

# THE DOE-2 USER NEWS

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DOE-2: A COMPUTER PROGRAM FOR  
BUILDING ENERGY SIMULATION

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## ☞ ☞ HANDS ON ☞ ☞

### ☞ Directory of Services

DOE-2 has generated program-related software and consulting services, which are listed on the inside back page of this newsletter. If you know of anything (or anyone!) we've missed, please let us know.

### ☞ Lights.. Camera.. Action.. !!

You've read the Manuals -- You've agonized over the Output -- Now, Watch the Video! The Joint Center for Energy Management at the University of Colorado has developed a DOE-2 video to guide the beginning user into the program. They offer a 1-hour-plus video and manual for \$160. For more information, please contact Karen George, Program Development, Joint Center for Energy Management, University of Colorado at Boulder, Campus Box 428, Boulder, CO 80309-0428.

### ☞ up! up! up! UP! and AWAY!

The National Technical Information Service has raised the price of DOE-2 documentation; please check the back cover of the USER NEWS for new prices.

### ☞ Mark Your Calendars

Jun 7-9 — *ESM '89 EUROPEAN SIMULATION MULTICONFERENCE*, in Rome, Italy. Sponsored by: The Society for Computer Simulation International. For more information, contact the Conference Coordinator: Philippe Geril, University of Ghent, Coupure Links 653, B-9000 Ghent, Belgium. Telephone: 0032.91.236961x233; Fax: 3291244093; Telex: 12574 rugent; Earnnet: GERIL @BGERUG51, BITNET

Jun 23-24 — *BLDG SIMULATION '89*, in Vancouver, B.C., Canada. Sponsored by: IBPSA, the International Building Performance Simulation Association. Contact Dr. Marianne McCarthy-Scott, MCC Systems Canada, Inc., 30 Wellington Street East #202, Toronto, Ontario M5E 1S3, Canada. Telephone: (416) 368-2959.

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# ■ ■ ■ THE HEAT EXCHANGER ■ ■ ■

by

Bruce Birdsall

## Sample Run Book and BDL Summary

Many users seem to miss the value of the *Sample Run Book* and the *BDL Summary*, both of which are standard parts of the DOE-2 documentation. The most obvious reason for this is that neither book contains much text, and so fails to draw attention upon casual observation. We hope to cure this problem by pointing out here the value of these two documents.

The *Sample Run Book* serves multiple purposes and should be of use both to beginning and experienced DOE-2 users. The first purpose of the *Sample Run Book* is to display sample inputs and corresponding outputs; this acts as a check set that can be used to compare results on the user's computer system against the results from the system on which the program was initially developed. (The inputs and outputs in the *Sample Run Book* are also contained on the DOE-2 release tape.) The second purpose is instructional:

- a) the user is led through a series of typical simulations which illustrate the capabilities of the program;
- b) various input styles are displayed, including the use of defaults and abbreviations, free formatting of input, and nesting of sub-command keywords within the command itself;
- c) the relationships among the LOADS, SYSTEMS, PLANT and ECONOMICS portions of the program are demonstrated. For example, the effect of peak shaving on operating costs for a time-of-day electric rate structure is shown.

The examples in the *Sample Run Book* include a simple structure with increasing levels of complexity, a 31-story office building with a variety of secondary and primary options, a medical building, a single-family house, a daylighting example, and an attached-sunspace example. Each sample run is preceded by a sketch of the building showing the zoning used in the input and the general appearance of the building. Descriptive material has been embedded as comments in the input itself. Most of the features of DOE-2 are demonstrated, and an index has been included to allow the user to easily locate features of interest. Among the DOE-2 features illustrated are the following:

- |  |   |   |
|--|---|---|
| ● Daylighting                                | ● Optimum Fan Start                         | ● 3-D Building Geometry   |
| ● Design Days                                | ● VAV System Options                        | ● Powered Induction Units                                       |
| ● Heat Recovery                              | ● Overhangs and Fins                        | ● Desiccant Cooling System                                      |
| ● Hourly Reports                             | ● Cogeneration Plant                        | ● Gas-Engine Driven Chiller                                     |
| ● Parametric Input                           | ● Sell-Back to Utility                      | ● Generalized Library Feature                                   |
| ● Sunspace (Atrium)                          | ● Chilled Water Storage                     | ● Peak Shaving Electric Demand                                  |
| ● Night Ventilation                          | ● Refrigerated Casework                     | ● User-input Performance Curves                                 |
| ● Altering DOE-2 Code<br>(Functional Values) | ● Direct Fired Absorption<br>Chiller/Heater | ● Electric Utility Rates, including<br>seasonal and time-of-day |

The *BDL Summary* serves as a quick reference for all of the DOE-2 commands, keywords, values, ranges, limits, and hierarchy of inputs. The *BDL Summary* is the book that first becomes "dog eared" and in which the user often writes reminder notes. It is the only document that combines information from the original DOE-2.1A *Reference Manual* and the latest 2.1D *Supplement*.

For each command in DOE-2, the *BDL Summary* gives a box with the following information:

- a abbreviation of the command or keyword,
- b number of times the command can be used,
- c the default value, separated from the range of inputs (d) by a semicolon,
- d range of inputs.
- e In version DOE-2.1D, we have added a new feature by printing a row of double dots as a line of demarcation that indicates keywords which are most often used (above the demarcation line) and those that are more advanced or of special use (below the demarcation line).
- f To augment the approach of giving an indication of the relative importance of the keywords, those keywords that are suggested inputs are printed **bold-faced**.
- g bullets (•) precede required keywords.

Note: The end of inputs allowed within each box is the point that a terminator (..) is required.

= **GLASS-TYPE**(G-T,32)  
 PANES(P)(1;1 to 3) (all integers)  
 • **GLASS-TYPE-CODE**(G-T-C)(---;0 to 11) (all integers)  
 or  
 • **SHADING-COEF**(S-C)(---;0.0 to 1.0)  
 .....  
**GLASS-CONDUCTANCE**(G-C)(\*;0.0 to 10.0 Btu/hr-ft<sup>2</sup>-°F)[\* See Supplement for defaults.]  
**INSIDE-EMISS**(I-E)(**0.84**;0.0 to 1.0)\*\*  
 → **VIS-TRANS**(V-T)(**0.90**;0.0 to 1.0)[ Used only for daylighting calculation.]

[Note: For typical values, see RM Chap.III or Chapter 23 of the *ASHRAE Handbook of Fundamentals*, 1985.]  
 \*\* Used only for single glazing (PANES = 1), with SHADING-COEF specified, or with GLASS-TYPE-CODE ≤ 8.

At the back of the *BDL Summary* are updated Applicability Tables for each HVAC system type. Because there have been additions to the Tables and many changes to the Default Value or Consequence column, we caution you **not** to use the same material found in the old 2.1A *Reference Manual*. There is also a list of the Verification and Summary Reports for LOADS, SYSTEMS, PLANT and ECONOMICS. Next, there is a summary of the thermal properties of building materials reproduced from Vol. 2 of the *Reference Manual*. On the last few pages you will find a Time Zone Map, Geographical Data for the 50 largest U.S. Cities, and a Julian calendar to help identify the day of the week on which peak loads have occurred for the year of the run-period specified.