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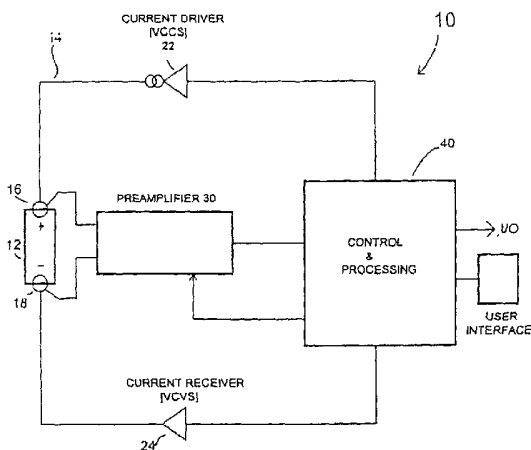
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[Continued on next page]

(54) Title: A METHOD AND APPARATUS FOR MEASURING AND ANALYZING ELECTRICAL OR ELECTROCHEMICAL SYSTEMS



(57) Abstract: A method and apparatus for creating a time-varying electrical excitation, delivering it to a system comprising at least one electronic or electrochemical element, and measuring and analyzing a time-varying electrical response developed within the system in response to the excitation. The response signal, and optionally the excitation signal, are sampled in a synchronous manner, and the sampled values are analyzed to determine various characteristics of the system, including State of Charge and State of Health. Additional analysis may be performed to: identify specific system defects; identify and quantify time-dependent processes; and, obtain values for elements of an equivalent electric circuit model. The method and apparatus may serve both as a measurement system as well as a control subsystem, and may be configured to operate in either an open-loop or closed loop manner. Furthermore, the method and/or apparatus may be used in conjunction with a power control system such as an electrical/electrochemical system test device, a battery charger, a battery conditioner, or a battery backup system or uninterruptible power supply. Alternate embodiments of the technique may be achieved by integration directly within a chip or chipset.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/15764

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : G01N 27/416
 US CL : 324/426

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 324/426, 425; 702/117, 124, 125; 379/88.07; 708/100; 73/1.01, 1.11; 320/116, 124, 1

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 Please See Continuation Sheet

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6,411,098 B1 (LALETIN) 25 June 2002 (25.06.2002), see entire document.	1-47
A	US5,040,126 A (ALLINGTON) 13 August 1991 (13.08.1991), see entire document.	1-47
A	US 5,771,178 A (STEMPORZEWSKI, JR. et al) 23 June 1998 (23.06.1998), see entire document.	1-47
A	US 6,202,933 B1 (POORE et al) 20 March 2001 (20.03.2001), see entire document.	1-47
A	LAU et al, DSP Based Fuzzy Controlled 2-Wheeler Forward Converter, University of Hong Kong, 9-1995, pages 440-445.	1-47

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:		
"A" document defining the general state of the art which is not considered to be of particular relevance	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"E" earlier application or patent published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
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"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

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INTERNATIONAL SEARCH REPORT

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Continuation of B. FIELDS SEARCHED Item 3:

EAST: US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB

search terms: electric near electromechanical; time near varying near response; (324/425 or 320/116 or 320/124 or 320/127)ccls. and (battery near charger or monitoring) and (excitation near means)