

# Meeting Minutes

Re: Battery Condition Monitoring Workgroup Meeting  
Tokyo Prince Hotel, Tokyo, Japan

Date: October 29, 2001

## LIST OF PARTICIPANTS:

Masahiko Amano, <i>Hitachi</i>	Takuya Kinoshita, <i>Hitachi</i>
Youichi Arai, <i>Yazaki</i>	Soung-Keun Lee, <i>Hyundai</i>
Gary DesGroseilliers, <i>MIT</i>	Toshiro Mori, <i>Honda</i>
Akihiko Emori, <i>Hitachi</i>	Tadashi Noda, <i>Japan Storage Battery</i>
Takashi Fukunaga, <i>Matsushita Electric</i>	Tetsuro Ohkoshi, <i>Hitachi</i>
Tokiyoshi Hirasawa, <i>Hitachi</i>	Kyung-Hyuck Park, <i>Hyundai</i>
Satoshi Hirota, <i>PowerSmart</i>	Kenji Sato, <i>Yazaki</i>
Fumikazu Iwahana, <i>Furukawa Electric</i>	Toshiyuki Satoh, <i>Furukawa Electric</i>
Tsuyoshi Kameda, <i>Yuasa</i>	Ryotomo Shirakawa, <i>Furukawa Electric</i>
Tetsuya Kanoh, <i>Furukawa Electric</i>	Hironori Tamagawa, <i>Honda</i>
Thomas Keim, <i>MIT</i>	Tsutomu Urushibata, <i>Delphi Automotive Systems</i>

## AGENDA

- Presentation by Tom Keim →
- Comments from Participants →
- Future Meetings →

## TOM KEIM

Tom Keim summarized the June 22, 2001, presentation of Tom Dougherty, including: a review of the eight battery discharge performance parameters, and recommended test procedure to be run on a brand new fully charged battery for measuring each parameter; a second group of eight charge acceptance and life parameters. A copy of Dougherty's presentation materials can be found on the workgroup's web page<sup>†</sup> →.

<sup>†</sup> [http://auto.mit.edu/vei/dis.nsf/DocId/53B2AA3651893F9685256A76006B5282/\\$file/mit+final+062201a.pdf](http://auto.mit.edu/vei/dis.nsf/DocId/53B2AA3651893F9685256A76006B5282/$file/mit+final+062201a.pdf)  
Username is "Ford" and Password is "Formula1"

## COMMENTS FROM PARTICIPANTS

- How and why were these parameters selected? Is there any reason to divide the parameters into Word 1 and Word 2? Wouldn't it be possible to develop a battery condition monitoring model with fewer parameters?
- There was some concern that if these 16 parameters become standardized, they would be used by OEMs as part of the purchasing specifications, and that would not be a desirable outcome.
- Furthermore, if replacement batteries need to meet all of the original specifications for these 16 parameters it will create a huge inventory problem. It would be preferable if automobile manufacturers could agree on a limited number of battery parameter combinations (e.g. 8 – 10 different types). Then each battery would be classified as meeting the minimum requirements for one of those types.
- If the industry agrees on a set of battery parameters, should there also be agreement on a model that will use these parameters to determine battery condition?
- It would be helpful to collect data to determine cycle behavior of batteries in the real-world. It may not be realistic to measure some of the proposed parameters in the 80% to 95% capacity range if this is not typical of actual battery states.
- Since automakers are just beginning to develop 42V systems and the architectures are continuing to evolve, perhaps it is too early to settle on an approach for determining battery condition monitoring. It would be preferable to have specific design requirements from the automobile manufacturers first.
- The most important function of an energy management system is to start the engine, but the battery alone cannot do that – system level specifications are necessary. Therefore, design specifications from the automobile manufacturer are needed.

## AGREEMENT TOPICS AND STATUS:

The status of topics under discussion by the BCM Workgroup is summarized in the table below

Topic	Status
1. BCM Workgroup "Statement-of-Purpose" → and "Guidelines for Participants" →	Accepted
2. Battery discharge performance parameters to be encoded in 5-bits each, referred to as "Word-1"	Under discussion
3. Charging Acceptance and life information of the battery to be encoded in separate set of parameters, "Word-2"	Under discussion
4. "Words" to be provided on a label or electronically coded chip.	Under discussion
5. Battery discharge performance parameters will include: <ul style="list-style-type: none"> <li>1. Capacity point</li> <li>2. Peukert's slope</li> <li>3. Charged voltage</li> </ul>	General agreement that the definition be set for the 2-hour Need to know slope Agreement to use open circuit voltage.

Topic	Status
4. OCV/SOC slope  5. Initial IR (IIR)  6. Ionic/electronic ratio  7. Kinetics 8. Thermal time constant	Agreement to use OCV/SOC slope as an indicator of acid concentration of a fully discharged and fully charged battery  Name of this parameter has been changed to avoid confusion with well accepted definition of "internal resistance"  Proposal to determine both internal resistance and kinetic resistance from a single experiment by fitting an equation with current and log (current) terms  Accepted  Agreement that thermal time constant test should be conducted in a bath of moving water.
6. Battery terminal standard should include 4 pins, two for power and two for sensing. The application of the sensing pins (e.g., temperature, disconnect, battery condition monitoring) will be determined later.	Accepted
7. Charge Acceptance and life parameters will include: 9. Charge Acceptance 40C 10. Charge Acceptance 0C 11. Charge Acceptance Current 12. Shallow Cycle Life 13. Over Charge Corrosion 14. Gassing (Water Loss) 15. Over Charge CA 16. Condition Factors	Under discussion Under discussion Under discussion Under discussion Under discussion Under discussion Under discussion
8. Measurement convention	Agreement to define positive current as charging and negative current as discharge
9. Battery Condition Model Testing	BCM Workgroup should consider setting standards for testing of models developed by others

**FUTURE MEETINGS:**

The next meeting will be on Tuesday, January 29, 2002, at the Ritz Carlton Marina del Rey Hotel in Los Angeles, California from 10:00 a.m. until 3:00 p.m., including lunch. The purpose of this meeting is a continuation of the discussion of about the battery discharge performance parameters and the charge acceptance and life parameters. Participants who would like to present alternative proposals can request time on the agenda by notifying Gary DesGroseilliers at [gjd@mit.edu](mailto:gjd@mit.edu).