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The Building Description Language (BDL) Summary lists defaults, limits,
and abbreviations for all commands and keywords found in this manual

What Is DOE-2?

DOE-2 is an up-to-date, unbiased, well-documented public-domain computer program for building energy analysis. DOE-2 predicts the hourly energy use and energy cost of a building given hourly weather information and a description of the building and its HVAC equipment and utility rate structure. DOE-2 is a portable FORTRAN program that can be used on a large variety of computers, including PC's. Using DOE-2, designers can determine the choice of building parameters that improve energy efficiency while maintaining thermal comfort. The purpose of DOE-2 is to *aid* in the analysis of energy usage in buildings; it is *not* intended to be the sole source of information relied upon for the design of buildings. The judgment and experience of the architect/engineer still remain the most important elements of building design.

About This Manual

During the 15 years that DOE-2 has been in existence, it has grown to three times its original size due to the addition of new capabilities. As a result, using the program can be difficult not only for the novice but also for the experienced user.

The enormous number of input and output variables from which you can choose is only part of the problem. Up until now there has been no attempt to give you guidance as to what is considered "basic" and what might be termed "finesse". Learning to use DOE-2 is analogous to learning a card game: first you learn how to bid, then to follow suit, then to trump. It is only after the "basic" rules have been mastered that the idea of a "finesse" can enter the game. This manual is aimed at introducing you to the basic rules of DOE-2.

DOE-2 Basics covers approximately 80% of normal simulation applications, yet requires you to be familiar with only 25% of the input variables available in the program. These variables have been chosen from our long experience of assisting the most experienced users prepare their inputs.

There is a real danger in preparing a manual with a limited set of variables because so many useful features of the program are left out. To compensate for this, we have provided, in Appendix A, a directory of the more complex features of DOE-2.

Other Documentation

In addition to this *DOE-2 Basics*, there are six other pieces of documentation:

- *Reference Manual (2.1A)*
  - detailed instructions on how to use all features of Version 2.1A of the program

- *Supplement (2.1E)*
  - a companion volume to the *Reference Manual (2.1A)*, it contains detailed discussions and instructions for using the enhancements introduced into subsequent versions of the program

- *BDL Summary (2.1E)*
  - summarizes all input commands and keywords
  - lists defaults, limits, abbreviations

- *Sample Run Book (2.1E)*
  - shows input and output for simple and complex buildings and systems
  - illustrates most program features
  - a complete set of sample inputs and outputs is available on the mainframe DOE-2 tape for you to examine, run, and/or edit; a reduced set of samples is distributed on diskette with the PC versions of DOE-2.

- *Engineers Manual (2.1A)*
  - describes engineering and mathematical basis of program calculations
  - lists sources of algorithms

- *User News*
  - published quarterly
  - distributed free of charge
  - features articles on the effective use of DOE-2
  - lists program problems and bug fixes
  - provides a directory of DOE-2 related software products

Any program user may receive the *User News* free of charge. To be put on the distribution list, please write the Simulation Research Group, Bldg. 90 - Room 3147, Lawrence Berkeley Laboratory, Berkeley, CA 94720.

DOE-2 manuals are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161; tel. (703) 487-4650, Fax (703) 321-8547. Contact NTIS for price and delivery information.

Title of Document (version of DOE-2)	NTIS Order Number
Reference Manual (2.1A)	LBL-8706, Rev.2
Supplement (2.1E)	*
DOE-2 Basics (2.1E)	*
BDL Summary (2.1E)	*
Sample Run Book (2.1E)	*
Engineers Manual (2.1A)	DE-830-04575

* At the time this manual went to press, NTIS reference numbers had not yet been assigned. Please call Kathy Ellington at (510) 486-5711, or fax to (510) 486-4089, for reference numbers.

What does a DOE-2 run look like?

Following are the input (complete with a system, plant, and energy rate) and selected output reports for the single zone building shown below. (A more detailed version of this building, with five zones and a plenum, is shown in Appendix B.)

BM034
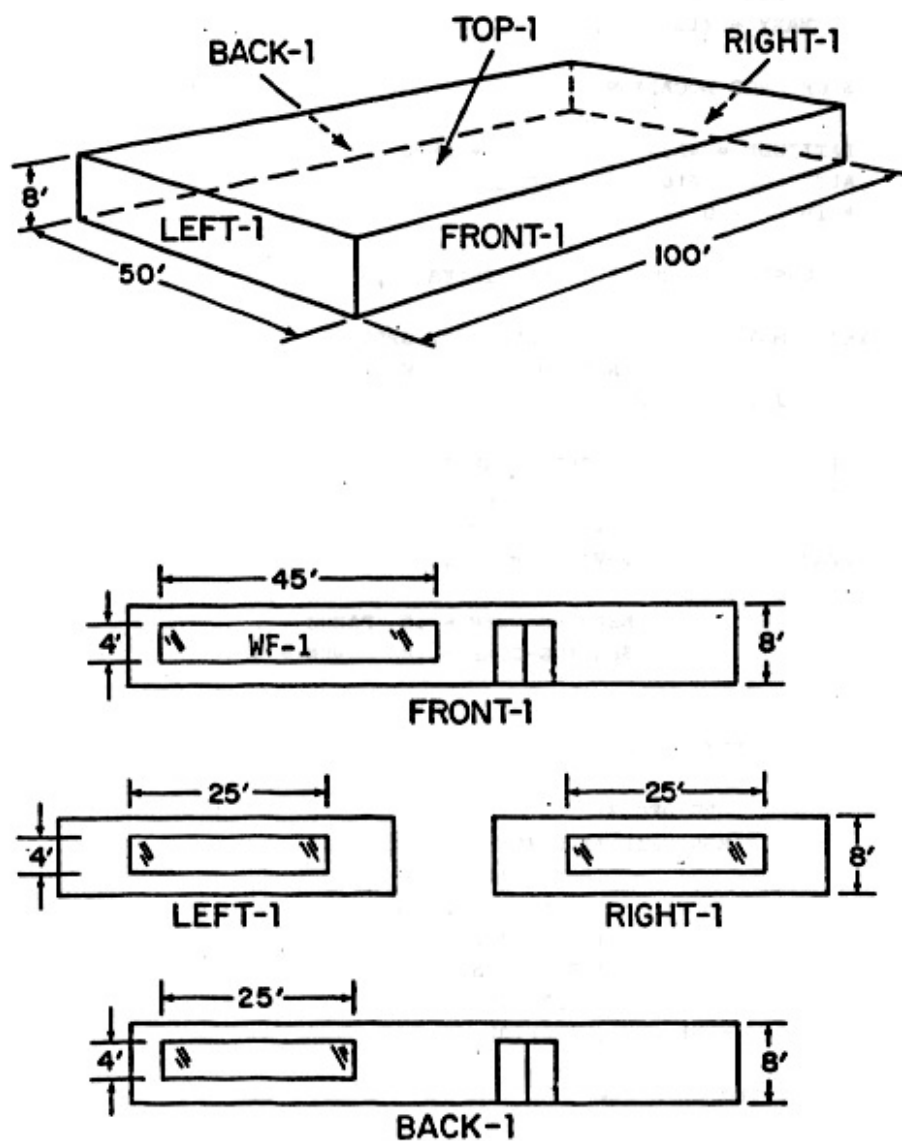
Figure 1.1: Simple Structure — Single Zone Building. LEFT-1, FRONT-1, etc. are user-defined names.

Sample Input

INPUT LOADS ..

TITLE   LINE-1 *SIMPLE EXAMPLE FOR DOE-2 BASICS* ..

RUN-PERIOD   JAN 1 1974 THRU DEC 31 1974   ..

ABORT   ERRORS   ..
DIAGNOSTIC   WARNINGS ..
LOADS-REPORT   SUMMARY = (LS-C) ..

                 $ CHICAGO LOCATION

BUILDING-LOCATION LATITUDE = 42.0 LONGITUDE = 88.0
                   ALTITUDE = 610   TIME-ZONE = 6
                   AZIMUTH = 0 ..

                 $ CONSTRUCTIONS AND GLASS TYPES

WA-1-2   =LAYERS MATERIAL = (WD01,PW03,IN02,GP01) ..
RB-1-1   =LAYERS MATERIAL = (RG01,BR01,IN22,WD01)
                      INSIDE-FILM-RES = .76 ..

ROOF-1   =CONSTRUCTION   LAYERS = RB-1-1 ..
WALL-1   =CONSTRUCTION   LAYERS = WA-1-2 ..
FLOOR-1   =CONSTRUCTION   U-VALUE = .05 ..
D1   =CONSTRUCTION   U-VALUE = .5 ..

WINDOW-1   =GLASS-TYPE   SHADING-COEF = .9 PANES = 2 ..
G-DOOR   =GLASS-TYPE   SHADING-COEF = .8 PANES = 1 ..

                 $ OCCUPANCY SCHEDULE

OCCUPY-1   =SCHEDULE   THRU DEC 31
                 (MON,FRI) (1,8)(0)
                           (9,11)(1)
                           (12,14)(.8,.4,.8)
                           (15,18)(1)
                           (19,21)(.5,.1,.1)
                           (22,24)(0)
                 (WEH)   (1,24)(0) ..

                 $ LIGHTING SCHEDULE

LIGHTS-1   =SCHEDULE   THRU DEC 31
                 (MON,FRI) (1,8) (0.05)
                           (9,14) (.9,.95,1,.95,.8,.9)
                           (15,18) (1)
                           (19,21) (.6,.2,.2)
                           (22,24) (0.05)
                 (WEH)   (1,24) (.05) ..

```
$ OFFICE EQUIPMENT SCHEDULE

EQUIP-1          =SCHEDULE    THRU DEC 31
                             (MON,FRI) (1,8) (.02)
                                       (9,14) (.8)
                                       (15,20) (.8,.7,.5,.5,.3,.3)
                                       (21,24) (.02)
                             (WEH)     (1,24) (.02) ..

       $ INFILTRATION SCHEDULE

INFIL-1          =SCHEDULE    THRU MAR 31 (ALL) (1,24) (1)
                             THRU OCT 31 (ALL) (1,24) (0)
                             THRU DEC 31 (ALL) (1,24) (1) ..


       $ SPACE DEFINITION

OFFICE-ENV       =SPACE-CONDITIONS    PEOPLE-SCHEDULE   = OCCUPY-1
                                      LIGHTING-SCHEDULE = LIGHTS-1
                                      EQUIP-SCHEDULE    = EQUIP-1
                                      LIGHTING-TYPE     = REC-FLUOR-RV
                                      LIGHTING-W/SQFT   = 1.5
                                      EQUIPMENT-W/SQFT  = 1
                                      AREA/PERSON       = 110
                                      PEOPLE-HEAT-GAIN  = 450
                                      FLOOR-WEIGHT      = 70
                                      INF-METHOD        = AIR-CHANGE
                                      INF-SCHEDULE      = INFIL-1
                                      AIR-CHANGES/HR    = .6 ..



OFFICE           =SPACE        SPACE-CONDITIONS = OFFICE-ENV
                               AREA = 5000        VOLUME = 40000 ..


       $ WALLS, WINDOWS, AND DOORS

   FRONT-1       =EXTERIOR-WALL    HEIGHT = 8          WIDTH = 100
                                   AZIMUTH=180         CONSTRUCTION = WALL-1 ..

     WF-1        =WINDOW           WIDTH = 45          HEIGHT = 4
                                   GLASS-TYPE = WINDOW-1 ..

     DF-1        =WINDOW           WIDTH = 8           HEIGHT = 7
                                   GLASS-TYPE = G-DOOR .. $ GLASS DOOR

   RIGHT-1       =EXTERIOR-WALL    HEIGHT = 8          WIDTH = 50
                                   AZIMUTH = 90        CONSTRUCTION = WALL-1 ..

     WR-1        =WINDOW           LIKE WF-1           WIDTH = 25 ..

   BACK-1        =EXTERIOR-WALL    HEIGHT = 8          WIDTH = 100
                                   AZIMUTH = 0         CONSTRUCTION = WALL-1 ..
```

```
WB-1        =WINDOW           LIKE WF-1         WIDTH = 45 ..
DB-1        =DOOR             WIDTH = 8         HEIGHT = 7
                             CONSTRUCTION = D1 ..   $ WOOD DOOR

LEFT-1      =EXTERIOR-WALL    HEIGHT = 8        WIDTH = 50
                             AZIMUTH = 270     CONSTRUCTION = WALL-1 ..

WL-1        =WINDOW           LIKE WF-1         WIDTH =25 ..

TOP-1       =ROOF             HEIGHT = 50       WIDTH = 100
                             AZIMUTH = 180     CONSTRUCTION = ROOF-1 ..

BOTTOM-1    =UNDERGROUND-FLOOR  AREA = 5000
                             CONSTRUCTION = FLOOR-1  ..

END ..
COMPUTE LOADS  ..



INPUT SYSTEMS ..


FANS-ON     =SCHEDULE   THRU DEC 31
                       (MON,FRI) (1,7)(0) (8,18)(1) (19,24)(0)
                       (WEH) (1,24)(0) ..

COOLSETPT   =SCHEDULE   THRU DEC 31
                       (MON,FRI) (1,7)(99) (8,18)(76) (19,24)(99)
                       (WEH) (1,24)(99) ..

HEATSETPT   =SCHEDULE   THRU DEC 31
                       (MON,FRI) (1,7)(55) (8,18)(72) (19,24)(55)
                       (WEH) (1,24)(55) ..

DHW         =SCHEDULE   THRU DEC 31
                       (MON,FRI) (1,7)(0) (8,18)(1) (19,24)(0)
                       (WEH) (1,24)(0) ..

OFFICE      =ZONE       DESIGN-HEAT-T     = 72
                       DESIGN-COOL-T     = 74
                       HEAT-TEMP-SCH     = HEATSETPT
                       COOL-TEMP-SCH     = COOLSETPT
                       OA-CFM/PER        = 20 ..

AC-SYST     =SYSTEM     SYSTEM-TYPE       = SZRH
                       MAX-SUPPLY-T      = 110
                       MIN-SUPPLY-T      = 55
                       NIGHT-CYCLE-CTRL = CYCLE-ON-FIRST
                       FAN-SCHEDULE      = FANS-ON
                       DRYBULB-LIMIT     = 68
                       OA-CONTROL        = TEMP
                       ZONE-NAMES        = (OFFICE) ..
```