS IS THE ONLY ONE RECOVERY DEVICE IN THE WORLD IN BATTERY CLEAN-UP ABOVE THE STANDARD CRITERIA.*

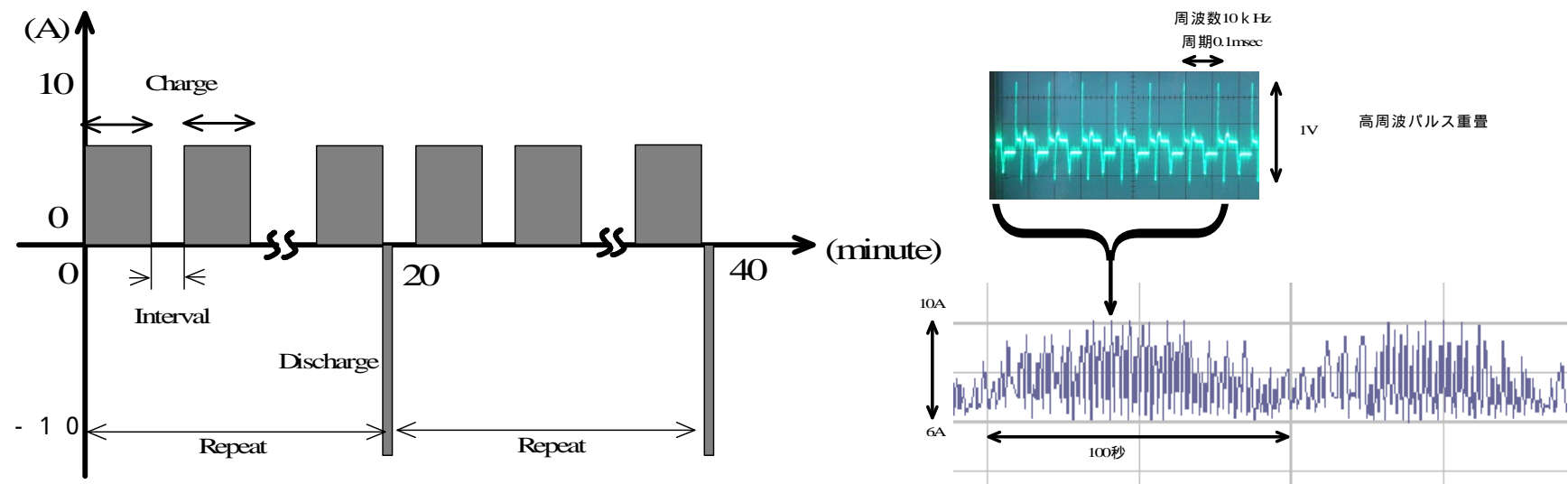


Fig.2(a) On-off constant current charge system (battery friendly recovery charging, using maximum 5A with low heat generation)

Note: the reverse current (discharge current) is about 20A, three times the usual current. Reverse current breadth is 10 seconds. This is less than a quarter of the usual current of 5 minutes.

Fig.2(b) high frequency pulse (traditional model) without reverse current

Case deterioration (the end of a product's life) Engine starting lead acid battery CCA 225 → CCA 245 → (New method applied) CCA 270  
Case Second-hand deep cycle type lead-acid battery, After high-frequency voltage pulse regeneration, discharge time Approximately 3.5 hours

(1.5  $\Omega$  constant resistance discharge), (New method applied ) Discharge time extended to about 4.5 hours.

### *3 . Even the deep cycle battery was achieved 70-80% recovery rate*

- With regards to the deep cycle battery, it realized a surprisingly high recovery rate in February, 2017.

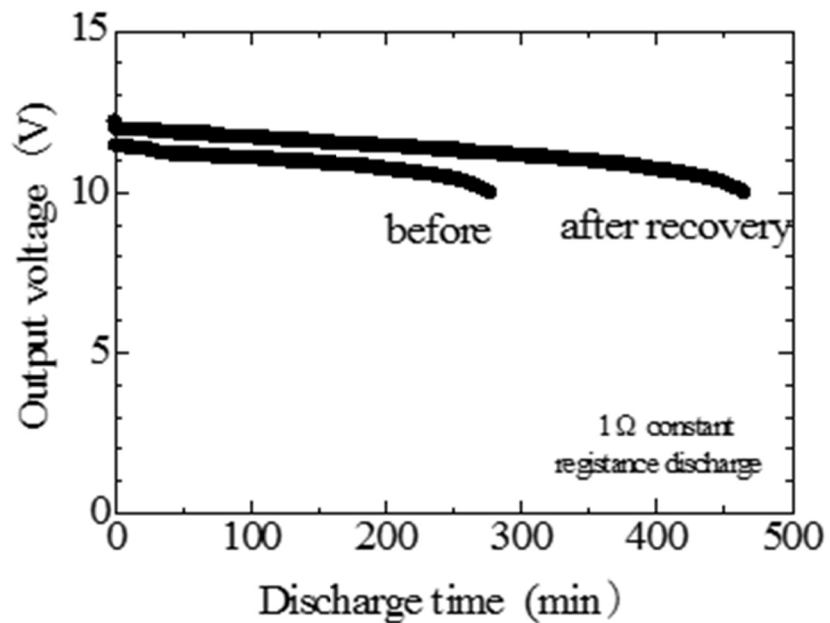


Figure3. Case of recovery of the deep cycle battery.

Note. The deep cycle battery has been evaluated with discharge durance.

## 4 . ECO CHARGE after service resolves the program defect under internet environment.

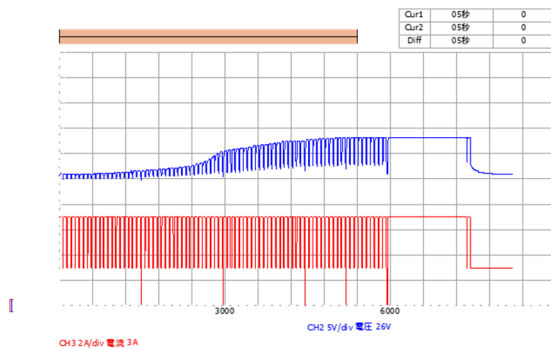
■ Human errors sometimes cause a malfunction or does not play unsatisfactorily.

For example, in case of soft wear error, it is resolved in real time under the environment where the Internet connects. In addition, it is possible to adjust the recovery pulse according to the batteries. Moreover, the characteristics of the battery can be visualized from quality regeneration pattern and quality control can be done. That is the strong merits of ECO CHARGE Rev.

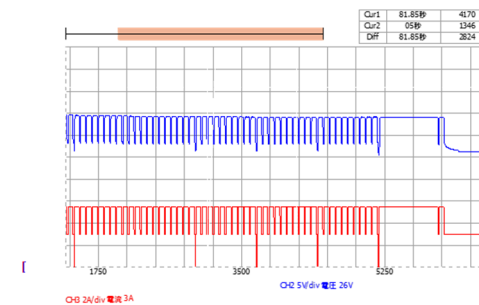


Figure4 (a) example of the remote access(remote access available through smart phone.) History management by personal computer





Recovery electric current, voltage pattern



Non recovery electric current, voltage pattern

## . JIS industry standards of Japanese battery technology has gained global recognition.

In recent years, cheap batteries made in China and Korea have been dominating the Southeast Asian market. These batteries have lower quality than those made by well known companies in India. However they are the winners of the price completion. Therefore, our proposal is only for second hand batteries (only periodically checked and exchanged) from Japanese automobile dealers (companies dealing directly with manufacturers such as Toyota, Nissan, Honda etc.) and domestically produced battery maker's expired battery only By supplying and regenerating, price differences will be resolved.

We will supply a certain amount with Japan brand of durability, price difference cancellation and regeneration technology power without uniformity of Japanese batteries.

## . III. ECO CHARGE Rev was created and produced by industry-academia collaboration development

We are hoping to make contributions to countries and regions around the world through the battery recovery project. We believe that allowing a region without infrastructure to cultivate land by installing solar power generating system to pump up the irrigation water can lead to a world without conflict. Currently, under the name of recovery, many excellent batteries are disposed of under law and state rules. Uninterruptible Power Supply (UPS) becomes an almost new condition using our technology. Therefore by taking this to relevant areas, and by linking it to solar power, we can give electricity together with hope.

: Participating organizations

National Institute of Technology, Toyama College, Department of Electronics and Computer Engineering

E C Japan Co. Ltd.

Manufactured by E C Japan Co.Ltd.