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# THE DOE–2 USER NEWS

PUB-439

*DOE-2: A COMPUTER PROGRAM FOR BUILDING ENERGY SIMULATION*

Vol. 12, No. 4

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## ☞ ☞ HANDS ON ☜ ☜

### ☞ You Asked for It...Now It's Here!!

**(well, almost here)** The 2.1E version of DOE-2 will be released in the Spring of 1992. It will feature a new window library with 200 glazings, switchable glazing, ice storage, evaporative cooling, add-on desiccant cooling, variable-speed heat pump (electric and gas), residential system with individual zone control, enhanced water-loop heat pump model, water-side economizer for packaged systems, additional air-side economizer options, additonal heat pump defrost options, enhanced energy cost calculation, multiple electric and fuel meters, consumption by end use, and hourly/monthly BEPS report. Check the next issue of the User News (Spring 1992) for information and availability.

### ☞ N.T.I.S. ... The Saga Continues

Regarding DOE-2 documentation, we have received several complaints that when users ordered the "D" Update Package from NTIS they were sent the "C" Update Package instead. We have attempted to resolve this problem with NTIS for *years*; it is clear that we have been less than successful. Our solution is for users to order new manuals individually, rather than as an Update Package. The NTIS order form has been revised in this issue.

### ☞ California Compliance Tool

The California Energy Commission has approved a new compliance version of DOE-2. The program, called CECDOEDC, is a microcomputer version of DOE-2 integrated with a pre- and post-processing system designed strictly for compliance use. CEC's formal announcement and ordering information are on page 13.

### ☞ Evaporative Cooling for 2.1D

CAER Engineers has developed a function generator for the microcomputer versions of DOE-2 that enables users to model one- or two-stage evaporative cooling. If you are interested, please contact Don Croy, CAER Engineers, Inc., 814 Eleventh Street, Golden, CO 80401; phone (303) 279-8136.

☞ HANDS ON Continued on page 3 ☜

# □ □ □ DOE–SCAN: A DOE-2 Output Interpreter □ □ □

by

**Steven D. Gates, P.E.**

The DOE-2 program is capable of generating a large number of reports. For a ten-zone building, DOE-2 will generate more than 100 reports if the user specifies all applicable reports. The number of reports generated may exceed 150 if hourly reports are specified and, because each report occupies an entire printed page, the output could take over an hour to print using a conventional dot-matrix printer. Of course, many more reports can be generated for buildings having more than ten zones.

Most program users limit the output to only a few reports to avoid the voluminous output described above. This is reasonable for simple buildings or once program input is thoroughly debugged. However, critical information may be excluded when complex systems are being modeled and the results look suspicious. It is then necessary to rerun the simulation with additional reports specified.

DOE–SCAN allows users to specify any number of reports in a DOE-2 run. When the run is complete, DOE–SCAN is used to interpret the output file. DOE–SCAN organizes the reports into a menu; the user can then selectively display, compare, and print any or all reports.

1. **Displaying Reports** Reports are displayed in the DOE-2 format, except that all double spacing is removed so that more information is displayed on the screen.

   Reports can be scrolled up/down and right/left. Column titles and row headings are always displayed, even when data in the lower right corner of a report is displayed. Word processing programs allow the column titles and row headings to scroll off the screen, which can make data review difficult.

2. **Difference Reports** DOE–SCAN facilitates comparative studies by allowing reports from a base case DOE-2 run to be compared with reports from an alternate run. The base case and alternate reports may either be in the same output file (parametric runs), or in two separate files.

   The data in the base case reports are subtracted from the data in the alternate reports. The results are displayed in the same formats as the original reports. One or all of the reports in a file may be compared, including verification reports and hourly reports.

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When he was a member of the Simulation Research Group at LBL, Steve Gates helped develop the DOE-2 program as an author of DOE-2's PLANT program. Steve is now an independent energy consultant living in northern California.

3. **Printing Reports** Any number of reports may be selected for printing from the Report Menu. DOE–SCAN will print on either normal size computer paper or 8½x11 paper. In addition, double spacing can be suppressed so that two or more whole reports can be printed per page.

DOE–SCAN can accommodate any size file with any number of reports. In addition, the file may contain any combination of LOADS, SYSTEMS, PLANT, and ECONOMICS runs. However, the portion of a file that can be manipulated at one time by DOE–SCAN is limited by available memory. Currently, the program can use only base memory; the Pascal compiler used does not support the use of extended memory for the heap.

In a computer with 650K of RAM, DOE–SCAN can load approximately 140 reports into memory. If the file is too large to fit entirely in memory, then operations are limited to the reports in memory. DOE–SCAN can be instructed at any time to dump the reports in memory and to load additional reports from the same file. To maximize the amount of memory available, it is recommended that the number of resident programs be limited, or located into high memory (DOS-5.0).

A single user may become licensed to use DOE–SCAN for a fee of $75.00. Contact Steve Gates for information on program purchase and restrictions. Steven D. Gates, P.E., *Building HVAC Design and Performance Modeling,* 2028 Murphys Court, Gold River, CA 95670; phone (916) 638-7540.

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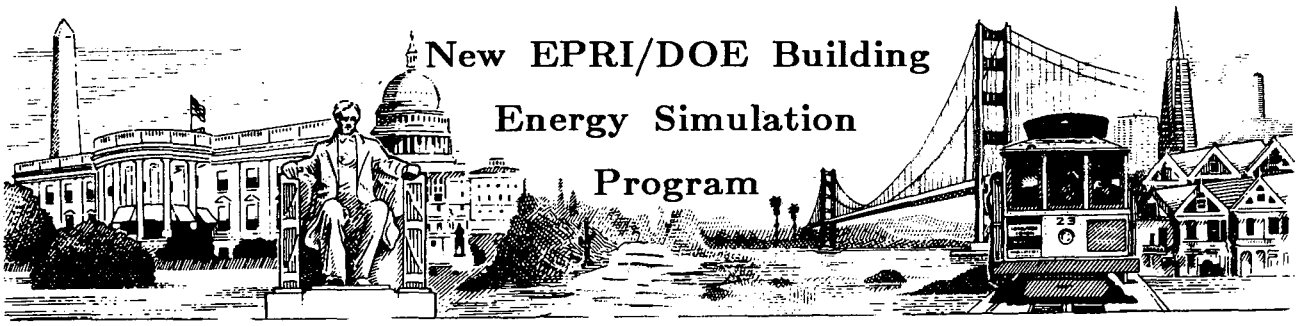
## ☞ ☞ HANDS ON Continued from page 1 ☜ ☜

### ☞ Home Energy Magazine — FREE Issue!!

For a limited period of time, *Home Energy,* the magazine of residential energy conservation, is offering a free, trial issue of their magazine. Contact *Home Energy* at 2124 Kittredge #95, Berkeley, CA 94704; phone (510) 524-5405. Yearly subscription rates are $49.00 (United States), $54.00 (Canada), and $59.00 (elsewhere).

Two interesting tidbits from the January/February 1992 issue:

- The University of Minnesota's Cold Climate Housing Center (CCHC) has closed. Since its founding in 1986, CCHC was dependent on a grant for funding; the grant ended last summer and CCHC was unable to find a new source of support. The Minnesota Building Research Center and Underground Space Center also received budget cuts but were unaffected by the closure of the CCHC.
- The U.S. Department of Energy conferred national laboratory status on the Solar Energy Research Institute and changed its name to the National Renewable Energy Laboratory. The address remains the same: 1617 Cole Boulevard, Golden, Colorado 80401, phone (303) 231-7000.




Early in 1992, LBL and Hirsch & Associates will begin development of a new, public-domain building energy simulation program. This project, jointly supported by the Customer Services Division of the Electric Power Research Institute (EPRI) and the Office of Building Technologies of the U.S. Department of Energy (DOE) will lead to phased releases of the program, each version containing progressively sophisticated capabilities for energy use analysis.

The new program will combine the best features of DOE's current program, DOE-2, and EPRI's current program, micro-AXCESS. The initial version of the new program will be easier to use and calculationally stronger than either of its predecessors. Later versions will have enhanced capabilities for input, simulation and display of results, and will provide built-in design guidance to help users achieve energy performance goals. The program will have an open architecture to encourage third-party development of specialized performance analysis modules that can be attached to the core program.

This PC—based program is aimed at a broad range of users:

| | |
|---|---|
| Architects and Engineers..... | to help achieve energy-efficient designs, |
| Utilities..... | to support marketing and demand-side planning efforts, |
| Researchers..... | for performance analysis of advanced technologies, and |
| State and Federal Agencies..... | to aid in development of energy-efficiency standards and guidelines. |

The following program features are planned:

*Calculation Improvements*: loads, systems, and plant calculations integrated into a single timestep; upgraded coil and compressor models; library of system controller functions; individual energy use meters; improved HVAC sizing; component-based approach for user-configurable HVAC systems.

*User Interface*: interactive, menu-driven; accepts different levels of user proficiency; graphical results display; on-line help; library of buildings, space types, schedules, HVAC configurations, etc.; option to automatically generate building description from type, vintage, area, and number of

floors; link to CAD packages.

*Energy Design Advisor*: expert system software that interprets the simulated performance of the building and recommends design improvements; accesses libraries of case studies, costs, energy standards and product data.

*Enhanced Program Support*: user assistance; hot-line; training courses; bug fixes; electronic bulletin board; newsletter. Program support will be provided initially by a central support office and, later, by regional offices.

**Timeline:**

Version I — will be released late 1992/early 1993 and will include screen-based interactive input with two user proficiency levels, improved user documentation with online help, basic graphical results display, buildings library, improved HVAC sizing, individual energy use metering, and upgraded coil and compressor models.

Version II — will be released late 1993/early 1994 and will include an initial *Energy Design Advisor*, user interface with additional expertise levels, enhanced graphical results display, improved engineering documentation, temperature/flow based plant simulation, integrated systems and plant calculation, and a library of system controllers.

Version III — will include an enhanced *Energy Design Advisor*, link to CAD packages, integrated loads/HVAC calculation, and user-configurable HVAC systems.

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**New Energy Software Center**

The new Energy Science and Technology Software Center (ESTSC) at Oak Ridge, TN, is now operational. ESTSC provides scientific and technical computer software and services to DOE, its contractors, other government agencies, business, industry, and academia on a cost-recovery basis. ESTSC has established a new software registration system and pricing structure; the first bulletin on new software will be issued in the spring of 1992. *Guide for Submitting and Ordering Software*, which describes ESTSC services and prices is available from the Center at P.O. Box 1020, Oak Ridge, TN 37831-1020; phone (615) 576-2606. ESTSC replaces the now-closed National Energy Software Center at Argonne National Laboratory.

# Index to the DOE–2 User News

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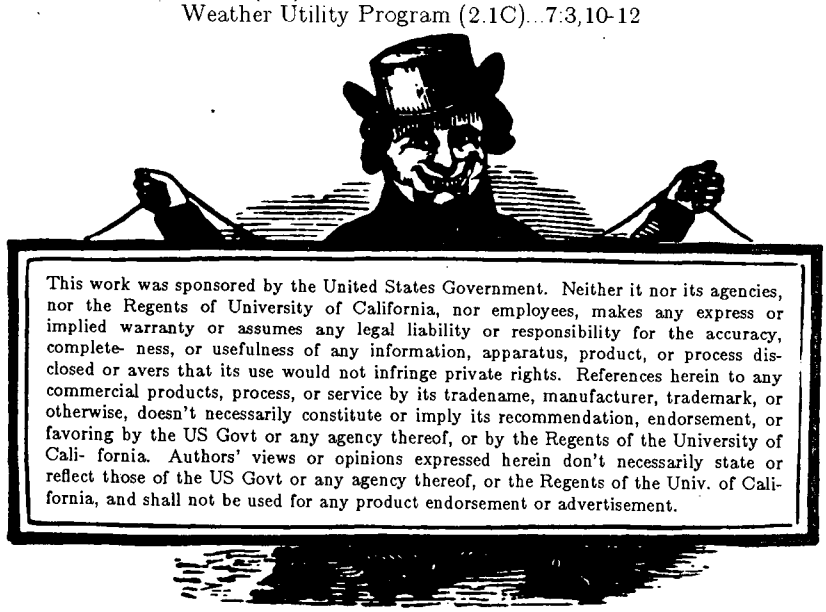

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# □ □ □ THE HEAT EXCHANGER □ □ □

**Question:** **I'd like to read and write files using DOE-2 input functions. How is this done?**

**Answer:** FORTRAN I/O statements can be used inside functions to read values from files, or to write files for special reports and debugging. Both binary I/O and formatted I/O are supported.

The following FORTRAN I/O statements can be used:

PRINT <format number>, var1, var2, ...
This writes to the OUTPUT file.

WRITE( <unit number>, <format number> ) var1, var2, ...
Writes to FORTRAN unit number, using formatted I/O.

WRITE( <unit number> ) var1, var2, ...
Same as previous but uses unformatted I/O.

READ( <unit number>, <format number> ) var1, var2, ...
Reads from FORTRAN unit number, using formatted I/O.

READ( <unit number> ) var1, var2, ...
Same as previous but uses unformatted I/O.

REWIND <unit number>
Rewinds FORTRAN unit number.

ENDFILE <unit number>
Terminates write to FORTRAN unit number.

<unit number> is the integer FORTRAN unit number within the range acceptable by the operating system and/or compiler. However, 1 through 40 are reserved by DOE-2 and, therefore, should NOT be used by user functions.

<format number> corresponds to the statement number of the FORMAT statement that is inside the function. Note that the FORMAT statement must not contain Ixx edit descriptors (e.g., I10) since all variables inside functions are REAL.

Because the DOE-2 functions do not support the OPEN statement, the filename corresponding to the unit number is assigned by the operating system and/or compiler. For example, "READ(50) X,Y" will read from the file named "fortran50" in UNIX systems, or "FORTRAN50.DAT" in VAX-VMS systems. (Check your system or compiler manual to determine the naming convention.) Correspondingly, "WRITE(60) U,V" will write to "fortran60" in UNIX or "FORTRAN60.DAT" in VAX-VMS. As a result, you will have to change the command file that runs DOE-2 so that (1) it copies your input file to a file named "fortran50" in the directory in which DOE-2 is running (assuming a UNIX system), and (2) it saves the output file by copying "fortran60" to a file named by you.

TABLE 5.2

Equipment PART-LOAD-RATIO Default Values

| TYPE Code-Word | | Electric Input to Nominal Capacity |
|---|---|---|
| **Heating Equipment** | | (default) |
| ELEC-STM-BOILER | Electric boiler | 1.000 |
| STM-BOILER | Steam boiler | 0.022 |
| HW-BOILER | Hot water boiler | 0.022 |
| ELEC-HW-BOILER | Electric hot water boiler | 1.000 |
| **Cooling Equipment** | | |
| ABSOR1-CHLR | One-stage absorption chiller | 0.004 |
| ABSOR2-CHLR | Two-stage absorption chiller w/economizer | 0.0071 |
| ABSORG-CHLR | Gas-driven absorption chiller | 0.0071 |
| HERM-CENT-CHLR | Hermetic centrifugal chiller | 0.220 |
| HERM-REC-CHLR | Hermetic reciprocating chiller | 0.274 |
| DBUN-CHLR | Double-bundle chiller | 0.220 |
| ENG-CHLR | Twin screw compressor chiller | 0.0053 |
| **Domestic Hot Water** | | |
| DHW-HEATER | Water heater | 0.000 |
| ELEC-DHW-HEATER | Electric water heater | 1.000 |

[ Table revised 11/91 ]

Please replace pp.5.10-11 in your "DOE-2 Basics" Manual with this page.

## PLANT–PARAMETERS

The PLANT–PARAMETERS instruction is used to change the value of many of the variables used by the PLANT program in the simulation of plant components. Detailed descriptions of how the variables represented by each keyword are used in the PLANT program calculations are provided in the *DOE-2 Engineers Manual.* Following is additional discussion of specific keywords.

### Chillers

| | |
|---|---|
| CHILL–WTR–T | is the chilled water temperature at the middle of the throttling range for chillers. Default is 44°F. |
| MIN–COND–AIR–T | is the minimum entering air temperature allowed for an air-cooled condenser (°F). This is the minimum operating temperature below which control action is initiated to maintain at least this temperature. |
| ABSOR1–HIR | is the full-load heat input ratio for a 1-stage absorption chiller. The heat input ratio is the ratio of heat energy input to cooling energy output. |
| ABSOR2–HIR | is the full-load heat input ratio for a 2-stage absorption chiller with an economizer (see ABSOR1–HIR). |
| ABSORG–HIR | is the full-load heat input ratio for a direct gas fired absorption chiller. |
| ABSORG–FUEL | accepts a code-word for the type of fuel used in a direct fired absorption chiller. The default is NATURAL–GAS. Other fuels that could be used are FUEL–OIL and LPG. |
| ABSORG–HEAT–XEFF | is the efficiency of the hot water heat exchanger used in the heating mode. The default is 0.8. |
| ENG–CH–COP | is the overall COP of the engine driven reciprocating chiller, or the evaporator capacity of the chiller divided by the heat input of the engine. The default is 1.4, which is appropriate when the engine operates at nominal speed to meet its design load. A COP in the range of 1.1 to 1.2 should be entered for a machine that is anticipated to operate at full speed to meet the design load. |
| ENG–CH–FUEL | accepts a code-word that specifies the type of fuel supplied to the engine. The default is NATURAL–GAS; other fuels are not recommended by the manufacturer. FUEL–OIL and LPG are possible alternatives for future equipment. |

NOTICE

# APPROVAL
## of
## CECDOEDC Version 1.0A

**APPLICABLE STANDARD:** Energy Efficiency Standards for Nonresidential Buildings

**AUDIENCE:** Building Officials, Building Permit Applicants and Analysts using DOE 2.1 for Compliance

**EFFECTIVE DATE:** August 1, 1991

**LEVEL OF CHANGE:** Optional

**SUMMARY:**

On August 1, 1991, the California Energy Commission approved a new compliance version of the DOE 2.1 computer program, CECDOEDC Version 1.0A. CECDOEDC is capable of modeling office buildings and stores with many zones. It can also model complex heating, ventilation and air conditioning (HVAC) systems that can serve many zones. Among the systems CECDOEDC can model are central variable air volume (VAV) systems with and without reheat, two- and four-pipe fan coil systems, and hydronic heat pump systems with central boilers and cooling towers. From August 1, 1991 until June 30, 1992, building permit applicants will be able to use CECDOEDC to demonstrate compliance of second generation buildings or first generation buildings using optional second generation compliance.

CECDOEDC is a microcomputer version of DOE 2.1D integrated with a pre- and post-processing system that was designed strictly for compliance use. It generates some of the standard compliance forms as output. CECDOEDC requires at least an IBM-compatible 80386 CPU with a math co-processor or a 80486 CPU with at least 4 megabytes of **extended** (not expanded) memory and at least 15 megabytes of free hard disk space for the program and output from the program.

From now until June 30, 1992 applicants will be able to use CECDOEDC for compliance with second generation nonresidential building standards or first generation buildings using optional second generation compliance. On July 1, 1992, revised standards will become effective and **new** Alternative Calculation Methods (ACM) approvals, including custom budget generation, will be required for **all** computer programs.

**CECDOEDC FEATURES**

***CECDOEDC Is A BDL Input Processing System.*** CECDOEDC accepts slightly modified DOE 2.1 BDL input files, further modifies them to conform to compliance modeling assumptions and input limitations, and submits them to DOE 2.1D for simulation. Special features allow convenient input of occupancy space conditions by $#OFFICE and $#RETAIL code words, automatic stripping of disallowed BDL codewords, and automatic insertion of compliance default values.

***CECDOEDC Is A DOE 2.1D Output Processing System.*** CECDOEDC scans the DOE 2.1D output and produces a set of standard compliance forms for the convenience of the user and the local enforcement agency. Standard DOE 2.1 output is also still available and is required for certain forms. CECDOEDC automatically calls out the required DOE 2.1 output reports for compliance purposes.

## CECDOEDC MANUALS & DOCUMENTATION

***CECDOEDC Manuals.*** One must already be familiar with the use of DOE 2.1 before using CECDOEDC. The CECDOEDC manuals only describe the installation and use of CECDOEDC, but because CECDOEDC is a compliance version of DOE 2.1, the user must understand DOE 2.1 to use CECDOEDC. To create and understand a BDL input file for DOE 2.1 or CECDOEDC, it is necessary to know and understand information found in the DOE 2.1 manuals available from the National Technical Information Service (NTIS) for $319. Manuals available from the CEC include the *CECDOEDC Executive User's Manual* and the *DOE 2.1 California Compliance Supplement.*

## BUILDING OFFICIALS - Enforcement Changes For CECDOEDC:

***The Commission Staff Expects Easier Enforcement For DOE 2.1 Submittals.*** Because CECDOEDC standardizes most compliance rules for the use of DOE 2.1, staff expects easier enforcement of DOE 2.1 submittals. However, CECDOEDC may also increase the number of DOE 2.1 submittals in your jurisdiction since it also makes it easier for the user to incorporate compliance assumptions and default values with less comprehension of the workings of the DOE 2.1 program. The Commission staff suggests that DOE submittals be filed with input files on diskettes and that they be checked using CECDOEDC.

***Note: As For All Programs A Minimum Fan Power Is Required.*** To show compliance, at least one cooling system must be modeled and all cooling systems modeled must be assumed to have supply fans with a miminum fan power of 0.20 watts per square foot. This value should be used as a guide for all performance methods. In particular, buildings using radiant or strip heat must always model an air conditioner (including heat pumps used for cooling) with a reasonably sized fan of that consumes at least 0.20 watts per square foot of fan power.

***Special Compliance Output Is Produced.*** CECDOEDC produces both required DOE 2.1D output and standardized compliance forms similar to those produced by the Simplified Compliance Method (SCM). The CECDOEDC output is the same output specified in the *DOE 2.1 California Compliance Supplement* for all versions of DOE 2.1. Commission staff urges enforcement agencies to ask for diskette copies of the input files to allow periodic random verification of actual runs and hold applicants accountable for accurate and consistent computer analyses and compliance.

## FOR MORE INFORMATION:

Questions regarding CECDOEDC may be directed to Jim Trowbridge or Bruce T. Maeda at (916) 324-3383 through September 13, 1991. They can be reached at (916) (916) 654-4064 beginning September 16, 1991.

## BUILDING DEPARTMENT ORDERING INFORMATION:

Prior to August 31, 1991, the CECDOEDC manual and program (publication number P400-91-009) and the associated *DOE 2.1 California Compliance Supplement* (publication number P400-91-010) will be available only to building officials and plan checkers employed by local enforcement agencies by mailing a request on building department letterhead stationery along with a self-addressed mailing label to:

**California Energy Commission**
**Building & Appliance Efficiency Office, MS-25**
**1516 Ninth Street**
**Sacramento, CA 95814-5512**

**GENERAL PUBLIC ORDERING INFORMATION:**

*CECDOEDC Version 1.0A* (publication number P400-91-009) and the *DOE 2.1 California Compliance Supplement* (publication number P400-91-010) are now available from the Commission's Publication Office by mailing a check or money order, payable to the California Energy Commission, for $39.00 per each program/manual set to:

**California Energy Commission**
**Publication Office, MS-13**
**P.O.Box 944295**
**Sacramento, CA 94244-2950**

To expedite your order, please: (1) return a completed order form with the number of copies and total cost; (2) include the ***enclosed*** mailing label with ***your*** address written or typed in the appropriate area; and (3) enclose your check or money order.

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Date

| PUBLICATION NUMBER | PUBLICATION TITLE | QUANTITY | UNIT PRICE | TOTAL PRICE |
|---|---|---|---|---|
| P400-91-009 | CECDOEDC Program Package (Manuals & Program) | | $28.00 | |
| P400-91-010 | DOE 2.1 California Compliance Manual | | $11.00 | |
| | | | | |

TOTAL AMOUNT ENCLOSED

**Mailed to lists: 50, 52, 408 and 409**
**91-6 (Compliance & Enforcement)**

**August 9, 1991**

# FTIDOE v2.1D

## FTIDOE v2.1D

Finite Technologies Incorporated, a small Alaskan software company specializing in multi-platform and operating system software, would like to announce the release of their FTIDOE v2.1D software, which will be available beginning the second week in February. The FTIDOE software is a direct port of the original Lawrence Berkeley DOE-2.1D code, there have been no changes other than those required to make the code independent of the operating system for which it was originally designed.

FTIDOE will be available for most major computing hardware platforms and operating systems, with plans for expansion to other platforms as our customers require. Currently FTIDOE is available on VMS, ULTRIX (RISC based), SCO UNIX and 32 bit DOS. By the middle of the second quarter of 1992, Finite Technologies will expand support to include IBM RS6000, OS/2 and NeXT. This list of platforms is by no means complete, Finite Technologies will provide the FTIDOE software on other platforms if there is sufficient demand for that computing system.

## Future Developments

Finite Technologies intends to make the FTIDOE software a continuously developing product with new versions offering increased processing speed, a graphical user interface (GUI) and FTIDOE v2.1E.

The increased processing speed will be the first of several planned updates to the first version of this program, (a current maintenance agreement will give the user free upgrades as they occur). As this software matures there will be optimizations of all of the FTIDOE modules to provide a version of the Lawrence Berkeley DOE software that will be unparalleled in its execution speed, (this will be true for both the D and E versions).

Finite Technologies is currently in the conceptualization phase for the development of a multi-platform GUI pre and post processor which will function with both FTIDOE and the Lawrence Berkeley DOE-2.1D software. These pre and post processors will be independent of the processing modules allowing users to create input files and analyze the output separate of the actual FTIDOE software. Add to this the fact that the pre and post processors will operate on most of the major computing platforms and you now have an environment where pre and post processing can be independent of the computing system where the actual processing takes place. This will allow computing resources to be allocated based on need and will help users decrease there dependance on the main frames for tasks that are intended for smaller computing systems.

Lawrence Berkeley Laboratories has tentatively announced the release of DOE-2.1E for April of 1992. Finite Technologies will be following this release as closely as possible with a multi platform version (FTIDOE-v2.1E). Like its predecessor it will be a direct port of the Lawrence Berkeley code. Finite Technologies will be taking orders for the FTIDOE v2.1E to be filled as soon as the product is available. We anticipate approximately 6 to 8 weeks after the Lawrence Berkeley release.

## Weather Files

Finite Technologies also offers a full line of DOE-2 TRY and TMY weather files. These files can be purchased in a variety of distribution formats which will give users the flexibility that the national weather service doesn't. These weather files are available to all DOE users regardless of the source of their DOE software. Call for pricing and further information.

For more information contact:

**Finite Technologies Incorporated**
**821 N Street, Suite 102**
**Anchorage, Alaska 99504**
**Phone (907) 272-2714**
**Fax (907) 274-5379**

## DECstation (RISC) Line:

| Item Number | Platform | Price | Main. Contract (Item 4030) |
|---|---|---|---|
| 4001 | DECstation 2100, 3100 | $1,495.00 | $150.00 |
| 4002 | DECstation 5000/100,120,125,200 (5200) | $2,195.00 | $225.00 |

## INTEL 80286, 80386/80486 Line:

| Item Number | CPU | Operating System | Number of Users | Price | Main. Contract (Item 4031) |
|---|---|---|---|---|---|
| 4003 | 80386/80486 | DOS | Single user | $495 | $50.00 |
| 4004 | 80386/80486 | DOS | Each additional user | $250 | $25.00 |
| 4005 | 80386/80486 | DOS | 5 user pack | $1,350.00 | $260.00 |
| 4006 | 80386/80486 | DOS | 10 user pack | $2,500.00 | $370.00 |
| 4007 | 80386/80486 | SCO UNIX | Single user | $1,595.00 | $220.00 |
| 4008 | 80386/80486 | SCO UNIX | Each additional user | $805.00 | $85.00 |
| 4009 | 80386/80486 | SCO UNIX | 5 user pack | $4,450.00 | $450.00 |
| 4010 | 80386/80486 | SCO UNIX | 10 user pack | $8.450.00 | $850.00 |

## VAX Line (VMS):

| Item Number | Platform | Price | Cluster Points | Main. Contract (Item 4032) |
|---|---|---|---|---|
| 4011 | VAX station 3100, 4300, VAXserver 3XXX | $795.00 | 10 | $90.00 |
| 4012 | MicroVAX 2000,3100 | $895.00 | 20 | $90.00 |
| 4013 | 730, MicroVAX II | $1,495.00 | 50 | $150.00 |
| 4014 | 750, 78X, MicroVAX 3300/3400, 82XX | $2,695.00 | 100 | $270.00 |
| 4015 | VAXserver 6210, 6310, 83XX, MicroVAX 3500/3600/3800/3900 | $4,700.00 | 200 | $270.00 |
| 4016 | VAX 3310, 4300, 6210, 6310 | $6,300.00 | 300 | $630.00 |
| 4017 | VAXserver 6220, 6320, 6410, 6420, 6510, 6520, 8530, 86XX | $7,300.00 | 400 | $780.00 |
| 4018 | VAX 6220, 6320, 6312, 6410, 8550, 8700, 8810 | $7,300.00 | 600 | $780.00 |
| 4019 | VAX 6230, 6330, 6510 | $7,300.00 | 900 | $780.00 |
| 4020 | VAX 6240, 6340, 6350, 6450, 6420, 8800, 8820 | $7,300.00 | 1200 | $780.00 |
| 4021 | VAX 6360, 6430, 6520, 8830 | $7,300.00 | 1800 | $780.00 |
| 4022 | VAX 6440, 6450, 6460, 6530, 6540, 6550, 6560, 8840, 8842, 8974, 9210, 9410 | $7,300.00 | 2400 | $780.00 |
| 4023 | VAX 8978, 9420, 9430, 9440 | $7,300.00 | 4800 | $800.00 |

## Documentation

| Item Number | Document | Price |
|---|---|---|
| 4024 | Reference Manual (2.1A) | 90.00 |
| 4025 | BDL Summary (2.1D) | 18.00 |
| 4026 | Sample Run Book (2.1D) | 45.00 |
| 4027 | DOE-2 Supplement (2.1D) | 45.00 |
| 4028 | Engineers Manual (2.1A) | 38.00 |
| 4029 | Complete Set of Documentation | 200.00 |

Notes:
1) Documentation is sold separately for the actual program. Users may purchase as many sets of documents as they need, the number of documents is not limited to the number of licenses purchased.
2) Discounts available for multiple copies.

Finite Technologies Incorporated
821 N Street, Suite 102
Anchorage, Alaska 99501
Phone: 907-272-2714 FAX: 907-274-5379

# ■ ■ ■ ■ DOE-2 DIRECTORY ■ ■ ■

## Program Related Software and Services

### ■ ■ Source Code ■ ■

*(2.1D VAX and SUN-4 Only)*
Simulation Research Group
Bldg. 90, Room 3147
Lawrence Berkeley Laboratory
Berkeley, CA 94720
Phone: (510) 486-5711 FAX: (510) 486-4089

*(2.1C and 2.1D Mainframe Only)*
Energy Science/Technology Software Center
Oak Ridge National Laboratory
P.O. Box 1020
Oak Ridge, TN 37831-1020
(615) 576-2606

### ■ ■ PC VERSIONS ■ ■

*MICRO-DOE2 (DOE-2.1D for Microcomputers)*
Acrosoft International (Gene Tsai)
9745 East Hampden Avenue
Denver, CO 80231 (303) 368-9225

*ADM-DOE2 (DOE-2.1D for Microcomputers)*
ADM Associates, Inc. (Taghi Alereza)
3299 Ramos Circle
Sacramento, CA 95827 (916) 363-8383

### ■ ■ Utility Programs ■ ■

*Graphs from DOE-2*
Ernie Jessup
4977 Canoga Avenue
Woodland Hills, CA 91364 (818) 884-3997

*Pre-DOE – (BDL math pre-processor)*
Nick Luick
19030 State Street
Corona, CA 91719 (714) 278-3131

### ■ ■ VIDEO ■ ■

*DOE-2 Instructional Video and Manual*
Prof. Jan Kreider – JCEM
University of Colorado at Boulder
Campus Box 428
Boulder, CO 80309-0428 (303) 492-3915

### ■ ■ DOE-2 Training ■ ■

*Mech. Engs., Consulting, Training*
Marlon Addison
Energy Simulation Specialists
64 East Broadway, Suite 230
Tempe, AZ 85282 (602) 967-5278

### ■ ■ Weather Tapes ■ ■

**TMY or TRY tapes:**
National Climatic Data Center
Federal Building
Asheville, North Carolina 28801
Phone: (704) 259-0871 climate data
Phone: (704) 259-0682 main number

**CTZ tapes:**
California Energy Commission
Attn: Bruce Maeda, MS-25
1516-9th Street
Sacramento, CA 95814-5512
Phone: 1-800-772-3300 Energy Hotline
or: (916) 654-5106

**WYEC tapes:**
ASHRAE
1791 Tullie Circle N.E.
Atlanta, GA 30329
Phone: (404) 636-8400

### ■ ■ User News ■ ■

*To be put on the newsletter distribution list, to submit articles, corrections or updates to documentation, or for DOE-2 program questions, please contact:*

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## ■ ■ CONSULTANTS ■

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## ■ ■ ■ DOE-2 PROGRAM DOCUMENTATION ■ ■ ■ ■

National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161

| | NTIS Order No. | Cost of Documentation U.S. | Foreign |
|---|---|---|---|
| BDL Summary (2.1D) | DE-890-17726 | 26.00 | 52.00 |
| Sample Run Book (2.1D) | DE-890-17727 | 66.00 | 132.00 |
| DOE-2 Supplement (2.1D) | DE-890-17728 | 59.00 | 118.00 |
| Reference Manual (2.1A) | LBL-8706, Rev.2 | 115.00 | 230.00 |
| Engineers Manual (2.1A) [algorithm descriptions] | DE-830-04575 | 50.00 | 100.00 |

DOE-2 Basics Manual (all versions) being printed now; contact Kathy Ellington

Phone orders using Visa or Mastercard (703) 487-4650 or FAX (703) 321-8547
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