

PACKAGE ID - 000269IBMPC00 DIANE2.1

KWIC TITLE - Electric Vehicle Battery Performance

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LIMITATION CODE -UNL **AUDIENCE CODE** - UNL

COMPLETION DATE - 01/01/1991 **PUBLICATION DATE** - 06/02/1990

DESCRIPTION - DIANE is used to analyze battery performance in electric vehicle (EV) applications. The principal objective of DIANE is to enable the prediction of EV performance on the basis of laboratory test data for batteries. The model provides a second-by-second simulation of battery voltage and current for any specified velocity/time or power/time profile. Two releases are included with the package. Diane21 has a graphics capability; DIANENP has no graphics capability.

PACKAGE CONTENTS - NESC Note; Software Abstract; ANL/ESD-8;

SOURCE CODE INCLUDED? - Yes

MEDIA QUANTITY - 1 3.5 diskette

METHOD OF SOLUTION - The capability of the battery is determined by an algorithm relating the battery voltage to the withdrawn current, taking into account the effect of battery depth-of-discharge. DIANE assumes that the characteristics of an EV battery pack can be represented by a typical cell. The capacity of a cell (in ampere hours) is determined from the discharge time that the cell can sustain at a given discharge current before the terminal voltage falls below a cutoff point. For a vehicle with specified characteristics, the power requirement at the wheels corresponding to the driving profile is calculated from the required force, which overcomes the drag force, the rolling resistance, the grade, and acceleration and, at the same time, maintains the vehicle at the specified speed. The battery current and voltage corresponding to the power/time profile are then calculated on a second-by-second basis. Battery power at any time is the product of current and voltage. After the instantaneous battery current is calculated, the battery voltage can be computed. The effective capacity discharged is then updated to include the time increment. The calculation continues for the driving cycles until the battery voltage falls below a cutoff point or the battery current reaches the limit set by the user. The range is obtained by multiplying the number of times the driving profile is repeated by the range of the profile. Three categories of input data are required: vehicle, driving profile, and battery. Default data files are provided. Input can be

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METHOD OF SOLUTION - (CONT) changed in either of two ways: (1) by modifying an existing (default) data file by use of an on-line interactive text editor or (2) by interactively changing the values of the preselected parameters prior to a simulation run.

COMPUTER - IBM PC

OPERATING SYSTEMS - DOS

PROGRAMMING LANGUAGES - Microsoft FORTRAN

SOFTWARE LIMITATIONS - Maximum of 400 entries for the second-by-second velocity data in the driving period. Because of the lack of test data and other constraints, DIANE currently deals only with vehicles using fresh batteries with or without regenerative braking. Deterioration of battery capability due to aging can be simulated with user-specified input parameters accounting for an increase of effective internal resistance and/or decrease of cell no-load voltage.

SOURCE CODE AVAILABLE (Y/N) - Y

RELATED SOFTWARE - Numerous attempts have been made to analytically describe battery performance so that EV performance can be projected. Such attempts include the fractional utilizational model in ELVEC and the design algorithms in MARVEL.

OTHER PROG/OPER SYS INFO - The Microcompatibles, Inc. GRAFMATIC software package required by the DIANE2.1 release for graphics capability is not included.

HARDWARE REQS - An EGA or VGA graphics board is needed for plotting.

REFERENCES - W.W. Marr, W.J. Walsh, and P.C. Symons, User's Guide to DIANE Version 2.1: A Microcomputer Software Package for Modeling Battery Performance in Electric Vehicle Applications, ANL/ESD-8, June 1990; DIANE2.1, NESC No. 9403, DIANE2.1 Flexible Disk Cartridge Directory and Implementation Information, National Energy Software Center Note 91-87, August 2, 1991.

SUBJECT CLASS CODE - T

KEYWORDS -

COMPUTER PROGRAM DOCUMENTATION
D CODES
ELECTRIC-POWERED VEHICLES
ELECTRIC BATTERIES
ELECTRIC POTENTIAL
PERFORMANCE
VELOCITY
COMPUTERIZED SIMULATION

EDB SUBJECT CATEGORIES -

990200 250902 330300 250904

E S T S C
ENERGY SCIENCE & TECHNOLOGY SOFTWARE CENTER
SOFTWARE ABSTRACT

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SPONSOR - DOE/CE

PACKAGE TYPE - SCREENED