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DESCRIPTION OF THE ENCORE-CANADA BUILDING ENERGY USE ANALYSIS COMPUTER PROGRAM

by

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INTRODUCTION

ENCORE-CANADA [4] is a Fortran IV computer program intended as a research tool for energy conservation studies on small residential buildings in Canada. It is particularly suited for thermal loads and energy use analyses to check energy conservation measures applicable to single family houses. The theoretical considerations and the mathematical methods employed have been described in detail elsewhere [1,2]. This publication concentrates on the program structure, data preparation, description of output and procedures for running the program.

The program performs a dynamic simulation of energy use on an hourly basis using real weather data. Conduction heat transfer through the building envelope involves a dynamic calculation procedure that takes internal heat storage into account. The air infiltration calculations are a prominent feature of the program: both wind and stack effects are incorporated in a calculation procedure based on mass flow balance. Solar effects on the building enclosure (walls, roofs, windows, doors) are included in the heat balance calculation and involves sol-air temperature, surface solar absorptivity and cloud cover effect.

The house interior environment is permitted to have temperature variation from room to room provided that individual electric resistance heaters are used for heating. The heaters are controlled by individual proportioning thermostats. Oil-fired furnace heated houses with hot air distribution systems can also be simulated but in this case the house model is restricted to one interior space.

Internal heat gains from occupants, lighting, equipment, appliances and the use of hot water are considered on the basis of hourly profiles which may vary from room to room and from working days to holidays.

Ground heat transfer through basement walls and floor is considered on the basis of a yearly cycle of average daily ground surface sol-air temperature variation and a constant basement indoor temperature.

ENCORE-CANADA consists of a main program and 28 associated subroutines. It requires two input data files, one containing weather data, the other containing building data. The weather data file must be one of 39 preprocessed years of weather and solar radiation data which are selected automatically from disc or tape according to the city and year specified by the user. The following information is transferred from the weather and solar radiation data files to the ENCORE-CANADA main program [4] (program variable names are given in parentheses)

a) data which are read once for each yearly data file

- year (IYEAR),
- leap year indicator (LEAP),
- city number (NOCITY),
- city name (NAME),
- province name (IPROV),
- latitude in degrees north (DNLAT),
- longitude in degrees west (DWLON),
- time zone (ITZN),
- time zone letter designation (ITZ),
- summer sky clearness number (SSCN, not used in program),
- winter sky clearness number (WSCN, not used in program),
- longitude in radians (RADLON, not used in program),
- sine of latitude angle (SINLAT),
- cosine of latitude angle (COSLAT),
- tangent of latitude angle (TANLAT, not used in program);

b) data which are read once for each day of the year

- day sequence number (IDOY),
- day of the month (ID),
- month of the year (MONTH),
- weekday sequence number (IDWEEK, not used in program),
- day of the week (NAMDAY),
- holiday flag (IWH),
- sunrise angle in radians (SUNRAS),
- tangent of declination angle (DEABC(1)),
- equation of time in hours (DEABC(2), not used in program),

- apparent solar constant in W/m² (DEABC(3), not used in program),
- atmospheric extinction coefficient (DEABC(4), not used in program),
- sky diffuse factor (DEABC(5), not used in program),
- sky clearness number for the day (CN, not used in program),
- ground reflectivity (ROGDAY);

c) data which are read for every hour of the day

- dry-bulb temperature in °C (IDBT),
- cloud amount in tenths (ICLC),
- wind velocity in km/h (IVEL),
- wind direction in degrees clockwise from north (WDIR),
- atmospheric pressure at ground level in cm of Hg (PATMOS),
- hour angle in radians (HANGLE),
- brightness of the sky in W/m² (BSKY),
- intensity of direct normal solar radiation in W/m² (DNR),
- percent difference between measured and calculated total solar radiation on a horizontal surface (PRC).

The building data must be generated by the user. Normally a Users' Manual is required to describe each entry in this data set, including the format codes used to punch the numbers on cards. It was recognized that the creation of such a data set on the basis of a manual was an exhaustive, lengthy task without assurance that the created data set was free of keypunching or other trivial errors. Moreover, some of the required data can only be obtained from other computer programs [3] (e.g. Z-transfer function coefficients for wall dynamic heat flow calculations). For these reasons, instead of a conventional Users' Manual, a conversational front-end computer program was written to facilitate and speed up the process of building data preparation for ENCORE-CANADA. The use of this front-end program is illustrated by an example described later [5]. The created ENCORE-CANADA input data set is generously commented (see Appendix I) so that subsequent modification to it can be easily accomplished with commonly available system editing programs.

CONVERSATIONAL FRONT-END PROGRAM

The conversational front-end program [6] eliminates the chores of studying a manual and the keypunching of input data cards. An intricate chain of system command procedures [5] (BUILD, BUILD1 through BUILD6, TRANS1 through TRANS6 and WIPES1) is used to run the front-end program on the IBM TSS/370 Time Sharing System.

The user may elect to stop and resume at six selected points and may create several different building data sets concurrently. Explanations, information and questions are printed on the teletype terminal. Internal checks are performed on the answer to each question. Such checks are transparent unless the user types an invalid answer.

The front-end program incorporates various computational procedures for hard to obtain data required by ENCORE-CANADA (e.g. wall Z-transfer function coefficients; window U-values). An appreciable amount of information is stored in four associated permanent data sets [5]. One of these (BUILD.PSWOLD1) is used to change and record the status of each session and is thus essential to the stop and resume feature of the program. The remaining three data sets (LAYERS.OLD, WNDWS.OLD and DOORS.OLD) store the properties of construction materials, windows and doors, respectively. Should the user enter a new construction material, window or door, the new information is appended to the three data sets, thus providing the program with a pseudo-learning capability.

At the end of each session the front-end program displays data card images created for ENCORE-CANADA (see Appendix I).

The average user, with about two hours of preparation, can produce a complete data set using the front-end program in three to four hours. Most likely, the data set would be free of trivial errors.

EXAMPLE OF BUILDING DATA DEFINITION

Consider a two-storey, three-bedroom, electrically heated, light-weight construction, Canadian house. The outlines of the three floor plans are shown in Figures 1, 2 and 3, respectively. Two bedrooms on the second floor are treated as one interior space (Figure 1). The bathroom and another bedroom are treated as separate interior spaces. No partitions are shown on the basement (Figure 3) and first floor (Figure 2) plans since they are each treated as one interior space. The following description of building data definition gives prospective users an idea about the input data required by ENCORE-CANADA. The user simply types the command BUILD 1 to start a session during which he describes building model No.1 (our example).

First Session (Part "A")

Table I lists the five interior and two exterior spaces shown in Figures 1 through 3 and data to be entered during the first session at the teletype terminal. Every interior space is described by its perimeter and floor area. Note that space No.5 comprises only the above ground portion of the basement. The below ground portion is described during the fifth session. The band in Rankine degrees of a proportioning thermostat and the capacity of heating units controlled by the thermostat in each interior space are also listed in Table I. A set of schedule numbers is assigned to interior spaces in the following categories

- thermostat setpoint,
- occupancy,
- constant light,
- variable light,
- appliance and equipment,
- hot water consumption.

Schedule numbers are tags relating schedules defined during the second session to interior spaces. Separate schedules may be assigned to working days and holidays. The schedules are shown in Tables IIa through IIf.

Exterior space No.6 is the space surrounding the nearly square shaped building and exterior space No.7 is the space above the roof of the building. Exterior space numbers are assigned according to the type of the adjacent exterior surface. Thus, a distinction is made between long walls, short walls, roofs and surfaces unaffected by the wind. The outside walls of a square shaped building would all be classified as short walls. This classification is essential for determining the wind effect on air infiltration.

The data card images created in Part "A" are shown in Appendix I.

Second Session (Part "E")

In the example, there is only one thermostat setpoint schedule, i.e. all thermostats are set identically both on working days and on holidays. During the day the temperature setting is 72°F, during the night it is 68°F (Table IIa).

There are nine different occupancy schedules which reflect the working day and holiday activities of a family of five (two

adults and three children). Schedules for occupancy are defined according to the number, type and activity level of each occupant (Table IIb). From this information the front-end program computes the amount of heat generated. Activity level is measured on a scale from 0 to 5 with 1 corresponding to very low activity, 2 to low, 3 to moderate, 4 to high and 5 tc very high activity.

Only one constant light schedule number appears in Table I. Constant lights are those lights which turn on or off strictly according to a specified schedule, regardless of the amount of natural light available. It is evident from Table IIc that there are in fact no constant lights. All lights are classified as variable lights which turn on and off according to the nine variable light schedules in Table IId but are on subject to the availability of sunlight. Light schedules are specified by the number and power rating of each light.

There are six appliance and equipment schedules in Table IIe. The first one is a null schedule indicating that no electrical appliances or equipment are connected in interior spaces No. 1 and 2 and in No.5 on holidays (see Table I). The schedules specify duration of use in minutes and power rating.

In the example, a 60 imperial gallon electric hot water heater tank is located in space No.5. It has a 4500 W upper and a 4500 W lower heater element. The standby heat loss from the tank is 130 W and from each connecting pipe it is 14 W. Water enters at 45°F and leaves at 130°F. Consumption occurs according to the six hot water consumption schedules in Table IIf. The first one is a null schedule for spaces No.1 and 2 and No.5 on holidays. The schedules specify duration of flow and tap flow rate. ENCORE-CANADA calculations are based on the assumption that 50% of the energy used to heat the incoming cold water, eventually shows up as internal heat gain in the house.

The data card images created in Part "B" are shown in Appendix I. Note that except for thermostat setpoint schedules, all schedules in the data set appear as hourly percentage values of a certain maximum quantity.

Third Session (Parts "C", "E", "G" and "I")

Part "C" of the third session concerns the specification of wall, floor, ceiling and roof surfaces. Table III lists 25 surfaces. Each surface is defined by two space numbers: partitions by two interior space numbers, exterior surfaces by one exterior and one interior space number.

The detailed construction of each surface is specified by a type number. Type numbers should be regarded as tags relating various construction characteristics specified during the fifth session (Part "D") to the surfaces listed in Table III.

The size of each surface is determined by its dimensions (height or length and width) assuming rectangular surfaces. The height above ground of the surface bottom edge is essential to air infiltration calculations in ENCORE-CANADA. Tilt and azimuth angles define surface orientation which is essential to both solar heat gain and air infiltration calculations. Air tightness is specified on a scale between 0 and 4, with 2 corresponding to average air tightness and 4 to an extremely leaky surface. The front-end program automatically assigns a value for resistance to air flow and establishes the number of equispaced holes along the surface height to represent air leakage. The number of doors in each surface and the number of windows in each exterior surface must be given.

The simplifications introduced in the representation of partitions and a few exterior surfaces are worth noting here.

For partitions (surfaces No.8, 9, 11, 13, 15 and 21) orientation plays no role in ENCORE-CANADA energy calculations and is ignored. This permits the lumping together of partitions of different orientations between two spaces. Surface No.19 is an unexposed garage wall and is assigned a tilt angle of 180° in Table III. A 180° tilt angle means that the surface is facing the ground and therefore does not see sunlight.

Exterior surfaces No.18 and 24 are not true representations of the walls indicated in Figures 2 and 3. In order to simplify the ENCORE-CANADA house model and keep the total number of surfaces to a minimum, east and north facing wall components are replaced with one wall surface (No.18) facing north. For the same reason, the above ground portion of the garage/basement partition wall is included in surface No.24.

Part "E" of the third session concerns the description of windows. Table IV lists 13 windows and associated data. Windows are characterized by type numbers relating various window thermal characteristics specified during the sixth session (Part "F") to windows listed in Table IV. For each window type the shading device, if any, must be specified as interior or exterior to the building.

The size of each window is determined by its height and width (including sash) assuming rectangular windows. The height above the bottom edge of the surface to which the window belongs or the height above floor is essential to ENCORE-CANADA air infiltration

calculations. Air tightness is specified on a scale between 0 and 4 as in the case of surfaces. The front-end program automatically assigns a value for resistance to air flow and establishes the number of equispaced holes along the window height to represent air leakage.

Part "G" of the third session concerns the description of doors. Table V lists 4 doors and associated data. These are analogous to the window data described above and need no further explanation.

Part "I" of the third session contains miscelleneous information such as

- heating season starting and ending days,
- heating system type code,
- building shape code
  (important to air infiltration calculations),
- terrain code,
- building height,
- building volume,
- interval in year to be processed by ENCORE-CANADA,
- program control variables,
- print control variables.

Most of the above are set automatically in the front-end program and may only be changed manually before an ENCORE-CANADA run. For example, the interval in the year to be processed by ENCORE-CANADA is automatically set to the first ten days of the year, i.e. the simulation starts on day No.1 and ends on day No.10. If the start of the simulation is specified as day 10 and the end as day 1, the program runs through January 1, leaves an eight day gap, and continues with January 10 through December 31. Print control variables are used to suppress ENCORE-CANADA output. Program control variables allow rotation of the building model and manipulation of climatic parameters (e.g. temperature, wind, solar radiation).

The data card images created in Parts "C", "E", "G" and "I" are shown in Appendix I.

Fourth Session (Part "J")

In this session, the user may evaluate the air infiltration characteristics of the building model. The front-end program executes the air infiltration algorithm of ENCORE-CANADA for given indoor/outdoor climatic conditions. The user specifies indoor and outdoor air temperatures, wind speed and direction and atmospheric pressure at ground level. The program returns air

change rate and a host of other air infiltration related information (e.g. indoor pressure at ground level, heat equivalent of air infiltration, air change rate contributions from rooms, walls, windows and doors). An optional detailed output displays neutral pressure levels for each surface and air flow at various heights. The air infiltration characteristics of the model may be obtained for any combination of test conditions.

A fan pressurization test is optional. The user may specify up to 500 cfm of air flow in or out of the building through a fan and obtain corresponding air change rates for the model.

No data card images are generated for ENCORE-CANADA during the fourth session.

Fifth Session (Part "D")

The thermal characteristics of surfaces in Table III are distinguished by five type numbers. Construction details of the five surface types in the example are specified during the fifth session.

The front-end program lists over one hundred materials to choose from. The thermal properties of these materials are stored in the data set LAYERS.OLD [5]. The user may choose the appropriate layers from the list. In the example the layers are as follows

Surface type No. 1 (exterior walls)

- aluminum siding,
- sheathing,
- insulation,
- gypsum board;

Surface type No.2 (partitions)

- gypsum board,
- air space,
- gypsum board;

Surface type No. 3 (roof/ceiling structure)

- asphalt shingles,
- plywood,
- air space between roof and ceiling,
- insulation,
- gypsum board;

Surface type No. 4 (floor/ceiling structure)

- carpeting,
- wood panels,
- air space,
- gypsum board;

Surface type No. 5 (basement walls above ground level)

- concrete,
- insulation,
- gypsum board.

For the layers listed above only the thickness need be given. The thermal resistance of air films and air spaces is computed for the tilt angle, thickness and temperature difference specified by the user. The front-end program automatically computes the Z-transfer function coefficients for each type of surface [3].

If a construction material is not listed, the user may select a layer of material with user defined thermal properties. The new material is automatically appended to the list of materials for future reference.

The data card images created in Part "D" are shown in Appendix I.

Sixth Session (Parts "F" and "H")

The thermal characteristics of windows listed in Table IV are distinguished by two type numbers. Similarly, doors in Table V are distinguished by two type numbers. The U-factor and shading coefficient of two window types and the U-factor and solar

absorptivity of two door types are specified during the sixth session in Parts "F" and "H" respectively.

A list of windows and doors appears on the teletype terminal. The properties of windows are stored in the data set WNDWS.OLD [5], the properties of doors are stored in the data set DOORS.OLD [5]. If a new type is introduced, it is appended to the lists for future reference. If the window U-factor is not known, it is computed by the front-end program based on information from the user.

In the example, window type No.1 is a triple glazed (1/8 inch glass and 3/8 inch air spaces), woodsash casement window. Type No.2 is a double glazed (3/16 inch glass, 2 inch air space) sashless horizontal slider. Neither window type is listed. Their U-factors for average winter conditions are computed by the front-end program.

Door type No.1 is a hollow core wooden door of very low thermal resistance used in partitions. Since it is not among the listed door types, its U-factor and solar absorptivity must be given. In specifying a U-factor of 10 Btu/h ft^2 ^{o}F the fact that these doors are usually kept open is taken into account. Door type No.2 is a 1.75 inch thick steel door with solid urethane foam core (15-th in the list of door types [5]).

The sixth session also includes the description of the below ground portion of the basement, if any. The basement plan may be rectangular or L-shaped. An L-shaped basement consists of a larger and a smaller rectangle of given lengths and widths. The user must specify the thickness of the concrete walls and floor, the level of the floor below ground surface, the length and R-value of wall and floor interior insulation, the type of soil, the extent and depth of average snowcover and the level and temperature of the ground water table. Default values and the range of realistic values for the above quantities are printed on the teletype terminal. The basement data is included among data cards created in Part "H".

At the end of the sixth session the front-end program will have created the following nine data sets for building model No.1 (our example)

DATA.BLDG1A
DATA.BLDG1B
DATA.BLDG1C
DATA.BLDG1D
DATA.BLDG1E
DATA.BLDG1F

DATA.BLDG1G
DATA.BLDG1H
DATA.BLDG1I

A dummy seventh session (Part "K") is designed to prevent accidental erasure of already existing ENCORE-CANADA data sets. In our example reissuing the command BUILD 1 starts Part "K". However, the command BUILD 2 starts Part "A".

The data card images created in Parts "F" and "H" are shown in Appendix I.

RUNNING ENCORE-CANADA

The system command procedure ENCORE is used to run the ENCORE-CANADA program [5]. The parameters of this ccmmand are

- building model number (BLDG=1 for our example),
- city name (CITY=OTTAWA for our example),
- year (YEAR=1971 for our example).

Additional parameters are KEEP, PRNT, DUMP and QUIT which may be omitted. KEEP=ERASE causes the erasure of the weather data file; PRNT=PURGE causes the erasure of the six ENCORE-CANADA output files after they are printed on the line printer; DUMP=CLEAN causes the erasure of the seventh ENCORE-CANADA output file; QUIT=LOGOFF causes automatic disconnection from the computer after execution of ENCORE-CANADA.

The command procedure ENCORE checks the validity of the building model, city name and year requested and issues appropriate messages. It invokes the procedures CREATE, ENCORE1 and EXISTS?. EXISTS? detects the non-existence of any of the data sets DATA.BLDG1A through DATA.BLDG1I. CREATE arranges these data sets in alphabetical order and stores the resulting data set under the name DATA.LOAD1#X. It is this data set which is read by ENCORE-CANADA. The procedure ENCORE1 is responsible for

- restoring non-existent weather data files from tape,
- starting the execution of ENCORE-CANADA,
- printing and erasing input and output data sets.

Typically, an ENCORE-CANADA run of one full day takes from 1 to 3 seconds on an IBM/370 3032 computer, depending on the complexity of the building model. Thus, a full year simulation run may take anywhere from 6 to 18 minutes depending on the

model. The most time consuming part of the program is the air infiltration algoritnm. The user may reduce execution time by reducing the number of holes per surface, window or door in the model. Often such measure has insignificant effect on the accuracy of the results.

ENCORE-CANADA OUTPUT

ENCORE-CANADA produces several separate printed outputs [5]. Any one of these outputs may be suppressed (see variable IPRNT2 in Part "A" and variables IPRNT4, IPRNT5, IPRNT6, IPRNT7 and IDUMP8 in Part "I" of Appendix I). There are individual outputs for

- building input information
  (ENCORE.BLDG1.CITY4.YEAR71.OUTPUT1 in the example [5]);
- weather and solar radiation data (see Appendix II)
  (ENCORE.BLDG1.CITY4.YEAR71.OUTPUT2 in the example [5]);
- heating loads, room temperatures and heating demands for the first nine spaces (see Appendix II)
  (ENCORE.BLDG1.CITY4.YEAR71.OUTPUT3 and
  ENCORE.BLDG1.CITY4.YEAR71.OUTPUT4 in the example [5]);
- basement heat losses (see Appendix II)
  (ENCORE.BLDG1.CITY4.YEAR71.OUTPUT5 in the example [5]);
- air infiltration and furnace operation, if any
  (see Appendix II)
  (ENCORE.BLDG1.CITY4.YEAR71.OUTPUT6 in the example [5]);
- hourly heating demand (optional) tc serve as input to other simulation programs (e.g. solar heating)
  (ENCORE.BLDG1.CITY4.YEAR71.OUTPUT7 in the example [5]);

The output for building input informatica is almost identical to the input data set shown in Appendix I. The differences are as follows

- all quantities are given in British units;
- occupancy ("O"), constant light ("C"), variable light ("V") and appliance and equipment ("E") schedules are given as hourly rates of heat input in Btu/h; hot water consumption ("A") schedules are given as hourly values of hot water used in imperial gallons. For a bar-chart type plot of two schedules see Appendix III;

- surface areas (WALLA) are given as net areas (i.e. minus windows and doors), and surface heights (AH) are heights projected on the vertical;
- the level of window (WL) and door (DL) bottom edges are given relative to ground level;
- the air leakage resistances, associated exponents for air flow and the number of holes used to model air leakage through surfaces (RES, EX, NAC), windows (WRES, WEX, NWC) and doors (DRES, DEX, NDC) are the ones computed or assigned by the conversational front-end program.

The output for weather and solar radiation data is an hour by hour display of

- dry-bulb temperature (TOF),
- cloud amount (ICLC),
- wind speed (W),
- wind direction (WDIR),
- atmospheric pressure at ground level (P),
- direct normal solar radiation (DN),
- total amount of direct solar radiation intercepted by the building envelope (TOTDIR),
- total amount of diffuse solar radiation intercepted by the building envelope (TOTDIF).

The three solar radiation quantities are computed values, the other weather related quantities are observed values. For a plot of the outdoor temperature, wind speed and direct normal radiation see Appendix III.

The output for heating loads, room temperatures and heating demands is an hour by hour display of

- total heating/cooling load (TRMQ0) based on an indoor reference temperature which is 70°F for electric heating and is a temperature based on thermostat setpoint schedules for oil heating;
- heating/cooling load contributions by
  - basement floor (QF),
  - basement walls (QW),
  - exterior surfaces (TGW0),
  - exterior doors (TGD0),
  - windows (TGQ0),
  - air infiltration when furnace is on (QON),
  - air infiltration when furnace is off (QOFF),
  - occupancy (TGO0),
  - appliances and equipment (TGE0),
  - hot water (TGR0),

lighting (TGLO),
given as a percentage of the total heating/cooling load (TRMQO). For electric heating QOFF represents the air infiltration load and QCN is set to 0.0;
- total heating demand based on computed room temperature(s), i.e. heating demand as seen by the heating unit(s) (TERO);
- percent contribution to total heating demand by the first nine interior spaces (PRO(1-9)) and space air temperatures (RMT(1-9)).

The printed output appears in two parts if there are more than three interior spaces (see OUTPUT3 and OUTPUT4 in Appendix II). Since some quantities appear as percentages of an algebraic total, it may happen that when the total is very small, the percentage is very high and exceeds the print format specifications. In such situations asterisks are printed in the output (see Appendix II).

The output for basement heat losses is a line printer plot of the basement floor, walls and total heat losses at time intervals specified by the user in Part "I" of the ENCORE-CANADA input data set (see the variable IPRNT6).

The output for air infiltration and furnace operation is an hour by hour display of

- mean on-cycle flue gas temperature (ONT),
- mean off-cycle flue gas temperature (OFFT),
- furnace efficiency (ETA),
- furnace load factor (FLF),
- number of burner cycles per hour (CCS),
- indoor atmospheric pressure on ground level when the furnace is on (PON),
- indoor atmospheric pressure on ground level when the furnace is off (POFF),
- chimney gas flow when the furnace is on (GCHON),
- chimney gas flow when the furnace is off (GCHOFF),
- air changes per hour when the furnace is on (VOLON),
- air changes per hour when the furnace is off (VOLOFF),
- total air changes per hour (VOLTOT),
- air infiltration heating load when the furnace is on (QON),
- air infiltration heating load when the furnace is off (QOFF).

For an electrically heated building the first five furnace operation related quantities listed above are set to 0.0 in the output. The same is true for the gas flows in the chimney, the air changes per hour and the air infiltration load when the furnace is on.

The optional output of hourly heating demand is not printed. This output contains a header with the title of the problem followed by day sequence numbers, hours of the day and the corresponding total heating demands (TERO). It is intended to serve as input to other simulation programs where hourly heating demand is a required input.

PLOTTING THE RESULTS

A conversational plotting program is available [5] to facilitate the interpretation of ENCORE-CANADA results. The plotting program is invoked by the ECPLOT command procedure [5]. This command enables the user to plot ENCORE-CANADA output data easily on a HP 7221 plotter. The parameters of the ECPLOT command are

- building model number (BLDG=1 for our example),
- city name (CITY=OTTAWA for our example),
- year (YEAR=1971 for our example).

Thus the command ECPLOT 1,OTTAWA,1971, for example, performs the following three functions

a) It checks the validity of the three input parameters and if they are acceptable, it invokes automatically the ECPLOT1 command procedure.

b) By invoking the ECPLCT1 procedure, it executes a Spitbol program (SPITBOL.ENCR [5]) which reformats the line printer output data sets of ENCORE-CANADA. Datasets ENCORE.BLDG1.CITY4.YEAR71.OUTPUTn (n=1,2,3,4,6) are read and data sets ENCORE.BLDG1.CITY4.YEAR71.RDATAn (n=1,2,3,4,6) are created. This function is omitted if the data sets have already been created by a previous ECPLOT command.

c) It sets up an environment in Speakeasy for plotting the data. The data sets ENCORE.BLDG1.CITY4.YEAR71.RDATAn (n=1,2,3,4,6) are read into Speakeasy and plots requested by the user are drawn on a HP 7221 plotter by the Speakeasy program PLOTPGM. The Speakeasy compiler uses DISSPLA plotting software.

A partial set of ENCORE-CANADA plotted output for the example is included in Appendix III.

CONTINUOUS DEVELOPMENT

The ENCORE-CANADA program and associated weather and solar radiation data tapes, the conversational front-end and plotting programs steadily evolved since work began on the ENCORE program in 1975. This report represents the state of the programs as of the end of 1979. Since new methods of calculation are continuously introduced, the above programs must be updated accordingly in the future. There are several known potential areas of improvement (including methodology, versatility, presentation and evaluation) such as

a) improved basement heat loss prediction;
b) more accurate calculation procedures for solar heat gain through windows and the inclusion of the effects of overhangs, shadows from surrounding structures and geographical features;
c) more accurate wind pressure coefficients for air infiltration calculations;
d) experimentally determined room Z-transfer function coefficients;
e) enlargement of the weather and solar radiation data base;
f) conversion routines to change all ENCORE-CANADA output variables to metric units;
g) validation of ENCORE-CANADA results with measurements.

Continuous development is an assurance that ENCORE-CANADA will remain a powerful, up-to-date and versatile research tool for building energy use studies.

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This computer program description is a contribution from the Division of Building Research, National Research Council of Canada and is published with the approval of the Director of the Division.

REFERENCES

[1] KONRAD, A. and LARSEN, B. T. 1978. "Encore-Canada: Computer Program for the Study of Energy Consumption of Residential Buildings in Canada," Proceedings of Third International Symposium on the Use of Computers for Environmental Engineering Related to Buildings, Banff, Alberta, Canada, May 10-12, 1978, pp. 439-450 (DBR Paper No.859, NRCC 17663).

[2] KONRAD, A., LARSEN, B. T. and SHAW, C. Y. 1978. "Programmed Computer Model of Air Infiltration in Small Residential Buildings with Oil Furnace," Proceedings of Third International Symposium on the Use of Computers for Environmental Engineering Related to Buildings, Banff, Alberta, Canada, May 10-12, 1978, pp. 637-644 (DBR Paper No.860, NRCC 17664).

[3] MITALAS, J. P. and ARSENAULT, J. G. 1972. "FORTRAN IV Program to Calculate Z-transfer Functions for the Calculation of Transient Heat Transfer through Walls and Roofs," National Research Council of Canada, Division of Building Research, Computer Program No.33, Ottawa.

(4) KONRAD, A. 1979. "ENCORE-CANADA Program Listing,"[1*]. Division of Building Research, National Research Council of Canada, Ottawa, Ontario, Canada, K1A 0R6.

(5) KONRAD, A. 1979. "ENCORE-CANADA Example,"[2*]. Division of Building Research, National Research Council of Canada, Ottawa, Ontario, Canada, K1A 0R6.

(6) KONRAD, A. 1979. "ENCORE-CANADA Conversational Front-End Program Listing,"[1*]. Division of Building Research, National Research Council of Canada, Ottawa, Ontario, Canada, K1A 0R6.

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[1] This is a complete listing of the Fortran IV compilation.

[2] This is a complete session at the computer terminal showing the example described in this publication. In addition, it contains the complete ENCORE-CANADA printed and plotted outputs, the listing of the four permanent datasets used with the conversational front-end program, the listing of the plotting programs and all the system command procedures (procdefs) used to run the programs.

*It is planned to make the documents cited in References 4, 5, and 6 available on microfiche. Information concerning price, procedure for ordering, and date of availability in this form can be obtained by writing to: Publications Section, Division of Building Research, National Research Council of Canada, Ottawa, Ontario, K1A 0R6.

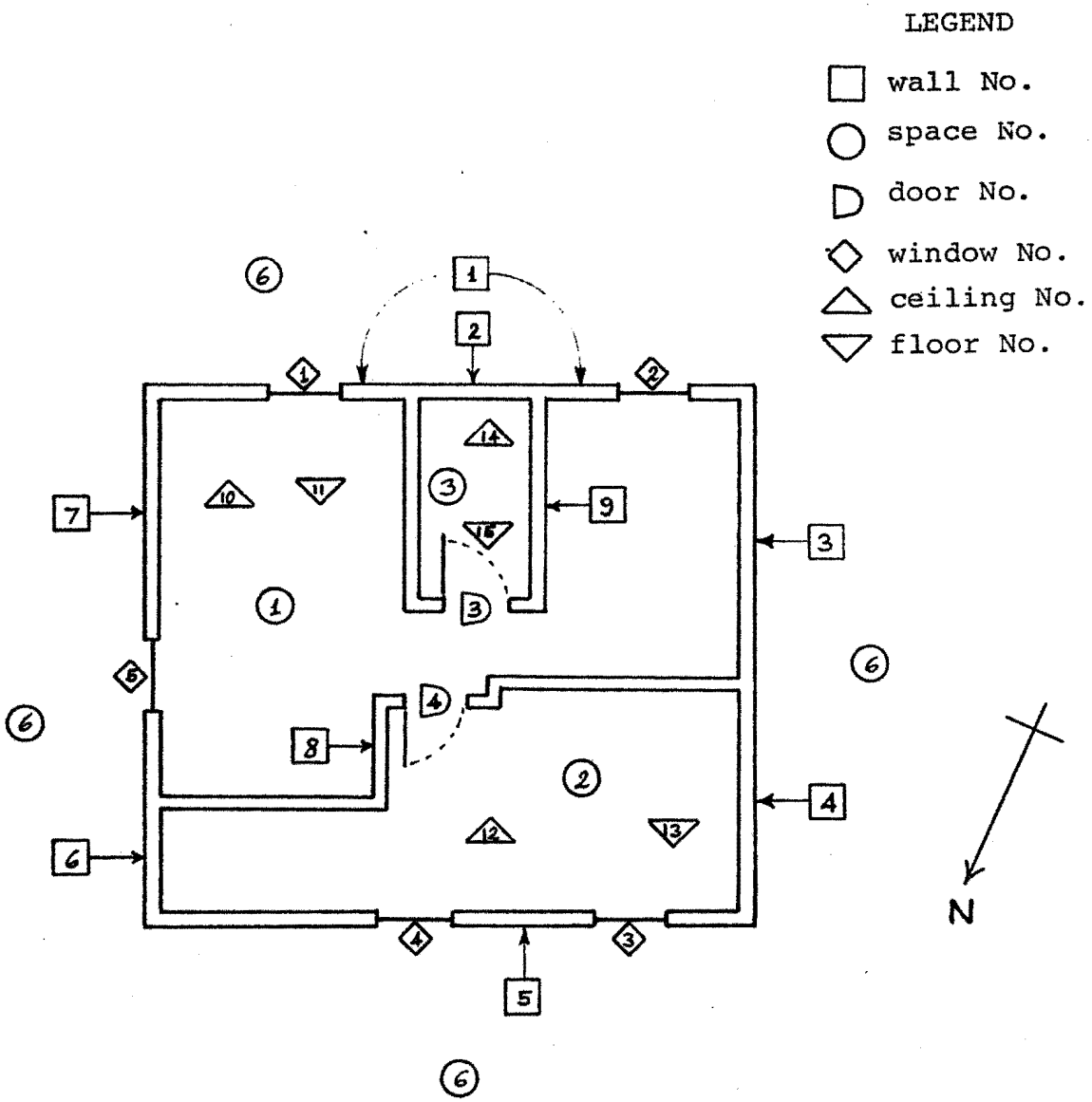

Figure 1 Second floor plan of house used in the example

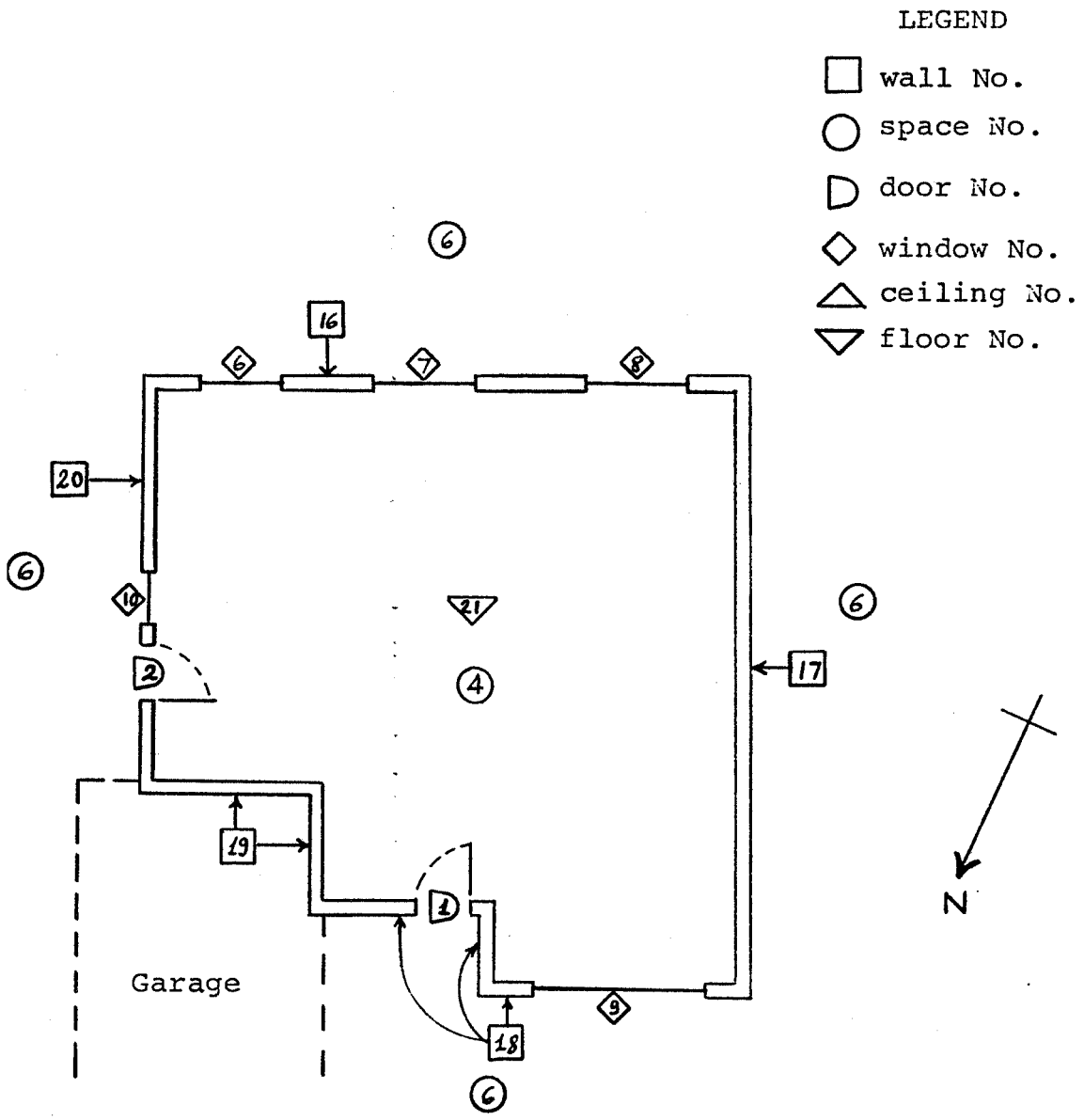

Figure 2 First floor plan of house used in the example

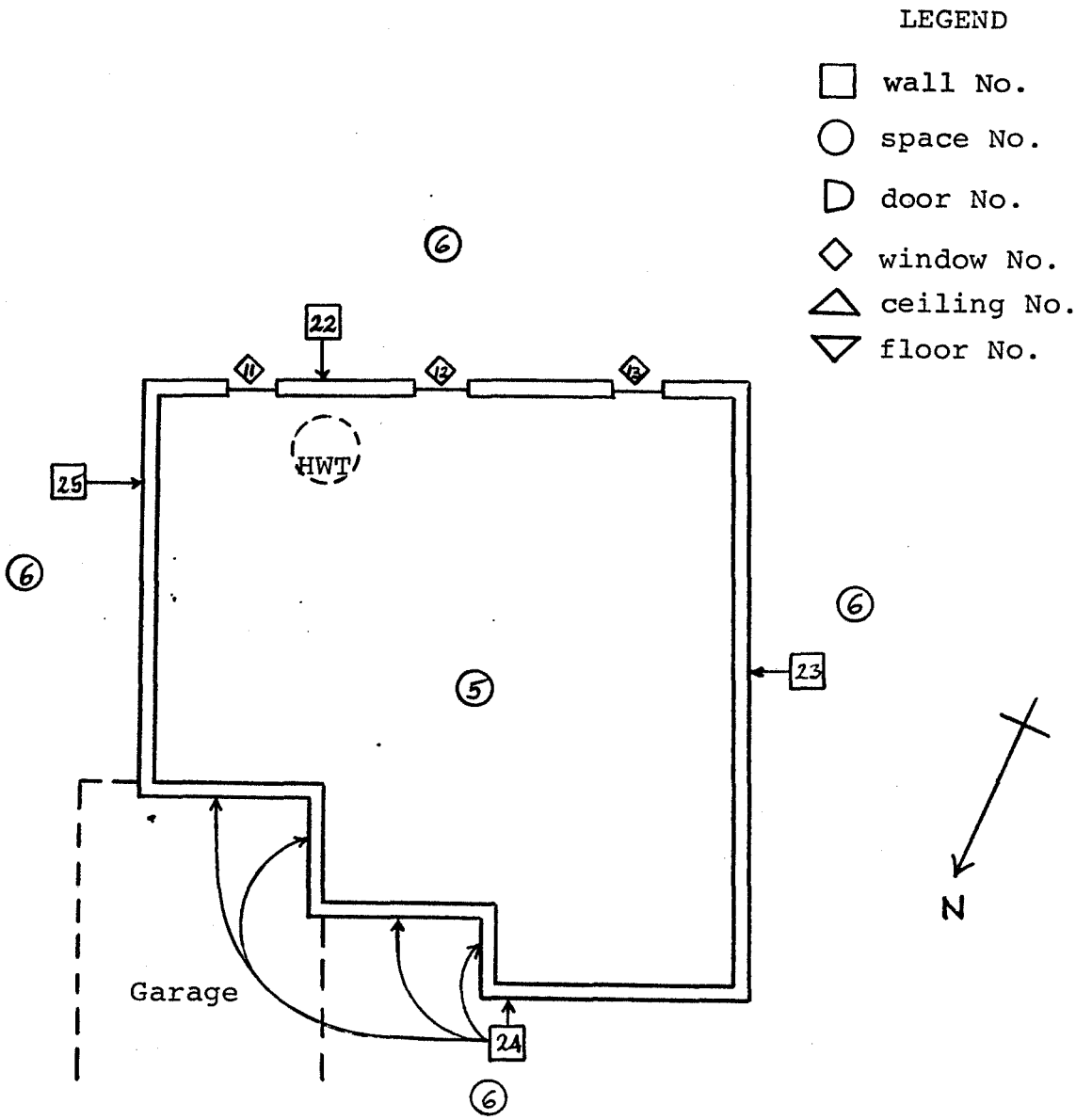

Figure 3 Basement floor plan (above grade) of house used in the example

Table I List of spaces and related data for the example

Space number	Space interior perimeter (ft)	Space interior floor area (sq.ft)	Thermostat band in Rankine degrees	Capacity of space heaters (Watts)	Schedule numbers associated with spaces												Description of space
					[T]		[O]		[C]		[V]		[E]		[A]		
					[w]	[h]	[w]	[h]	[w]	[h]	[w]	[h]	[w]	[h]	[w]	[h]	
1	98	342	1	3000	1	1	1	2	1	1	1	2	1	1	1	1	bedrooms
2	73	249	1	3000	1	1	3	4	1	1	3	4	1	1	1	1	bedroom
3	26	40	1	1000	1	1	5	6	1	1	5	6	2	3	2	3	bathroom
4	105	667	1	6000	1	1	7	8	1	1	7	8	4	5	4	5	1st floor
5	105	667	1	2000	1	1	9	9	1	1	9	9	6	1	6	1	basement
6	---	---	-	----	-	-	-	-	-	-	-	-	-	-	-	-	outside
7	---	---	-	----	-	-	-	-	-	-	-	-	-	-	-	-	outside

[T] Thermostat setpoint schedule numbers
[O] Occupancy schedule numbers
[C] Constant light schedule numbers
[V] Variable light schedule numbers
[E] Appliance and equipment schedule numbers
[A] Hot water consumption schedule numbers
[w] Working day schedule numbers
[h] Holiday schedule numbers

Table IIa

Thermostat setpoint

Schedule No. 1

hour	des.F
1	68
2	68
3	68
4	68
5	68
6	68
7	68
8	72
9	72
10	72
11	72
12	72
13	72
14	72
15	72
16	72
17	72
18	72
19	72
20	72
21	72
22	68
23	68
24	68

Table IIb

Occupancy

Schedule Nos. 1 to 9

Occupancy schedule No.1			
hour	number	type	activity level
1	3	c	0.0
2	3	c	0.0
3	3	c	0.0
4	3	c	0.0
5	3	c	0.0
6	3	c	0.0
7	-	-	---
8	-	-	---
9	-	-	---
10	1 1	c a	2.0 2.0
11	-	-	---
12	-	-	---
13	-	-	---
14	-	-	---
15	1	c	0.0
16	1	c	0.0
17	-	-	---
18	-	-	---
19	-	-	---
20	1	c	0.0
21	3	c	0.0
22	3	c	0.0
23	3	c	0.0
24	3	c	0.0

type 'a' is an adult;

Occupancy schedule No.2			
hour	number	type	activity level
1	3	c	0.0
2	3	c	0.0
3	3	c	0.0
4	3	c	0.0
5	3	c	0.0
6	3	c	0.0
7	3	c	0.0
8	3	c	0.0
9	-	-	---
10	-	-	---
11	1 1	c a	2.0 2.0
12	1 1	c a	2.0 2.0
13	-	-	---
14	-	-	---
15	2	c	2.0
16	2	c	2.0
17	-	-	---
18	-	-	---
19	-	-	---
20	1	c	0.0
21	1	c	0.0
22	3	c	0.0
23	3	c	0.0
24	3	c	0.0

type 'c' is a child;

Occupancy schedule No.3			
hour	number	type	activity level
1	2	a	0.0
2	2	a	0.0
3	2	a	0.0
4	2	a	0.0
5	2	a	0.0
6	2	a	0.0
7	2	a	0.0
8	-	-	---
9	-	-	---
10	-	-	---
11	1 1	c a	2.0 2.0
12	-	-	---
13	-	-	---
14	-	-	---
15	1	a	0.0
16	-	-	---
17	-	-	---
18	-	-	---
19	-	-	---
20	-	-	---
21	-	-	---
22	-	-	---
23	-	-	---
24	2	a	0.0

type 'p' is a pet

Table IIb - continued

Occupancy schedule No.4			
hour	number	type	activity level
1	2	a	0.0
2	2	a	0.0
3	2	a	0.0
4	2	a	0.0
5	2	a	0.0
6	2	a	0.0
7	2	a	0.0
8	1	a	0.0
9	1	a	0.0
10	-	-	---
11	1	a	2.0
12	-	-	---
13	-	-	---
14	-	-	---
15	-	-	---
16	-	-	---
17	-	-	---
18	-	-	---
19	2	a	2.0
20	-	-	---
21	-	-	---
22	-	-	---
23	-	-	---
24	-	-	---

type 'a' is an adult;

Occupancy schedule No.5			
hour	number	type	activity level
1	-	-	---
2	-	-	---
3	-	-	---
4	-	-	---
5	-	-	---
6	-	-	---
7	-	-	---
8	1 1	c a	2.0 2.0
9	-	-	---
10	-	-	---
11	-	-	---
12	1	a	2.0
13	-	-	---
14	-	-	---
15	-	-	---
16	-	-	---
17	-	-	---
18	-	-	---
19	-	-	---
20	1	c	2.0
21	-	-	---
22	-	-	---
23	1	a	2.0
24	-	-	---

type 'c' is a child;

Occupancy schedule No.6			
hour	number	type	activity level
1	-	-	---
2	-	-	---
3	-	-	---
4	-	-	---
5	-	-	---
6	-	-	---
7	-	-	---
8	1	c	2.0
9	-	-	---
10	1 1	c a	2.0 2.0
11	-	-	---
12	-	-	---
13	-	-	---
14	-	-	---
15	-	-	---
16	-	-	---
17	-	-	---
18	-	-	---
19	-	-	---
20	1 1	c a	2.0 2.0
21	-	-	---
22	-	-	---
23	-	-	---
24	-	-	---

type 'p' is a pet

Table IIb - continued

Occupancy schedule No.7			
hour	number	type	activity level
1	-	-	---
2	-	-	---
3	-	-	---
4	-	-	---
5	-	-	---
6	-	-	---
7	-	-	---
8	3 2	c a	3.0 3.0
9	-	-	---
10	-	-	---
11	-	-	---
12	-	-	---
13	1	a	2.0
14	1	a	2.0
15	-	-	---
16	-	-	---
17	1	a	2.0
18	3 1 1	c a a	2.0 2.0 2.5
19	3 1 1	c a a	2.0 2.0 2.5
20	3 1 1	c a a	2.0 2.0 2.5
21	1 1	a a	2.0 2.5
22	1 1	a a	2.0 2.5
23	1 1	a a	2.0 2.5
24	-	-	---

Occupancy schedule No.8			
hour	number	type	activity level
1	-	-	---
2	-	-	---
3	-	-	---
4	-	-	---
5	-	-	---
6	-	-	---
7	-	-	---
8	1	a	2.5
9	3 1	c a	2.0 2.5
10	3 1 1	c a a	2.0 2.0 2.5
11	3 1 1	c a a	2.0 2.0 2.5
12	3 1 1	c a a	2.0 2.0 2.5
13	-	-	---
14	-	-	---
15	3 2	c a	2.0 2.0
16	3 2	c a	2.0 2.0
17	3 2	c a	2.0 2.0
18	3 1	c a	2.0 2.0
19	3 1	c a	2.0 2.0
20	3 1	c a	2.0 2.0
21	-	-	---
22	-	-	---
23	-	-	---
24	-	-	---

Occupancy schedule No.9			
hour	number	type	activity level
1	-	-	---
2	-	-	---
3	-	-	---
4	-	-	---
5	-	-	---
6	-	-	---
7	-	-	---
8	-	-	---
9	-	-	---
10	-	-	---
11	-	-	---
12	-	-	---
13	-	-	---
14	-	-	---
15	-	-	---
16	-	-	---
17	-	-	---
18	-	-	---
19	-	-	---
20	-	-	---
21	-	-	---
22	-	-	---
23	-	-	---
24	-	-	---

type 'a' is an adult; type 'c' is a child; type 'p' is a pet

Table IIc

Constant light

Schedule No. 1

hour	number	power rating (W)
1	-	---
2	-	---
3	-	---
4	-	---
5	-	---
6	-	---
7	-	---
8	-	---
9	-	---
10	-	---
11	-	---
12	-	---
13	-	---
14	-	---
15	-	---
16	-	---
17	-	---
18	-	---
19	-	---
20	-	---
21	-	---
22	-	---
23	-	---
24	-	---

Variable light schedule No.1		
hour	number	power rating (W)
1	-	---
2	-	---
3	-	---
4	-	---
5	-	---
6	-	---
7	3	60
8	3	60
9	-	---
10	-	---
11	-	---
12	-	---
13	-	---
14	-	---
15	-	---
16	-	---
17	3	60
18	3	60
19	3	60
20	3	60
21	1	60
22	1	60
23	1	60
24	-	---

Variable light schedule No.2		
hour	number	power rating (W)
1	-	---
2	-	---
3	-	---
4	-	---
5	-	---
6	-	---
7	3	60
8	3	60
9	-	---
10	-	---
11	-	---
12	-	---
13	-	---
14	-	---
15	-	---
16	-	---
17	-	---
18	-	---
19	3	60
20	3	60
21	3	60
22	1	60
23	1	60
24	1	60

Variable light schedule No.7		
hour	number	power rating (W)
1	-	---
2	-	---
3	-	---
4	-	---
5	-	---
6	-	---
7	2	60
8	2	60
9	-	---
10	-	---
11	-	---
12	-	---
13	-	---
14	-	---
15	-	---
16	-	---
17	2	60
18	2	60
19	2	60
20	-	---
21	-	---
22	-	---
23	-	---
24	-	---

Table IId Variable Light -- Schedule Nos. 1 to 9

Variable light schedule No.4		
hour	number	power rating (W)
1	-	---
2	-	---
3	-	---
4	-	---
5	-	---
6	-	---
7	2	60
8	2	60
9	-	---
10	-	---
11	-	---
12	-	---
13	-	---
14	-	---
15	-	---
16	-	---
17	-	---
18	-	---
19	2	60
20	2	60
21	-	---
22	-	---
23	-	---
24	2	60

Variable light schedule No.5		
hour	number	power rating (W)
1	1	60
2	1	60
3	1	60
4	1	60
5	1	60
6	1	60
7	1	60
8	1	60
9	1	60
10	1	60
11	1	60
12	1	60
13	1	60
14	1	60
15	1	60
16	1	60
17	1	60
18	1	60
19	1	60
20	1	60
21	1	60
22	1	60
23	1	60
24	1	60

Variable light schedule No.6		
hour	number	power rating (W)
1	1	60
2	1	60
3	1	60
4	1	60
5	1	60
6	1	60
7	1	60
8	1	60
9	1	60
10	-	---
11	-	---
12	-	---
13	-	---
14	-	---
15	-	---
16	1	60
17	1	60
18	1	60
19	1	60
20	1	60
21	1	60
22	1	60
23	1	60
24	1	60

Variable light schedule No.7		
hour	number	power rating (W)
1	-	---
2	-	---
3	-	---
4	-	---
5	-	---
6	1	150
7	1 2	150 60
8	1	150
9	-	---
10	-	---
11	-	---
12	-	---
13	-	---
14	-	---
15	-	---
16	-	---
17	1	150
18	1 5	150 60
19	5	60
20	4	60
21	4	60
22	4	60
23	4	60
24	-	---

Variable light schedule No.8		
hour	number	power rating (W)
1	-	---
2	-	---
3	-	---
4	-	---
5	-	---
6	1	150
7	1 2	150 60
8	1 2	150 60
9	-	---
10	-	---
11	-	---
12	-	---
13	-	---
14	-	---
15	-	---
16	-	---
17	1	150
18	1 5	150 60
19	5	60
20	5	60
21	5	60
22	3	60
23	3	60
24	3	60

Variable light schedule No.9		
hour	number	power rating (W)
1	-	---
2	-	---
3	-	---
4	-	---
5	-	---
6	-	---
7	-	---
8	-	---
9	-	---
10	1	100
11	1	100
12	-	---
13	-	---
14	-	---
15	-	---
16	-	---
17	-	---
18	-	---
19	2	100
20	2	100
21	2	100
22	-	---
23	-	---
24	-	---

Table IId - continued

Table IIe

Appliance and Equipment

Schedule Nos. 1 to 6

Appliance and equipment schedule No.1		
hour of the day	number of minutes in use	device power rating (W)
1	--	----
2	--	----
3	--	----
4	--	----
5	--	----
6	--	----
7	--	----
8	--	----
9	--	----
10	--	----
11	--	----
12	--	----
13	--	----
14	--	----
15	--	----
16	--	----
17	--	----
18	--	----
19	--	----
20	--	----
21	--	----
22	--	----
23	--	----
24	--	----

Appliance and equipment schedule No.2		
hour of the day	number of minutes in use	device power rating (W)
1	--	----
2	--	----
3	--	----
4	--	----
5	--	----
6	--	----
7	--	----
8	20	300
9	20	300
10	--	----
11	--	----
12	--	----
13	--	----
14	--	----
15	--	----
16	--	----
17	--	----
18	--	----
19	--	----
20	--	----
21	--	----
22	--	----
23	30	300
24	--	----

Appliance and equipment schedule No.3		
hour of the day	number of minutes in use	device power rating (W)
1	--	----
2	--	----
3	--	----
4	--	----
5	--	----
6	--	----
7	--	----
8	--	----
9	20	300
10	20	700
11	--	----
12	--	----
13	--	----
14	--	----
15	--	----
16	--	----
17	20	300
18	20	500
19	--	----
20	--	----
21	--	----
22	--	----
23	--	----
24	--	----

Table IIe - continued

Appliance and equipment schedule No.4		
hour of the day	number of minutes in use	device power rating (W)
1	10	500
2	10	500
3	10	500
4	10	500
5	10	500
6	10	500
7	20 20	500 2000
8	20 20	500 2000
9	20	500
10	10	500
11	10	500
12	15	500
13	10	500
14	10	500
15	10	500
16	15 20	500 2000
17	20 40	500 2000
18	20 20	500 2000
19	20 60	500 300
20	10 60	500 300
21	10 60	500 300
22	10 45	500 300
23	10 45	500 300
24	10	500

Appliance and equipment schedule No.5		
hour of the day	number of minutes in use	device power rating (W)
1	10	500
2	10	500
3	10	500
4	10	500
5	10	500
6	10	500
7	10	500
8	15 20	500 2000
9	20 20	500 2000
10	15	500
11	10	500
12	15	500
13	15	500
14	10	500
15	10	500
16	10	500
17	20 20	500 2000
18	20 40	500 2000
19	15 20	500 2000
20	10 60	500 400
21	10 60	500 400
22	10 45	500 300
23	10 45	500 300
24	10 45	500 300

Appliance and equipment schedule No.6		
hour of the day	number of minutes in use	device power rating (W)
1	--	----
2	--	----
3	--	----
4	--	----
5	--	----
6	--	----
7	--	----
8	--	----
9	--	----
10	30	5000
11	30	5000
12	--	----
13	--	----
14	--	----
15	--	----
16	--	----
17	--	----
18	--	----
19	--	----
20	--	----
21	--	----
22	--	----
23	--	----
24	--	----

hot water consumption schedule No.1		
hour of the day	number of minutes in use	tap flow rate (IGPM)
1	--	----
2	--	----
3	--	----
4	--	----
5	--	----
6	--	----
7	--	----
8	--	----
9	--	----
10	--	----
11	--	----
12	--	----
13	--	----
14	--	----
15	--	----
16	--	----
17	--	----
18	--	----
19	--	----
20	--	----
21	--	----
22	--	----
23	--	----
24	--	----

hot water consumption schedule No.2		
hour of the day	number of minutes in use	tap flow rate (IGPM)
1	--	----
2	--	----
3	--	----
4	--	----
5	--	----
6	--	----
7	16	2.2
8	11	2.2
9	1	2.2
10	--	----
11	--	----
12	--	----
13	1	2.2
14	--	----
15	--	----
16	1	2.2
17	--	----
18	1	2.2
19	--	----
20	1	2.2
21	--	----
22	5	2.2
23	--	----
24	--	----

hot water consumption schedule No.3		
hour of the day	number of minutes in use	tap flow rate (IGPM)
1	--	----
2	--	----
3	--	----
4	--	----
5	--	----
6	--	----
7	--	----
8	1	2.2
9	10	2.2
10	--	----
11	--	----
12	--	----
13	1	2.2
14	--	----
15	--	----
16	1	2.2
17	--	----
18	1	2.2
19	15	2.2
20	--	----
21	--	----
22	--	----
23	1	2.2
24	--	----

hot water consumption schedule No.4		
hour of the day	number of minutes in use	tap flow rate (IGPM)
1	--	----
2	--	----
3	--	----
4	--	----
5	--	----
6	--	----
7	1	2.0
8	2	4.1
9	--	----
10	--	----
11	--	----
12	1	2.0
13	2	4.1
14	--	----
15	--	----
16	--	----
17	--	----
18	1	2.0
19	2	4.1
20	--	----
21	--	----
22	--	----
23	--	----
24	--	----

hot water consumption schedule No.5		
hour of the day	number of minutes in use	tap flow rate (IGPM)
1	--	----
2	--	----
3	--	----
4	--	----
5	--	----
6	--	----
7	--	----
8	1	2.0
9	2	4.1
10	--	----
11	--	----
12	1	2.0
13	2	4.1
14	--	----
15	1	4.1
16	--	----
17	--	----
18	1	2.0
19	2	4.1
20	--	----
21	--	----
22	--	----
23	--	----
24	--	----

hot water consumption schedule No.6		
hour of the day	number of minutes in use	tap flow rate (IGPM)
1	--	----
2	--	----
3	--	----
4	--	----
5	--	----
6	--	----
7	--	----
8	--	----
9	5	2.0
10	5	2.0
11	--	----
12	--	----
13	--	----
14	--	----
15	--	----
16	--	----
17	--	----
18	--	----
19	--	----
20	--	----
21	--	----
22	--	----
23	--	----
24	--	----

Table IIf - Hot Water Consumption, Schedule Nos. 1 to 6

Table III

List of Surfaces and Related Data for the Example

Surface number	Spaces separated by the surface		Surface type number	Surface height or length (ft)	Surface width (ft)	Surface bottom height above ground (ft)	Surface tilt angle (deg.)	Surface azimuth angle (deg.)	Surface air tightness	Number of windows in this surface	Number of doors in this surface	Description of the surface	
	Space number	Space number										Surface location	Surface orientation
1	1	6	1	7.5	15.7	10	90	156	1	2	0	2nd fl.	South
2	3	6	1	7.5	5	10	90	156	1	0	0	2nd fl.	South
3	1	6	1	7.5	12.5	10	90	246	1	0	0	2nd fl.	West
4	2	6	1	7.5	10.1	10	90	246	1	0	0	2nd fl.	West
5	2	6	1	7.5	25	10	90	336	1	2	0	2nd fl.	North
6	2	6	1	7.5	5	10	90	66	1	0	0	2nd fl.	East
7	1	6	1	7.5	18	10	90	66	1	1	0	2nd fl.	East
8	1	2	2	7.5	29	--	---	---	-	-	1	2nd fl.	partition
9	3	1	2	7.5	18	--	---	---	-	-	1	2nd fl.	partition
10	1	7	3	13.7	25	17.5	20	156	2	0	0	roof	South
11	1	4	4	13.7	25	--	---	---	-	-	0	1st fl.	ceiling
12	2	7	3	10	25	17.5	20	336	2	0	0	roof	North
13	2	4	4	10	25	--	---	---	-	-	0	1st fl.	ceiling
14	3	7	3	8	5	17.5	20	156	2	0	0	roof	South
15	3	4	4	8	5	--	---	---	-	-	0	1st fl.	ceiling
16	4	6	1	8	25	2	90	156	1	3	0	1st fl.	South
17	4	6	1	8	27	2	90	246	1	0	0	1st fl.	West
18	4	6	1	8	22	2	90	336	1	1	1	1st fl.	North
19	4	6	1	8	12	2	180	---	1	0	0	1st fl.	garage wall
20	4	6	1	8	17	2	90	66	1	1	1	1st fl.	East
21	4	5	4	26.7	25	-	---	---	-	-	0	basement	ceiling
22	5	6	5	2	25	0	90	156	0	3	0	basement	South
23	5	6	5	2	27	0	90	246	0	0	0	basement	West
24	5	6	5	2	34	0	90	336	0	0	0	basement	North
25	5	6	5	2	17	0	90	66	0	0	0	basement	East

Table IV

List of Windows and Related Data for the Example

Window number	Window type number	Window height (ft)	Window width (ft)	Window bottom height above floor (ft)	Window air tightness	Window horizontal cross-bars		Window vertical cross-bars		Window location surface number	Window orientation
						no.	length (ft)	no.	length (ft)		
1	1	4.7	2	1	1	0	0	0	0	1	South
2	1	4.7	2	1	1	0	0	0	0	1	South
3	1	3	4.5	3.5	2	1	4.5	0	0	5	North
4	1	3	4.5	3.5	2	1	4.5	0	0	5	North
5	1	3	3.5	3.5	2	0	0	1	3	7	East
6	1	3.5	3	3.5	2	0	0	1	3.5	16	South
7	1	3.5	3	3	2	0	0	1	3.5	16	South
8	1	3.5	3	3	2	0	0	1	3.5	16	South
9	1	5	7	2	1	1	7	2	5	18	North
10	1	2.5	2	3.5	2	0	0	1	2.5	20	East
11	2	1.5	2.5	0	3	0	0	1	1.5	22	South
12	2	1.5	2.5	0	3	0	0	1	1.5	22	South
13	2	1.5	2.5	0	3	0	0	1	1.5	22	South

Note: Both window type No.1 and window type No.2 are windows without shading devices

Table V

List of Doors and Related Data for the Example

Door number	Door type number	Door height (ft)	Door width (ft)	Door bottom height above floor (ft)	Door air tightness	Door location surface number	Door orientation
1	1	7	2.8	-	-	8	-----
2	1	7	2.8	-	-	9	-----
3	2	7	2.8	0	1	18	North
4	2	7	2.8	0	1	20	East

APPENDIX I

Output from the Conversational Front-End Program;
Complete ENCORE-CANADA Input Data for the Example

THE FOLLOWING DATA CARD IMAGES HAVE BEEN CREATED

PART "A"

```
****** TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE ******
     0      IPRNT2: INPUT DATA PRINTED IF 0. NOT PRINTED IF 1
     5      NROOM : NO. OF SPACES
TABLE( 1) IROOM : SPACE NO.
TABLE( 2) IRC   : WEIGHT CODE FOR TYPE OF CONSTRUCTION (1-4)
TABLE( 3) PERIM : SPACE INTERIOR PERIMETER  (FT)
TABLE( 4) FLAREA: SPACE INTERIOR FLOOR AREA (FT**2)
TABLE( 5) TRANGE: THERMOSTAT BAND (R DEGREES)
TAB_E( 6) ERMAX : MAX. OUTPUT OF SPACE HEATING UNIT(S) (BTU/H)
TABLE( 7) NO(,1): OCCUPANCY SCHEDULE NO. FOR WORKING DAYS
TABLE( 8) NO(,2): OCCUPANCY SCHEDULE NO. FOR HOLIDAYS
TABLE( 9) NC(,1): CONSTANT LIGHT SCHEDULE NO. FOR WORKING DAYS
TABLE(10) NC(,2): CONSTANT LIGHT SCHEDULE NO. FOR HOLIDAYS
TABLE(11) NV(,1): VARIABLE LIGHT SCHEDULE NO. FOR WORKING DAYS
TAB_E(12) NV(,2): VARIABLE LIGHT SCHEDULE NO. FOR HOLIDAYS
TABLE(13) NE(,1): APPL. & EQUIP. SCHEDULE NO. FOR WORKING DAYS
TAB_E(14) NE(,2): APPL. & EQUIP. SCHEDULE NO. FOR HOLIDAYS
  3LE(15) NT(,1): THERMO. SETPT. SCHEDULE NO. FOR WORKING DAYS
  3LE(16) NT(,2): THERMO. SETPT. SCHEDULE NO. FOR HOLIDAYS
TABLE(17) NA(,1): HOT WATER CON. SCHEDULE NO. FOR WORKING DAYS
TABLE(18) NA(,2): HOT WATER CON. SCHEDULE NO. FOR HOLIDAYS
 1  1    98.00   342.00 1.0 10236.4  1  2  1  1  1  2  1  1  1  1  1  1
 2  1    73.00   249.00 1.0 10236.4  3  4  1  1  3  4  1  1  1  1  1  1
 3  1    26.00    40.00 1.0  3412.1  5  6  1  1  5  6  2  3  1  1  2  3
 4  1   105.00   657.00 1.0 20472.8  7  8  1  1  7  8  4  5  1  1  4  5
 5  1   105.00   657.00 1.0  6824.3  9  9  1  1  9  9  6  1  1  1  6  1
     2      NCTP  : NO. OF OUTSIDE PRESSURE POINTS
     2      ICTP  : NO. 1 OUTSIDE PRESS. PT. CODE; EXTERIOR SPACE NO. 6
     3      ICTP  : NO. 2 OUTSIDE PRESS. PT. CODE; EXTERIOR SPACE NO. 7
```

PART "B"

```
    9       NOS    : NO. OF OCCUPANCY SCHEDULES
  990.000 OSMAX  : MAX. QUANTITY FOR OCCUPANCY      SCHEDULE NO. 1 (ETU/H)
TABLE( I) O(I,) : PERCENTAGE OF OSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 1  AM(%) 63.6 63.6 63.6 63.6 63.6 63.6  0.0  0.0  0.0100.0  0.0  0.0
 1  PM(%)  0.0  0.0 19.2 19.2  0.0  0.0  0.0 19.2 57.6 63.6 63.6 63.6
  990.000 OSMAX  : MAX. QUANTITY FOR OCCUPANCY      SCHEDULE NO. 2 (ETU/H)
TAB_E( I) O(I,) : PERCENTAGE OF OSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 2  AM(%) 63.6 63.6 63.6 63.6 63.6 63.6 63.6 57.6  0.0  0.0100.0100.0
 2  PM(%)  0.0  0.0 66.7 66.7  0.0  0.0  0.0 19.2 19.2 63.6 63.6 63.6
  990.000 OSMAX  : MAX. QUANTITY FOR OCCUPANCY      SCHEDULE NO. 3 (ETU/H)
TABLE( I) O(I,) : PERCENTAGE OF OSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 3  AM(%) 84.8 84.8 34.8 84.8 84.8 84.8 84.8  0.0  0.0  0.0100.0  0.0
 3  PM(%)  0.0  0.0 38.4  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0 34.8
 1320.000 OSMAX  : MAX. QUANTITY FOR OCCUPANCY      SCHEDULE NO. 4 (ETU/H)
TAB_E( I) O(I,) : PERCENTAGE OF OSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 4  AM(%) 63.6 63.6 63.6 63.6 63.6 63.6 63.6 28.8 28.8  0.0 50.0  0.0
 4  PM(%)  0.0  0.0  0.0  0.0  0.0  0.0100.0  0.0  0.0  0.0  0.0  0.0
  990.000 OSMAX  : MAX. QUANTITY FOR OCCUPANCY      SCHEDULE NO. 5 (ETU/H)
TAB_E( I) O(I,) : PERCENTAGE OF OSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 5  AM(%)  0.0  0.0  0.0  0.0  0.0  0.0 0.0100.0  0.0  0.0  0.0 66.7
 5  PM(%)  0.0  0.0  0.0  0.0  0.0  0.0  0.0 33.3  0.0  0.0 74.7  0.0
  990.000 OSMAX  : MAX. QUANTITY FOR OCCUPANCY      SCHEDULE NO. 6 (ETU/H)
TAB_E( I) O(I,) : PERCENTAGE OF OSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 6  AM(%)  0.0  0.0  0.0  0.0  0.0  0.0  0.0 33.3  0.0100.0  0.0  0.0
 6  PM(%)  0.0  0.0  0.0  0.0  0.0  0.0 0.0100.0  0.0  0.0  0.0  0.0
 3290.000 OSMAX  : MAX. QUANTITY FOR OCCUPANCY      SCHEDULE NO. 7 (ETU/H)
TABLE( I) O(I,) : PERCENTAGE OF OSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 7  AM(%)  0.0  0.0  0.0  0.0  0.0  0.0 0.0100.0  0.0  0.0  0.0  0.0
 7  PM(%) 20.1 20.1  0.0  0.0 20.1 74.0 74.0 74.0 43.9 49.3 49.3  0.0
 2433.438 OSMAX  : MAX. QUANTITY FOR OCCUPANCY      SCHEDULE NO. 8 (ETU/H)
TAB_E( I) O(I,) : PERCENTAGE OF OSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 8  AM(%)  0.0  0.0  0.0  0.0  0.0  0.0  0.0 32.2 72.9100.0100.0100.0
 8  PM(%)  0.0  0.0 94.9 94.9 94.9 67.8 67.8 67.8  0.0  0.0  0.0  0.0
    0.000 OSMAX  : MAX. QUANTITY FOR OCCUPANCY      SCHEDULE NO. 9 (ETU/H)
TAB_E( I) O(I,) : PERCENTAGE OF OSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 9  AM(%)  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 9  PM(%)  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
    1       NCS    : NO. OF CONSTANT LIGHT SCHEDULES
    0.000 CSMAX  : MAX. QUANTITY FOR CONST. LIGHT SCHEDULE NO. 1 (ETU/H)
TAB_E( I) C(I,) : PERCENTAGE OF CSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 1  AM(%)  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 1  PM(%)  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
    9       NVS    : NO. OF VARIABLE LIGHT SCHEDULES
  614.185 VSMAX  : MAX. QUANTITY FOR VARIAB. LIGHT SCHEDULE NO. 1 (ETU/H)
TAB_E( I) V(I,) : PERCENTAGE OF VSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 1  AM(%)  0.0  0.0  0.0  0.0  0.0 0.0100.0100.0  0.0  0.0  0.0  0.0
 1  PM(%)  0.0  0.0  0.0 0.0100.0100.0100.0100.0 33.3 33.3 33.3  0.0
  614.185 VSMAX  : MAX. QUANTITY FOR VARIAB. LIGHT SCHEDULE NO. 2 (ETU/H)
TAB_E( I) V(I,) : PERCENTAGE OF VSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 2  AM(%)  0.0  0.0  0.0  0.0  0.0  0.0100.0100.0  0.0  0.0  0.0  0.0
 2  PM(%)  0.0  0.0  0.0  0.0  0.0 0.0100.0100.0100.0 33.3 33.3 33.3
  409.457 VSMAX  : MAX. QUANTITY FOR VARIAB. LIGHT SCHEDULE NO. 3 (ETU/H)
TAB_E( I) V(I,) : PERCENTAGE OF VSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 3  AM(%)  0.0  0.0  0.0  0.0  0.0  0.0100.0100.0  0.0  0.0  0.0  0.0
 3  PM(%)  0.0  0.0  0.0  0.0100.0100.0100.0  0.0  0.0  0.0  0.0  0.0
  409.457 VSMAX  : MAX. QUANTITY FOR VARIAB. LIGHT SCHEDULE NO. 4 (ETU/H)
TABLE( I) V(I,) : PERCENTAGE OF VSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 4  AM(%)  0.0  0.0  0.0  0.0  0.0  0.0100.0100.0  0.0  0.0  0.0  0.0
 4  PM(%)  0.0  0.0  0.0  0.0  0.0 0.0100.0100.0  0.0  0.0  0.0 0.0100.0
  204.728 VSMAX  : MAX. QUANTITY FOR VARIAB. LIGHT SCHEDULE NO. 5 (ETU/H)
TAB_E( I) V(I,) : PERCENTAGE OF VSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 5  AM(%)100.0100.0100.0100.0100.0100.0100.0100.0100.0100.0100.0100.0
 5  PM(%)100.0100.0100.0100.0100.0100.0100.0100.0100.0100.0100.0100.0
  204.728 VSMAX  : MAX. QUANTITY FOR VARIAB. LIGHT SCHEDULE NO. 6 (ETU/H)
TABLE( I) V(I,) : PERCENTAGE OF VSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 6  AM(%)100.0100.0100.0100.0100.0100.0100.0100.0100.0  0.0  0.0  0.0
 6  PM(%)  0.0  0.0  0.0100.0100.0100.0100.0100.0100.0100.0100.0100.0
 1535.463 VSMAX  : MAX. QUANTITY FOR VARIAB. LIGHT SCHEDULE NO. 7 (ETU/H)
TAB_E( I) V(I,) : PERCENTAGE OF VSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 7  AM(%)  0.0  0.0  0.0  0.0  0.0 33.3 60.0 33.3  0.0  0.0  0.0  0.0
 7  PM(%)  0.0  0.0  0.0  0.0 33.3100.0 66.7 53.3 53.3 53.3 53.3  0.0
 1535.463 VSMAX  : MAX. QUANTITY FOR VARIAB. LIGHT SCHEDULE NO. 8 (ETU/H)
TABLE( I) V(I,) : PERCENTAGE OF VSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 8  AM(%)  0.0  0.0  0.0  0.0  0.0 33.3 60.0 60.0  0.0  0.0  0.0  0.0
 8  PM(%)  0.0  0.0  0.0  0.0 33.3100.0 66.7 66.7 66.7 40.0 40.0 40.0
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  682.428 VSMAX : MAX. QUANTITY FOR VARIAB. LIGHT SCHEDULE NO. 9 (BTU/H)
TAB_E( I) V(I,) : PERCENTAGE OF VSMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 9  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0 50.0 50.0  0.0
 9  PM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0100.0100.0100.0  0.0  0.0  0.0
     6     NES   : NO. OF APPLIANCE AND EQUIPMENT SCHEDULES
     0.000 ESMAX : MAX. QUANTITY FOR APPL. & EQUI. SCHEDULE NO. 1 (BTU/H)
TAB_E( I) E(I,) : PERCENTAGE OF ESMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 1  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 1  PM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
  796.166 ESMAX : MAX. QUANTITY FOR APPL. & EQUI. SCHEDULE NO. 2 (BTU/H)
TAB_E( I) E(I,) : PERCENTAGE OF ESMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 2  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0 42.9100.0  0.0  0.0  0.0  0.0
 2  PM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0 64.3  0.0  0.0
  796.166 ESMAX : MAX. QUANTITY FOR APPL. & EQUI. SCHEDULE NO. 3 (BTU/H)
TABLE( I) E(I,) : PERCENTAGE OF ESMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 3  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0 42.9100.0  0.0  0.0  0.0
 3  PM(%)  0.0   0.0  0.0  0.0 42.9 71.4  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 5118.207 ESMAX : MAX. QUANTITY FOR APPL. & EQUI. SCHEDULE NO. 4 (BTU/H)
TAB_E( I) E(I,) : PERCENTAGE OF ESMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 4  AM(%)  5.6   5.6  5.6  5.6  5.6  5.6 55.6 55.6 11.1  5.6  5.6  8.3
 4  PM(%)  5.6   5.6  5.6 52.8100.0 55.6 31.1 25.6 25.6 20.6 20.6  5.6
 5118.207 ESMAX : MAX. QUANTITY FOR APPL. & EQUI. SCHEDULE NO. 5 (BTU/H)
TAB_E( I) E(I,) : PERCENTAGE OF ESMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 5  AM(%)  5.6   5.6  5.6  5.6  5.6  5.6  5.6 52.8 55.6  8.3  5.6  8.3
 5  PM(%)  8.3   5.6  5.6  5.6 55.6100.0 52.8 32.2 32.2 20.6 20.6 20.6
 8530.352 ESMAX : MAX. QUANTITY FOR APPL. & EQUI. SCHEDULE NO. 6 (BTU/H)
TABLE( I) E(I,) : PERCENTAGE OF ESMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 6  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0100.0100.0  0.0
 6  PM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
     1     NTS   : NO. OF THERMOSTAT SETPOINT SCHEDULES
     0.000 TSMAX : NULL QUANTITY FOR THERM. SETPT. SCHEDULE NO. 1
TAB_E( I) T(I,) : TEMPERATURE SETTING FOR HOUR I, I=1 TO 12 AND 13 TO 24
 1  AM(F) 68.0 68.0 68.0 68.0 68.0 68.0 68.0 72.0 72.0 72.0 72.0 72.0
 1  PM(F) 72.0 72.0 72.0 72.0 72.0 72.0 72.0 72.0 72.0 68.0 68.0 68.0
     6     NAS   : NO. OF HOT WATER CONSUMPTION SCHEDULES
     0.000 ASMAX : MAX. QUANTITY FOR HOT WTR. CON. SCHEDULE NO. 1 (IMP.G)
TAB_E( I) A(I,) : PERCENTAGE OF ASMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 1  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
 1  PM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
    35.200 ASMAX : MAX. QUANTITY FOR HOT WTR. CON. SCHEDULE NO. 2 (IMP.G)
TAB_E( I) A(I,) : PERCENTAGE OF ASMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 2  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0100.0 68.7  6.2  0.0  0.0  0.0
 2  PM(%)  6.2   0.0  0.0  6.2  0.0  6.2  0.0  6.2  0.0 31.2  0.0  0.0
    33.000 ASMAX : MAX. QUANTITY FOR HOT WTR. CON. SCHEDULE NO. 3 (IMP.G)
TABLE( I) A(I,) : PERCENTAGE OF ASMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 3  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  6.7 66.7  6.7  0.0  0.0
 3  PM(%)  6.7   0.0  0.0  6.7  0.0  6.7100.0  0.0  0.0  0.0  6.7  0.0
     8.200 ASMAX : MAX. QUANTITY FOR HOT WTR. CON. SCHEDULE NO. 4 (IMP.G)
TAB_E( I) A(I,) : PERCENTAGE OF ASMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 4  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0 24.4100.0  0.0  0.0  0.0 24.4
 4  PM(%)100.0   0.0  0.0  0.0  0.0 24.4100.0  0.0  0.0  0.0  0.0  0.0
     8.200 ASMAX : MAX. QUANTITY FOR HOT WTR. CON. SCHEDULE NO. 5 (IMP.G)
TAB_E( I) A(I,) : PERCENTAGE OF ASMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 5  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0 24.4100.0  0.0  0.0 24.4
 5  PM(%)100.0   0.0 50.0  0.0  0.0 24.4100.0  0.0  0.0  0.0  0.0  0.0
    10.000 ASMAX : MAX. QUANTITY FOR HOT WTR. CON. SCHEDULE NO. 6 (IMP.G)
TABLE( I) A(I,) : PERCENTAGE OF ASMAX FOR HOUR I, I=1 TO 12 AND 13 TO 24
 6  AM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0100.0100.0  0.0  0.0
 6  PM(%)  0.0   0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.0
     5     IHWTR : SPACE NO. WHERE DOMESTIC HOT WATER HEATER IS LOCATED
    60.000 VOLMAX: VOLUME OF HOT WATER HEATER STORAGE TANK          (IMP.G)
15354.633 EPMAX1: MAX. ELECTRIC INPUT TO UPPER HEATER ELEMENT      (BTU/H)
15354.633 EPMAX2: MAX. ELECTRIC INPUT TO LOWER HEATER ELEMENT      (BTU/H)
  539.118 QL    : STANDBY LOSSES FROM WATER HEATER STORAGE TANK    (BTU/H)
  130.000 THW   : TEMPERATURE OF DOMESTIC  HOT WATER (F)
   45.000 TCW   : TEMPERATURE OF INCOMING COLD WATER (F)
```

PART "C"

```
   25       NWALL  : NO. OF SURFACES
TAB_E( 1)   IWALL  : SURFACE NO.
TAB_E( 2)   IWA    : SPACE NO. ON SIDE "A" OF THE SURFACE
TABLE( 3)   IWB    : SPACE NO. ON SIDE "B" OF THE SURFACE
TAB_E( 4)   IWALLT : SURFACE TYPE NO.
TAB_E( 5)   WALLA  : NET INTERIOR SURFACE AREA (FT**2)
TABLE( 6)   AL     : LEVEL OF BOTTOM OF SURFACE ABOVE GROUND (FT)
TAB_E( 7)   AH     : HEIGHT OF SURFACE ALONG VERTICAL (FT)
TABLE( 8)   RES    : RESISTANCE TO AIR FLOW (LB/FT**2)/(FT**3/S)**(1/EX)
TAB_E( 9)   EX     : EXPONENT FOR RESISTANCE TO AIR FLOW
TAB_E(10)   NAC    : NO. OF HOLES IN SURFACE TO MODEL AIR LEAKAGE
TABLE(11)   WAZIM  : SURFACE AZIMUTH ANGLE (DEG. CLOCKWISE FROM NORTH)
TAB_E(12)   WTILT  : SURFACE TILT ANGLE (DEG. FROM HORIZONTAL)
```

1	1	6	1	98.9	10.0	7.5	0.1087790E 02	0.67	4	156.0	90.0
2	3	6	1	37.5	10.0	7.5	0.2870313E 02	0.67	4	156.0	90.0
3	1	6	1	93.8	10.0	7.5	0.1148125E 02	0.67	4	246.0	90.0
4	2	6	1	75.7	10.0	7.5	0.1420947E 02	0.67	4	246.0	90.0
5	2	6	1	160.5	10.0	7.5	0.6706339E 01	0.67	4	336.0	90.0
6	2	6	1	37.5	10.0	7.5	0.2870313E 02	0.67	4	66.0	90.0
7	1	6	1	124.5	10.0	7.5	0.8645521E 01	0.67	4	66.0	90.0
8	1	2	2	197.9	0.0	0.0	0.0000000	0.00	1	0.0	0.0
9	3	1	2	115.4	0.0	0.0	0.0000000	0.00	1	0.0	0.0
10	1	7	3	342.5	17.5	4.7	0.4714023E 00	0.67	1	156.0	20.0
11	1	4	4	342.5	0.0	0.0	0.0000000	0.00	1	0.0	0.0
12	2	7	3	250.0	17.5	3.4	0.6458207E 00	0.67	1	336.0	20.0
13	2	4	4	250.0	0.0	0.0	0.0000000	0.00	1	0.0	0.0
14	3	7	3	40.0	17.5	2.7	0.4036379E 01	0.67	1	156.0	20.0
15	3	4	4	40.0	0.0	0.0	0.0000000	0.00	1	0.0	0.0
16	4	6	1	168.5	2.0	8.0	0.6387937E 01	0.67	4	156.0	90.0
17	4	6	1	216.0	2.0	8.0	0.4983182E 01	0.67	4	246.0	90.0
18	4	6	1	121.4	2.0	8.0	0.8866287E 01	0.67	4	336.0	90.0
19	4	6	1	96.0	2.0	0.0	0.1681824E 02	0.67	1	0.0	180.0
20	4	6	1	111.4	2.0	8.0	0.9662184E 01	0.67	4	66.0	90.0
21	4	5	4	667.5	0.0	0.0	0.0000000	0.00	1	0.0	0.0
22	5	6	5	38.8	0.0	2.0	0.2777720E 03	0.67	1	156.0	90.0
23	5	6	5	54.0	0.0	2.0	0.1993273E 03	0.67	1	246.0	90.0
24	5	6	5	68.0	0.0	2.0	0.1582893E 03	0.67	1	336.0	90.0
25	5	6	5	34.0	0.0	2.0	0.3165784E 03	0.67	1	66.0	90.0

PART "E"

```
   13       NWNDW  : NO. OF WINDOWS
TABLE( 1)   IWNDW  : WINDOW NO.
TAB_E( 2)   IWW    : SURFACE NO. TO WHICH WINDOW BELONGS
TAB_E( 3)   IWNDWT : WINDOW TYPE NO.
TAB_E( 4)   ISHADT : SHADING TYPE CODE (INTERIOR:-1, EXTERIOR:+1)
TAB_E( 5)   WNDWA  : WINDOW AREA (FT**2)
TABLE( 6)   WL     : LEVEL OF BOTTOM OF WINDOW ABOVE GROUND (FT)
TABLE( 7)   WH     : HEIGHT OF WINDOW ALONG VERTICAL (FT)
TABLE( 8)   WRES   : RESISTANCE TO AIR FLOW (LB/FT**2)/(FT**3/S)**(1/WEX)
TABLE( 9)   WEX    : EXPONENT FOR RESISTANCE TO AIR FLOW
TAB_E(10)   NWC    : NO. OF HOLES IN WINDOW TO MODEL AIR LEAKAGE
```

1	1	1	0	9.4	11.0	4.7	0.1204889E 03	0.67	3
2	1	1	0	9.4	11.0	4.7	0.1204889E 03	0.67	3
3	5	1	0	13.5	13.5	3.0	0.8279752E 01	0.67	3
4	5	1	0	13.5	13.5	3.0	0.8279752E 01	0.67	3
5	7	1	0	10.5	13.5	3.0	0.1009095E 02	0.67	3
6	15	1	0	10.5	5.5	3.5	0.9785161E 01	0.67	3
7	16	1	0	10.5	5.0	3.5	0.9785161E 01	0.67	3
8	16	1	0	10.5	5.0	3.5	0.9785161E 01	0.67	3
9	18	1	0	35.0	4.0	5.0	0.3937929E 02	0.67	4
10	20	1	0	5.0	5.5	2.5	0.1403958E 02	0.67	3
11	22	2	0	3.8	0.0	1.5	0.1699529E 01	0.67	2
12	22	2	0	3.8	0.0	1.5	0.1699529E 01	0.67	2
13	22	2	0	3.8	0.0	1.5	0.1699529E 01	0.67	2

PART "D"

```
     5      NWALLT: NO. OF SURFACE TYPES
   0.400 WSABS : SOLAR ABSORPTIVITY (TYPE NO. 1)
     6      NCOEFS: NO. OF Z-TRANSFER FUNCTION COEFFICIENTS (TYPE NO. 1)
TABLE( I) BCOEFS: B-COEFFICIENTS (TYPE NO. 1) (BTU/H FT**2 F)
 1 B( 1- 4)  0.7408790E-02  0.2501732E-01  0.4370380E-02  0.1644209E-04
 1 B( 5- 6)  0.5558013E-11  0.4336809E-17
   0.037 CCOEFS: SUM OF B-COEFFICIENTS (TYPE NO. 1) (BTU/H FT**2 F)
TABLE( I) DCOEFS: D-COEFFICIENTS (TYPE NO. 1)
 1 D( 1- 4)  0.1000000E 01 -0.2554798E 00  0.1508402E-01 -0.5994035E-08
 1 D( 5- 6)  0.2315923E-18       0.0000000
   0.048 WALLU : THERMAL CONDUCTANCE (TYPE NO. 1) (BTU/H FT**2 F)
   0.000 WSABS : SOLAR ABSORPTIVITY (TYPE NO. 2)
     5      NCOEFS: NO. OF Z-TRANSFER FUNCTION COEFFICIENTS (TYPE NO. 2)
TABLE( I) BCOEFS: B-COEFFICIENTS (TYPE NO. 2) (BTU/H FT**2 F)
 2 B( 1- 4)  0.1166440E 00  0.1436939E 00  0.5255982E-02  0.2191272E-06
 2 B( 5- 5)  0.2775558E-16
   0.266 CCOEFS: SUM OF B-COEFFICIENTS (TYPE NO. 2) (BTU/H FT**2 F)
TABLE( I) DCOEFS: D-COEFFICIENTS (TYPE NO. 2)
 2 D( 1- 4)  0.1000000E 01 -0.1133047E 00  0.4933695E-03       0.0000000
 2 D( 5- 5)       0.0000000
   0.299 WALLU : THERMAL CONDUCTANCE (TYPE NO. 2) (BTU/H FT**2 F)
   0.900 WSABS : SOLAR ABSORPTIVITY (TYPE NO. 3)
     6      NCOEFS: NO. OF Z-TRANSFER FUNCTION COEFFICIENTS (TYPE NO. 3)
TABLE( I) BCOEFS: B-COEFFICIENTS (TYPE NO. 3) (BTU/H FT**2 F)
 3 B( 1- 4)  0.5987443E-02  0.1818065E-01  0.2443724E-02  0.1353744E-04
 3 B( 5- 6)  0.5082614E-09  0.1734723E-17
   0.027 CCOEFS: SUM OF B-COEFFICIENTS (TYPE NO. 3) (BTU/H FT**2 F)
TABLE( I) DCOEFS: D-COEFFICIENTS (TYPE NO. 3)
 3 D( 1- 4)  0.1000000E 01 -0.1095158E 00  0.1363555E-02 -0.9886944E-06
 3 D( 5- 6)  0.1010899E-16       0.0000000
   0.030 WALLU : THERMAL CONDUCTANCE (TYPE NO. 3) (BTU/H FT**2 F)
   0.000 WSABS : SOLAR ABSORPTIVITY (TYPE NO. 4)
     7      NCOEFS: NO. OF Z-TRANSFER FUNCTION COEFFICIENTS (TYPE NO. 4)
TABLE( I) BCOEFS: B-COEFFICIENTS (TYPE NO. 4) (BTU/H FT**2 F)
 4 B( 1- 4)  0.5890217E-02  0.5062259E-01  0.2470676E-01  0.8766232E-03
 4 B( 5- 7)  0.1034502E-05  0.5035597E-11 -0.2775558E-16
   0.082 CCOEFS: SUM OF B-COEFFICIENTS (TYPE NO. 4) (BTU/H FT**2 F)
TABLE( I) DCOEFS: D-COEFFICIENTS (TYPE NO. 4)
 4 D( 1- 4)  0.1000000E 01 -0.6349480E 00  0.3590041E-01 -0.2390702E-03
 4 D( 5- 7)  0.7673762E-08 -0.1218514E-16       0.0000000
   0.205 WALLU : THERMAL CONDUCTANCE (TYPE NO. 4) (BTU/H FT**2 F)
   0.750 WSABS : SOLAR ABSORPTIVITY (TYPE NO. 5)
     9      NCOEFS: NO. OF Z-TRANSFER FUNCTION COEFFICIENTS (TYPE NO. 5)
TABLE( I) BCOEFS: B-COEFFICIENTS (TYPE NO. 5) (BTU/H FT**2 F)
 5 B( 1- 4)  0.6008724E-06  0.2093869E-03  0.1416850E-02  0.1315554E-02
 5 B( 5- 8)  0.2267879E-03  0.6769016E-05  0.2441198E-07  0.5468605E-11
 5 B( 9- 9)  0.7323786E-16
   0.003 CCOEFS: SUM OF B-COEFFICIENTS (TYPE NO. 5) (BTU/H FT**2 F)
TABLE( I) DCOEFS: D-COEFFICIENTS (TYPE NO. 5)
 5 D( 1- 4)  0.1000000E 01 -0.1515156E 01  0.7590463E 00 -0.1151997E 00
 5 D( 5- 8)  0.5005459E-02 -0.6481010E-04  0.4097295E-07 -0.5590039E-12
 5 D( 9- 9)  0.6885152E-19
   0.092 WALLU : THERMAL CONDUCTANCE (TYPE NO. 5) (BTU/H FT**2 F)
```

PART "F"

```
  2      NWNDWT: NO. OF WINDOW TYPES
  0.800  WSHCO : SHADING COEFF. (NO SHADING DEVICE); WINDOW TYPE NO. 1
  0.800  WSHCC : SHADING COEFF. WITH SHADING DEVICE; WINDOW TYPE NO. 1
  0.293  WNDWUO: U-FACTOR (NO SHADING DEVICE); WINDOW TYPE NO. 1
  0.293  WNDWUC: U-FACTOR WITH SHADING DEVICE; WINDOW TYPE NO. 1
  0.900  WSHCO : SHADING COEFF. (NO SHADING DEVICE); WINDOW TYPE NO. 2
  0.900  WSHCC : SHADING COEFF. WITH SHADING DEVICE; WINDOW TYPE NO. 2
  0.495  WNDWUO: U-FACTOR (NO SHADING DEVICE); WINDOW TYPE NO. 2
  0.495  WNDWUC: U-FACTOR WITH SHADING DEVICE; WINDOW TYPE NO. 2
  0      ID1   : DAY OF YEAR WINDOW SHADING DEVICES ARE FIRST ACTIVATED
  0      ID2   : DAY OF YEAR WINDOW SHADING DEVICES ARE  LAST ACTIVATED
  0      IH1   : HOUR OF DAY WINDOW SHADING DEVICES ARE ACTIVATED
  0      IH2   : HOUR OF DAY WINDOW SHADING DEVICES ARE DEACTIVATED
```

PART "H"

```
  2      NDOORT: NO. OF DOOR TYPES
  0.800  DSABS : SOLAR ABSORPTIVITY; DOOR TYPE NO. 1
 10.000  DOORU : U-FACTOR; DOOR TYPE NO. 1
  0.900  DSABS : SOLAR ABSORPTIVITY; DOOR TYPE NO. 2
  0.400  DOORU : U-FACTOR; DOOR TYPE NO. 2
  5      IBSMT : SPACE NO. ADJACENT TO BELOW GROUND PORTION OF BASEMENT
 26.000  WIDTH1: WIDTH OF BASEMENT RECTANGLE OF LARGER  WIDTH (FT)
  0.000  WIDTH2: WIDTH OF BASEMENT RECTANGLE OF SMALLER WIDTH (FT)
  5.800  HEIGHT: DISTANCE BETWEEN GROUND AND FLOOR BOTTOM (FT)
  5.500  BASINS: LENGTH OF BASEMENT INTERIOR INSULATION (FT)
 50.000  SURINS: LENGTH OF SNOWCOVER MEASURED FROM THE WALL (FT)
 34.200  WATER : DISTANCE BETWEEN WATER TABLE LEVEL AND FLOOR (FT)
106.000  PERIMO: OVERALL OUTER PERIMETER  OF THE BASEMENT (FT)
702.000  AREA  : OVERALL OUTER FLOOR AREA OF THE BASEMENT (FT**2)
  0.667  RWALL : BASEMENT WALL  THERMAL RESISTANCE (F FT**2 H/BTU)
  0.250  RFLOOR: BASEMENT FLOOR THERMAL RESISTANCE (F FT**2 H/BTU)
  8.000  RBASIN: THE INSULATION THERMAL RESISTANCE (F FT**2 H/BTU)
 18.144  RSURIN: THE SNOW COVER THERMAL RESISTANCE (F FT**2 H/BTU)
  1.800  RSOIL : THERMAL RESISTIVITY PER FOOT OF SOIL (F FT H/BTU)
  0.018  ALPHA : THERMAL DIFFUSIVITY OF SOIL (FT**2/H)
 45.000  TETAWT: TEMPERATURE AT WATER TABLE LEVEL (F)
```

PART "G"

```
     4       NDOOR  : NO. OF DOORS
TABLE( 1)    IDOOR  : DOOR NO.
TABLE( 2)    IDW    : SURFACE NO. TO WHICH DOOR BELONGS
TABLE( 3)    IDOORT : DOOR TYPE NO.
TABLE( 4)    DOORA  : DOOR AREA (FT**2)
TABLE( 5)    DL     : LEVEL OF BOTTOM OF DOOR ABOVE GROUND (FT)
TABLE( 6)    DH     : HEIGHT OF DOOR ALONG VERTICAL (FT)
TABLE( 7)    DRES   : RESISTANCE TO AIR FLOW (LB/FT**2)/(FT**3/S)**(1/DEX)
TABLE( 8)    DEX    : EXPONENT FOR RESISTANCE TO AIR FLOW
TABLE( 9)    NDC    : NO. OF HOLES IN DOOR TO MODEL AIR LEAKAGE
  1   8   1          19.6    0.0    0.0        0.0000000 0.00 0
  2   9   1          19.6    0.0    0.0        0.0000000 0.00 0
  3  18   2          19.6    2.0    7.0   0.2549510E 02 0.50 4
  4  20   2          19.6    2.0    7.0   0.2549510E 02 0.50 4
```

PART "I"

```
   258        IS1    : DAY HEATING SEASON STARTS (1-366)
   135        IS2    : DAY HEATING SEASON ENDS   (1-366)
     2        ISYSTM : HEATING SYSTEM TYPE CODE (OIL:1, ELECTRIC:2)
     1        ISHAPE : BUILDING SHAPE CODE (1-8)
     2        L      : TERRAIN CODE (RURAL:1, SUBURBAN:2, URBAN:3)
    22.186    H      : BUILDING HEIGHT FROM GROUND LEVEL (FT)
 14535.000    VOLUME : BUILDING VOLUME INCL. BSMT. (FT**3)
     1        IDF    : FIRST DAY OF YEAR TO BE PROCESSED
    10        IDT    : LAST  DAY OF YEAR TO BE PROCESSED
     0.000    ROTATE : ANGLE OF CLOCKWISE ROTATION OF BLDG. (DEG.)
  -450.000    CDBT   : CONST. OUTDOOR TEMP. (F) (CDBT>-459.688)
    -1.000    CW     : CONST. WIND SPEED (FT/S) (CW>=0.0)
    -1.000    CWDIR  : CONST. WIND DIRECTION (DEG.) (CWDIR>=0.0)
     1        NOSUN  : NO SOLAR RADIATION IF 0
    -1        ICLOUD : CONST. CLOUD AMOUNT (10>=ICLOUD>=0)
     0        IDH    : HOURLY RESULTS PRINTED IF 0, DAILY IF 1
     0        IPRNT4 : WEATHER DATA   PRINTED IF 0, NOT   IF 1
     0        IPRNT5 : LOADS/DEMAND   PRINTED IF 0, NOT   IF 1
     5        IPRNT6 : INTERVAL (DAYS) FOR BSMT. HEATLOSS PLOT
     0        IPRNT7 : FURNACE/INFILTRATION RESULTS PRINTED IF 0
     0        IDUMP8 : HEATING DEMAND DUMPED  IF 0, NOT   IF 1
```

APPENDIX II

Partial ENCORE-CANADA Printed Output for the Example

********** TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE **********

ENCORE.BLDG1.CITY4.

YEAR71.OUTPUT2

GEOGRAPHICAL LOCATION

VALUE OF	VARIABLE:	EXPLANATION OF VARIABLES
1971	IYEAR :	YEAR ANNUM DEUM
0	LEAP :	LEAP YEAR INDICATOR (1=LEAP YEAR)
4	NOCITY:	CITY NUMBER
OTTAWA	NAME :	CITY NAME
ONT.	IPROV :	PROVINCE OF CANADA
45.450	ONLAT :	LATITUDE (DEGREES NORTH)
75.617	OWLON :	LONGITUDE (DEGREES WEST)
5	ITZN :	TIME ZONE NUMBER
E	ITZ :	TIME ZONE LETTER DESIGNATION

WEATHER AND SOLAR RADIATION DATA

VALUE OF	VARIABLE:	EXPLANATION OF VARIABLES
TABLE(1)	IDOY :	DAY SEQUENCE NUMBER (1-366)
TABLE(2)	ID :	DAY OF THE MONTH (1- 31)
TABLE(3)	MONTH :	MONTH OF THE YEAR (1- 12)
TABLE(4)	NAMDAY:	DAY OF THE WEEK
TABLE(5)	IWH :	HOLIDAY FLAG (1=WORKING DAY, 2=HOLIDAY)
TABLE(6)	RDGDAY:	GROUND REFLECTIVITY (0.4=SNOWCOVER, 0.2=NO SNOWCOVER)
TABLE(1)	IHOUR :	HOUR OF THE DAY (1- 24)
TABLE(2)	TOF :	DRY-BULB TEMPERATURE (F)
TABLE(3)	ICLC :	CLOUD AMOUNT (TENTHS)
TABLE(4)	W :	WIND SPEED AT BUILDING SITE (FT/S)
TABLE(5)	WDIR :	WIND DIRECTION (DEG. CLOCKWISE FROM NORTH)
TABLE(6)	P :	ATMOSPHERIC PRESSURE (LB/FT**2)
TABLE(7)	DN :	DIRECT NORMAL SOLAR RADIATION (BTU/H FT**2)
TABLE(8)	TOTDIR:	DIRECT SOLAR RADIATION INTERCEPTED BY BLDG. (BTU/H)
TABLE(9)	TOTDIF:	DIFFUSE SOLAR RADIATION INTERCEPTED BY BLDG. (BTU/H)

IDDY	ID	MONTH	NAMDAY	IWH	ROGDAY
6	6	1	WED.	1	0.4

IHOJR	TOF	ICLC	W	WDIR	P	DN	TOTDIR	TOTDIF
1	21.2	4	9.	270.	2082.	0.	0.	0.
2	21.2	4	6.	270.	2084.	0.	0.	0.
3	19.4	3	6.	270.	2084.	0.	0.	0.
4	17.6	2	3.	248.	2086.	0.	0.	0.
5	15.8	0	4.	225.	2086.	0.	0.	0.
6	15.8	2	4.	225.	2086.	0.	0.	0.
7	17.6	7	7.	225.	2086.	0.	0.	0.
8	17.6	5	6.	225.	2088.	20.	11610.	2481.
9	17.6	8	6.	225.	2090.	110.	66443.	17896.
10	17.6	9	5.	248.	2093.	209.	122779.	41250.
11	19.4	9	7.	248.	2093.	226.	141011.	50013.
12	23.0	8	6.	248.	2090.	240.	171379.	55552.
13	24.8	9	8.	270.	2090.	204.	153529.	46374.
14	24.8	9	7.	270.	2090.	167.	123565.	34930.
15	26.6	9	5.	293.	2090.	90.	60704.	15963.
16	26.6	9	7.	270.	2090.	62.	35377.	8414.
17	26.6	6	7.	248.	2090.	15.	0.	0.
18	24.8	6	7.	225.	2090.	0.	0.	0.
19	21.2	3	6.	248.	2093.	0.	0.	0.
20	21.2	2	5.	248.	2093.	0.	0.	0.
21	21.2	3	5.	248.	2093.	0.	0.	0.
22	21.2	7	6.	248.	2093.	0.	0.	0.
23	19.4	6	7.	248.	2095.	0.	0.	0.
24	19.4	7	9.	248.	2095.	0.	0.	0.
AVERAGE	20.9	5	6.	249.	2090.			
TOTAL						1344.	886396.	272773.

AVERAGES AND CUMULATIVE TOTALS AFTER 6 DAY(S)

AVERAGE	19.2	7	6.	259.	2086.			
TOTAL						5452.	3592180.	1085134.

********** TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE **********

GEOGRAPHICAL LOCATION

VALUE OF	VARIABLE:	EXPLANATION OF VARIABLES
1971	IYEAR :	YEAR ANNUM DUM
0	LEAP :	LEAP YEAR INDICATOR (1=LEAP YEAR)
4	NOCITY:	CITY NUMBER
OTTAWA	NAME :	CITY NAME
ONT.	IPROV :	PROVINCE OF CANADA
45.450	DNLAT :	LATITUDE (DEGREES NORTH)
75.617	DWLON :	LONGITUDE (DEGREES WEST)
5	ITZN :	TIME ZONE NUMBER
E	ITZ :	TIME ZONE LETTER DESIGNATION

HEATING LOADS, ROOM TEMPERATURES AND HEATING DEMANDS

VALUE OF	VARIABLE:	EXPLANATION OF VARIABLES
TABLE(1)	IDOY :	DAY SEQUENCE NUMBER (1-366)
TABLE(2)	ID :	DAY OF THE MONTH (1- 31)
TABLE(3)	MONTH :	MONTH OF THE YEAR (1- 12)
TABLE(4)	NAMDAY:	DAY OF THE WEEK
TABLE(5)	IWH :	HOLIDAY FLAG (1=WORKING DAY, 2=HOLIDAY)
TABLE(6)	ROGDAY:	GROUND REFLECTIVITY (0.4=SNOWCOVER, 0.2=NO SNOWCOVER)
TABLE(1)	IHOUR :	HOUR OF THE DAY (1- 24)
TABLE(2)	TRMQO :	TOTAL HEAT LOAD (BTU/H) AT REFERENCE TEMP. OF 70. (F)
TABLE(3)	QF :	BASEMENT FLOOR LOSS (% TRMQO) AT MEAN TEMP. OF 70. (F)
TABLE(4)	QW :	BASEMENT WALL LOSS (% TRMQO) AT MEAN TEMP. OF 70. (F)
TABLE(5)	TGWO :	LOAD/BUILDING WALLS (% TRMQO)
TABLE(6)	TGDO :	LOAD/EXTERIOR DOORS (% TRMQO)
TABLE(7)	TGQO :	LOAD/ALL WINDOWS (% TRMQO)
TABLE(8)	QON :	LOAD/INFILTRATION/FURNACE ON (% TRMQO)
TABLE(9)	QOFF :	LOAD/INFILTRATION/FURNACE OFF (% TRMQO)
TABLE(10)	TGPO :	LOAD/ROOM OCCUPANCY (% TRMQO)
TABLE(11)	TGEO :	LOAD/EQUIPMENT (% TRMQO)
TABLE(12)	TGRO :	LOAD/HOT WATER CONS.(% TRMQO)
TABLE(13)	TGLO :	LOAD/LIGHTING (% TRMQO)
TABLE(14)	TERO :	TTL. HEATING DEMAND (BTU/H)
TABLE(15)	RMT(1):	TEMP. IN ROOM NO. 1 (F)
TABLE(16)	PRO(1):	HTNG. DEMAND, RM. 1 (% TERO)
TABLE(17)	RMT(2):	TEMP. IN ROOM NO. 2 (F)
TABLE(18)	PRO(2):	HTNG. DEMAND, RM. 2 (% TERO)
TABLE(19)	RMT(3):	TEMP. IN ROOM NO. 3 (F)
TABLE(20)	PRO(3):	HTNG. DEMAND, RM. 3 (% TERO)

IDJY	ID	MONTH	NAMDAY	IWH	ROGDAY
6	6	1	WED.	1	0.4

IHOJR	TRMQO	QF	QW	TGWO	TGDO	TGQO	QON	QOFF	TGDO	TGEO	TGRO	TGLO	TERO	RMT(1)	PRO(1)	RMT(2)	PRO(2)	RMT(3)	PRO(3)
1	-3176.	-14.	-14.	-119.	-10.	-54.	0.	-77.	53.	28.	38.	26.	0.	70.8	0.0	70.1	0.0	72.4	0.0
2	-4092.	-11.	-11.	-99.	-10.	-44.	0.	-57.	40.	19.	26.	18.	0.	70.6	0.0	70.0	0.0	72.1	0.0
3	-5223.	-8.	-8.	-81.	-10.	-36.	0.	-47.	31.	13.	19.	12.	0.	70.3	0.0	69.7	0.0	71.7	0.0
4	-6298.	-7.	-7.	-72.	-10.	-32.	0.	-40.	25.	10.	14.	9.	0.	70.1	0.0	69.6	0.0	71.4	0.0
5	-7470.	-6.	-6.	-64.	-10.	-29.	0.	-36.	21.	7.	11.	7.	450.	69.8	0.0	69.3	0.0	71.1	0.0
6	-8277.	-5.	-5.	-61.	-10.	-26.	0.	-33.	19.	6.	9.	5.	1646.	69.6	0.0	69.1	0.0	70.9	0.0
7	-2588.	-17.	-17.	-201.	-29.	-83.	0.	-108.	47.	68.	172.	25.	1010.	69.9	0.0	68.9	0.0	78.3	0.0
8	2815.	-16.	-15.	-182.	-4.	-69.	0.	-105.	101.	77.	186.	49.	12867.	72.3	14.6	72.3	18.6	80.6	0.0
9	1266.	-35.	-34.	-390.	0.	-58.	0.	-240.	83.	115.	452.	43.	11428.	72.3	16.5	72.3	20.1	76.9	0.0
10	8040.	-5.	-5.	-54.	1.	15.	0.	-35.	16.	64.	76.	5.	6763.	72.4	14.3	72.3	30.3	74.5	0.0
11	7834.	-6.	-6.	-49.	2.	37.	0.	-34.	16.	76.	35.	5.	4685.	72.4	15.4	72.4	30.4	74.1	0.0
12	7082.	-6.	-6.	-49.	3.	60.	0.	-32.	14.	32.	50.	6.	1782.	72.5	7.4	72.3	87.0	74.5	0.0
13	8156.	-5.	-5.	-38.	3.	57.	0.	-29.	12.	21.	54.	4.	1564.	72.6	0.0	72.4	91.5	74.7	0.0
14	5630.	-8.	-8.	-51.	5.	78.	0.	-40.	16.	25.	41.	5.	1663.	72.6	0.0	72.4	78.2	73.6	0.0
15	4142.	-11.	-10.	-71.	6.	85.	0.	-50.	20.	30.	46.	7.	2403.	72.5	4.2	72.4	44.5	73.3	0.0
16	4134.	-11.	-10.	-75.	6.	63.	0.	-51.	14.	55.	51.	7.	2478.	72.5	14.4	72.4	51.1	74.0	0.0
17	3980.	-11.	-11.	-81.	6.	44.	0.	-51.	18.	91.	39.	7.	3164.	72.4	26.0	72.4	41.5	73.0	0.0
18	4421.	-10.	-10.	-77.	5.	24.	0.	-54.	37.	63.	51.	23.	3256.	72.4	20.9	72.4	35.3	73.7	0.0
19	4515.	-10.	-10.	-78.	4.	8.	0.	-54.	40.	47.	70.	37.	3652.	72.4	24.6	72.4	31.3	72.6	0.0
20	3418.	-13.	-13.	-107.	5.	-2.	0.	-72.	64.	54.	61.	57.	3381.	72.4	23.2	72.4	33.9	73.9	0.0
21	1678.	-26.	-26.	-223.	10.	-27.	0.	-144.	111.	105.	86.	109.	3657.	72.4	22.3	72.4	36.6	72.7	0.0
22	3484.	-13.	-12.	-109.	1.	-21.	0.	-70.	57.	44.	103.	49.	0.	71.9	0.0	70.4	0.0	77.3	0.0
23	575.	-76.	-76.	-676.	-24.	-182.	0.	-444.	418.	297.	287.	244.	0.	71.4	0.0	70.0	0.0	74.6	0.0
24	-1956.	-22.	-22.	-208.	-13.	-64.	0.	-131.	90.	54.	69.	70.	0.	71.0	0.0	70.1	0.0	72.9	0.0
TOTAL	32091.	-33.	-32.	-294.	-7.	21.	0.	-186.	112.	143.	192.	63.	65847.	MX 72.6	15.3	72.4	31.7	80.6	0.0
														MN 69.6		68.9		70.9	
														AV 71.6		71.3		74.0	

AVERAGES AND CUMULATIVE TOTALS AFTER 6 DAY(S)

TOTAL	-171699.	-37.	-36.	-362.	-18.	-52.	0.	-231.	135.	129.	186.	88.	726012.	MX 72.7	15.4	72.4	19.7	81.9	0.1
														MN 68.4		68.4		69.2	
														AV 71.4		71.1		73.6	

IDOY	ID	MONTH	NAMDAY	IWH	ROGDAY
7	7	1	THU.	1	0.4

IHOUR	TRMOO	QF	QW	TGWO	TGDO	TGOO	QON	QOFF	TGUO	TGEO	TGPO	TG_O	TERO	RMT(1)	PRO(1)	RMT(2)	PRO(2)	RMT(3)	PRO(3)
1	-3711.	-12.	-12.-114.		-10.	-38.	0.	-74.	45.	24.	32.	22.	0.	70.7	0.0	70.0	0.0	72.4	0.0
2	-4803.	-9.	-9. -91.		-10.	-32.	0.	-58.	34.	16.	23.	15.	0.	70.5	0.0	69.7	0.0	72.0	0.0
3	-5585.	-8.	-8. -81.		-10.	-31.	0.	-46.	29.	12.	18.	11.	0.	70.2	0.0	69.5	0.0	71.7	0.0
4	-6628.	-7.	-7. -71.		-10.	-27.	0.	-41.	24.	9.	14.	8.	42.	70.0	0.0	69.4	0.0	71.4	0.0
5	-7445.	-6.	-6. -66.		-10.	-26.	0.	-36.	21.	8.	11.	7.	622.	69.8	0.0	69.2	0.0	71.1	0.0
6	-8182.	-5.	-5. -63.		-11.	-25.	0.	-32.	19.	6.	10.	5.	1786.	69.6	0.0	69.0	0.0	70.9	0.0
7	-2975.	-15.	-15.-178.		-27.	-72.	0.-101.		41.	59.	149.	22.	1417.	69.9	0.0	68.9	0.0	78.3	0.0
8	1637.	-27.	-27.-330.		-13.	-131.	0.-217.		175.	133.	320.	84.	14160.	72.3	14.2	72.5	18.0	80.0	0.0
9	175.	-252.	-249.*****		-44.	-523.	0.*****		600.	831.	3275.	312.	12614.	72.3	16.4	72.3	19.7	75.9	0.0
10	6812.	-6.	-6. -71.		-0.	16.	0. -49.		19.	75.	90.	7.	7656.	72.4	14.8	72.3	29.2	74.3	0.0
11	6796.	-6.	-6. -64.		1.	40.	0. -44.		18.	88.	40.	6.	5407.	72.4	15.2	72.3	28.6	74.0	0.0
12	4763.	-9.	-9. -83.		2.	68.	0. -62.		22.	48.	75.	8.	3965.	72.4	14.3	72.3	45.4	74.4	0.0
13	4960.	-9.	-9. -77.		2.	67.	0. -65.		19.	34.	89.	7.	3374.	72.5	12.4	72.3	59.0	74.8	0.0
14	1792.	-25.	-24.-210.		6.	175.	0.-209.		50.	80.	130.	18.	5411.	72.4	11.4	72.3	40.4	73.3	0.0
15	295.	-149.	-148.*****		24.	846.	0.*****		276.	416.	649.	105.	6294.	72.4	11.5	72.3	30.1	73.1	0.0
16	96.	-459.	-456.*****		63.	1803.	0.*****		601.	2361.	2219.	302.	6538.	72.4	11.8	72.3	37.0	73.9	0.0
17	-238.	-185.	-184.*****		4.	363.	0.*****		308.	1513.	657.	115.	6155.	72.4	22.1	72.3	37.2	72.9	0.0
18	606.	-73.	-72.-753.		-2.	30.	0.-636.		267.	461.	371.	170.	5477.	72.4	20.8	72.3	35.0	73.0	0.0
19	548.	-80.	-80.-875.		-7.	-70.	0.-737.		329.	388.	575.	309.	5840.	72.4	23.9	72.3	33.4	72.7	0.0
20	-605.	-73.	-72.-819.		-10.	-141.	0.-665.		360.	308.	342.	323.	6281.	72.4	20.3	72.3	27.9	73.8	0.0
21	-2689.	-16.	-16.-190.		-3.	-47.	0.-155.		69.	65.	54.	63.	7657.	72.4	18.0	72.3	24.5	72.6	0.0
22	-1622.	-27.	-27.-329.		-25.	-99.	0.-266.		122.	95.	221.	105.	0.	71.3	0.0	69.5	0.0	77.0	0.0
23	-4546.	-10.	-10.-124.		-13.	-41.	0. -92.		53.	38.	36.	31.	0.	70.7	0.0	69.0	0.0	74.2	0.0
24	-7646.	-6.	-6. -77.		-10.	-27.	0. -57.		23.	14.	18.	18.	0.	70.2	0.0	68.9	0.0	72.4	0.0
TOTAL	-28196.	-37.	-37.-401.		-22.	-17.	0.-295.		127.	163.	218.	71.	100700.	MX 72.5	19.8	72.3	28.7	80.0	0.0
														MN 69.8		68.9		70.9	
														AV 71.5		71.1		73.8	

AVERAGES AND CUMULATIVE TOTALS AFTER 7 DAY(S)

TOTAL	-199895.	-37.	-36.-367.		-19.	-47.	0.-240.		134.	133.	190.	65.	826712.	MX 72.7	15.4	72.4	23.8	81.5	0.0
														MN 68.4		68.4		69.2	
														AV 71.5		71.1		73.7	

ENCORE.BLDG1.CITY4.

YEAR71.OUTPUT4

********** TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE **********

GEOGRAPHICAL LOCATION

VALUE OF	VARIABLE:	EXPLANATION OF VARIABLES
1971	IYEAR :	YEAR ANNUM DEUM
0	LEAP :	LEAP YEAR INDICATOR (1=LEAP YEAR)
4	NOCITY:	CITY NUMBER
OTTAWA	NAME :	CITY NAME
ONT.	IPROV :	PROVINCE OF CANADA
45.450	ONLAT :	LATITUDE (DEGREES NORTH)
75.617	OWLON :	LONGITUDE (DEGREES WEST)
5	ITZN :	TIME ZONE NUMBER
E	ITZ :	TIME ZONE LETTER DESIGNATION

ROOM TEMPERATURES AND HEATING DEMANDS

VALUE OF	VARIABLE:	EXPLANATION OF VARIABLES
TABLE(1)	IDOY :	DAY SEQUENCE NUMBER (1-366)
TABLE(2)	ID :	DAY OF THE MONTH (1- 31)
TABLE(3)	MONTH :	MONTH OF THE YEAR (1- 12)
TABLE(4)	NAMDAY:	DAY OF THE WEEK
TABLE(5)	IWH :	HOLIDAY FLAG (1=WORKING DAY, 2=HOLIDAY)
TABLE(6)	RDGDAY:	GROUND REFLECTIVITY (0.4=SNOWCOVER, 0.2=NO SNOWCOVER)
TABLE(1)	IHOUR :	HOUR OF THE DAY (1- 24)
TABLE(2)	RMT(4):	TEMP. IN ROOM NO. 4 (F)
TABLE(3)	PRO(4):	HTNG. DEMAND, RM. 4 (% TERO)
TABLE(4)	RMT(5):	TEMP. IN ROOM NO. 5 (F)
TABLE(5)	PRO(5):	HTNG. DEMAND, RM. 5 (% TERO)
TABLE(6)	RMT(6):	TEMP. IN ROOM NO. 6 (F)
TABLE(7)	PRO(6):	HTNG. DEMAND, RM. 6 (% TERO)
TABLE(8)	RMT(7):	TEMP. IN ROOM NO. 7 (F)
TABLE(9)	PRO(7):	HTNG. DEMAND, RM. 7 (% TERO)
TABLE(10)	RMT(8):	TEMP. IN ROOM NO. 8 (F)
TABLE(11)	PRO(8):	HTNG. DEMAND, RM. 8 (% TERO)
TABLE(12)	RMT(9):	TEMP. IN ROOM NO. 9 (F)
TABLE(13)	PRO(9):	HTNG. DEMAND, RM. 9 (% TERO)

IDOY	ID	MONTH	NAMDAY	IWH	ROGDAY
6	6	1	WED.	1	0.4

IHOJR	RMT(4)	PRO(4)	RMT(5)	PRO(5)	RMT(6)	PRO(6)	RMT(7)	PRO(7)	RMT(8)	PRO(8)	RMT(9)	PRO(9)
1	70.9	0.0	70.1	0.0								
2	70.3	0.0	69.7	0.0								
3	69.7	0.0	69.2	0.0								
4	69.1	0.0	68.7	0.0								
5	68.5	34.3	68.5	65.7								
6	68.5	56.9	68.4	43.1								
7	68.6	0.0	68.4	100.0								
8	72.4	22.6	71.7	44.2								
9	72.3	41.9	72.1	21.5								
10	72.3	55.4	75.3	0.0								
11	72.4	54.2	74.9	0.0								
12	72.5	5.5	72.7	0.0								
13	73.4	0.0	72.5	8.5								
14	72.6	0.0	72.4	21.8								
15	72.5	25.9	72.4	25.5								
16	72.5	1.6	72.4	32.8								
17	73.4	0.0	72.3	32.5								
18	73.8	0.0	72.3	43.8								
19	74.7	0.0	72.3	44.1								
20	73.7	0.0	72.3	42.9								
21	73.2	0.0	72.3	41.1								
22	73.0	0.0	71.1	0.0								
23	72.7	0.0	70.5	0.0								
24	71.6	0.0	70.2	0.0								
TOTAL	MX 74.7	24.1	75.3	29.0								
	MN 68.5		68.4									
	AV 71.8		71.4									

AVERAGES AND CUMULATIVE TOTALS AFTER 6 DAY(S)

TOTAL	MX 74.7	27.9	75.3	37.0								
	MN 68.3		68.1									
	AV 71.5		70.9									

********** TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE **********

GEOGRAPHICAL LOCATION

VALUE OF	VARIABLE:	EXPLANATION OF VARIABLES
1971	IYEAR :	YEAR ANNUM DEUM
0	LEAP :	LEAP YEAR INDICATOR (1=LEAP YEAR)
4	NOCITY:	CITY NUMBER
OTTAWA	NAME :	CITY NAME
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75.617	DWLON :	LONGITUDE (DEGREES WEST)
5	ITZN :	TIME ZONE NUMBER
E	ITZ :	TIME ZONE LETTER DESIGNATION

BASEMENT HEATLOSS PLOT

DRIVING FUNCTION

51.89 + 37.63 * COS(2*PI*T/N + 2.90)

GROUND SURFACE SOL-AIR TEMPERATURE (DEG.F)

WHERE

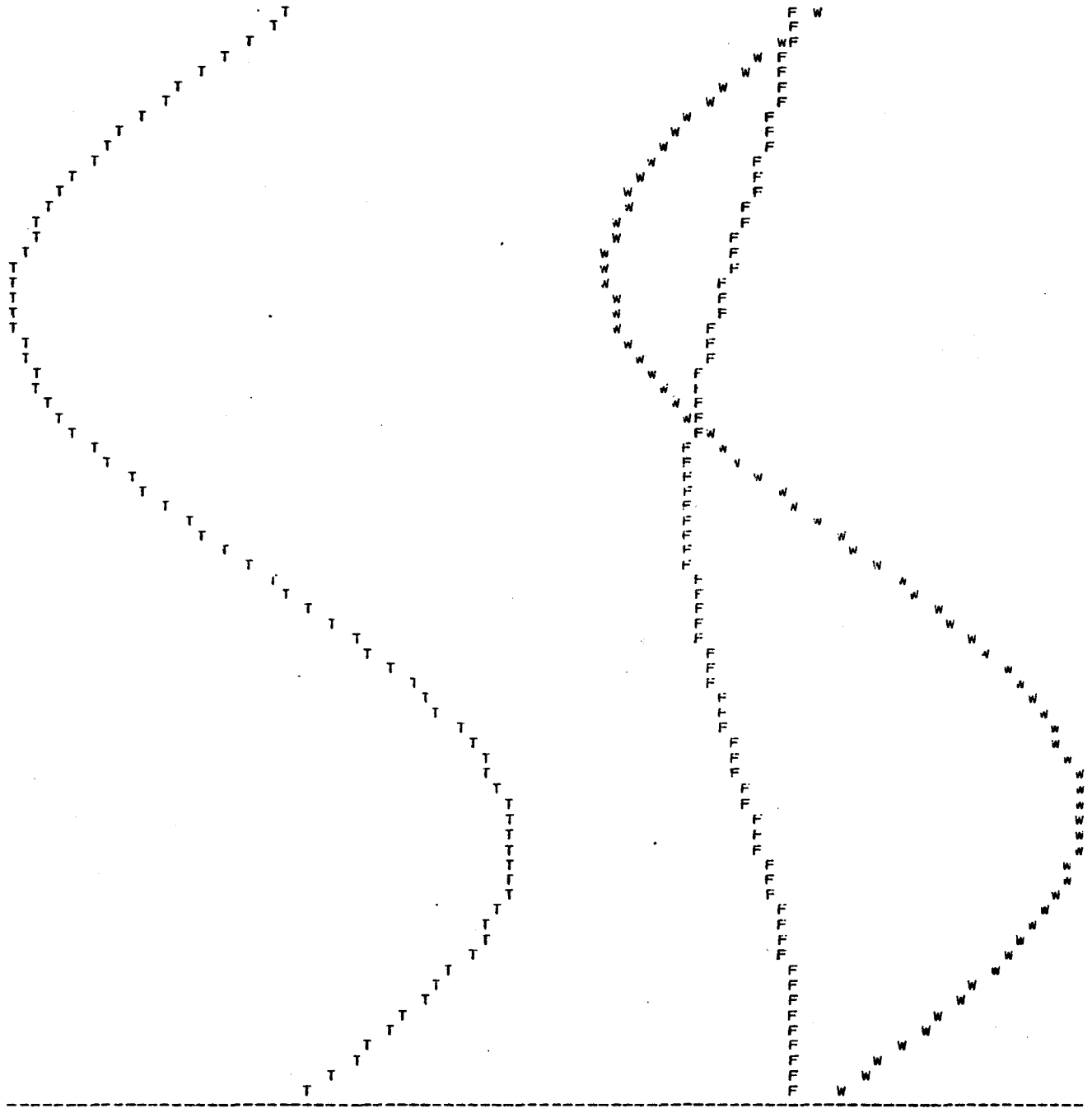
PI = 3.1415926
T = TIME IN DAYS FROM BEGINNING OF YEAR
N = NUMBER OF DAYS IN A YEAR (365 OR 366)

MEAN INTERIOR SURFACE TEMPERATURE: 70. (F)

BASEMENT HEATLOSS PLOT

DAY NO.	WALL-LOSS (BTU/H)	FLOOR-LOSS (BTU/H)	TOTAL-LOSS (BTU/H)
1	-0.415E 03	-0.438E 03	-0.853E 03
6	-0.432E 03	-0.439E 03	-0.871E 03
11	-0.448E 03	-0.441E 03	-0.889E 03
16	-0.464E 03	-0.443E 03	-0.907E 03
21	-0.479E 03	-0.445E 03	-0.924E 03
26	-0.494E 03	-0.447E 03	-0.941E 03
31	-0.508E 03	-0.450E 03	-0.958E 03
36	-0.521E 03	-0.453E 03	-0.974E 03
41	-0.533E 03	-0.456E 03	-0.989E 03
46	-0.544E 03	-0.459E 03	-0.100E 04
51	-0.555E 03	-0.462E 03	-0.102E 04
56	-0.564E 03	-0.466E 03	-0.103E 04
61	-0.571E 03	-0.469E 03	-0.104E 04
66	-0.578E 03	-0.473E 03	-0.105E 04
71	-0.583E 03	-0.477E 03	-0.106E 04
76	-0.586E 03	-0.481E 03	-0.107E 04
81	-0.589E 03	-0.484E 03	-0.107E 04
86	-0.589E 03	-0.488E 03	-0.108E 04
91	-0.589E 03	-0.492E 03	-0.108E 04
96	-0.587E 03	-0.495E 03	-0.108E 04
101	-0.583E 03	-0.499E 03	-0.108E 04
106	-0.578E 03	-0.502E 03	-0.108E 04
111	-0.572E 03	-0.505E 03	-0.108E 04
116	-0.565E 03	-0.508E 03	-0.107E 04
121	-0.556E 03	-0.511E 03	-0.107E 04
126	-0.546E 03	-0.513E 03	-0.106E 04
131	-0.535E 03	-0.515E 03	-0.105E 04
136	-0.523E 03	-0.517E 03	-0.104E 04
141	-0.510E 03	-0.519E 03	-0.103E 04
146	-0.496E 03	-0.520E 03	-0.102E 04
151	-0.481E 03	-0.522E 03	-0.100E 04
156	-0.466E 03	-0.522E 03	-0.988E 03
161	-0.450E 03	-0.523E 03	-0.973E 03
166	-0.434E 03	-0.523E 03	-0.957E 03
171	-0.417E 03	-0.523E 03	-0.940E 03
176	-0.401E 03	-0.522E 03	-0.923E 03
181	-0.384E 03	-0.522E 03	-0.905E 03
186	-0.367E 03	-0.520E 03	-0.888E 03
191	-0.351E 03	-0.519E 03	-0.870E 03
196	-0.335E 03	-0.517E 03	-0.852E 03
201	-0.319E 03	-0.515E 03	-0.835E 03
206	-0.304E 03	-0.513E 03	-0.817E 03
211	-0.290E 03	-0.511E 03	-0.800E 03
216	-0.276E 03	-0.508E 03	-0.784E 03
221	-0.264E 03	-0.505E 03	-0.768E 03
226	-0.252E 03	-0.502E 03	-0.754E 03
231	-0.241E 03	-0.499E 03	-0.740E 03
236	-0.232E 03	-0.495E 03	-0.727E 03
241	-0.223E 03	-0.492E 03	-0.715E 03
246	-0.216E 03	-0.488E 03	-0.704E 03
251	-0.211E 03	-0.484E 03	-0.695E 03
256	-0.206E 03	-0.481E 03	-0.687E 03
261	-0.203E 03	-0.477E 03	-0.680E 03
266	-0.202E 03	-0.473E 03	-0.675E 03
271	-0.202E 03	-0.469E 03	-0.671E 03
276	-0.203E 03	-0.466E 03	-0.669E 03
281	-0.206E 03	-0.462E 03	-0.668E 03
286	-0.210E 03	-0.459E 03	-0.669E 03
291	-0.215E 03	-0.456E 03	-0.671E 03
296	-0.222E 03	-0.453E 03	-0.675E 03
301	-0.230E 03	-0.450E 03	-0.680E 03
306	-0.240E 03	-0.447E 03	-0.687E 03
311	-0.250E 03	-0.445E 03	-0.695E 03
316	-0.262E 03	-0.443E 03	-0.705E 03
321	-0.275E 03	-0.441E 03	-0.716E 03
326	-0.288E 03	-0.439E 03	-0.728E 03
331	-0.302E 03	-0.438E 03	-0.741E 03
336	-0.317E 03	-0.437E 03	-0.755E 03
341	-0.333E 03	-0.437E 03	-0.769E 03
346	-0.349E 03	-0.436E 03	-0.785E 03
351	-0.365E 03	-0.436E 03	-0.802E 03
356	-0.382E 03	-0.437E 03	-0.818E 03
361	-0.399E 03	-0.437E 03	-0.836E 03
TTL	-0.346E 07	-0.420E 07	-0.766E 07

W:WALL, F:FLOOR, T:TOTAL, |:ZERO HEATLOSS/TIME AXIS



(TOTALS ARE GIVEN IN BTU)

ENCORE.BLDG1.CITY4.

YEAR71.OUTPUT6

********** TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE **********

GEOGRAPHICAL LOCATION

VALUE OF	VARIABLE:	EXPLANATION OF VARIABLES
1971	IYEAR :	YEAR ANNUM DRUM
0	LEAP :	LEAP YEAR INDICATOR (1=LEAP YEAR)
4	NOCITY:	CITY NUMBER
OTTAWA	NAME :	CITY NAME
ONT.	IPROV :	PROVINCE OF CANADA
45.460	DNLAT :	LATITUDE (DEGREES NORTH)
75.617	DWLON :	LONGITUDE (DEGREES WEST)
5	ITZN :	TIME ZONE NUMBER
E	ITZ :	TIME ZONE LETTER DESIGNATION

FURNACE AND INFILTRATION RESULTS

VALUE OF	VARIABLE:	EXPLANATION OF VARIABLES
TABLE(1)	IDDY :	DAY SEQUENCE NUMBER (1-366)
TABLE(2)	ID :	DAY OF THE MONTH (1- 31)
TABLE(3)	MONTH :	MONTH OF THE YEAR (1- 12)
TABLE(4)	NAMDAY:	DAY OF THE WEEK
TABLE(5)	IWH :	HOLIDAY FLAG (1=WORKING DAY, 2=HOLIDAY)
TABLE(6)	RDGDAY:	GROUND REFLECTIVITY (0.4=SNOWCOVER, 0.2=NO SNOWCOVER)
TABLE(1)	IHOUR :	HOUR OF THE DAY (1- 24)
TABLE(2)	ONT :	MEAN ON-CYCLE FLUE-GAS TEMP. (F)
TABLE(3)	OFFT :	MEAN OFF-CYCLE FLUE-GAS TEMP. (F)
TABLE(4)	ETA :	FURNACE EFFICIENCY (%)
TABLE(5)	FLF :	FURNACE LOAD FACTOR
TABLE(6)	CCS :	NO. OF BURNER CYCLES/HOUR
TABLE(7)	PON :	INDOOR PRESSURE, GND. LEVEL, FURNACE ON (LB/FT**2)
TABLE(8)	POFF :	INDOOR PRESSURE, GND. LEVEL, FURNACE OFF (LB/FT**2)
TABLE(10)	GCHON :	CHIMNEY FLOW, FURNACE ON (LB/S)
TABLE(11)	GCHOFF:	CHIMNEY FLOW, FURNACE OFF (LB/S)
TABLE(12)	VOLON :	FURNACE ON AIR CHANGE/HOUR
TABLE(13)	VOLOFF:	FURNACE OFF AIR CHANGE/HOUR
TABLE(14)	VOLTOT:	=FLF*VOLON+(1-FLF)*VOLOFF
TABLE(15)	QON :	FURNACE ON INFILTRATION (BTU/H)
TABLE(16)	QOFF :	FURNACE OFF INFILTRATION (BTU/H)

IDOY	ID	MONTH	NAMDAY	IWH	ROGDAY
6	6	1	WED.	1	0.4

IHOUR	ONT	OFFT	ETA	FLF	CCS	PON	POFF	GCHON	GCHOFF	VOLON	VOLOFF	VOLTOT	QON	QOFF
1	0.0	0.0	0.0	0.00	0.00	-0.1276	-0.1276	0.0000	0.0000	0.00	0.20	0.20	0.	-2448.
2	0.0	0.0	0.0	0.00	0.00	-0.1000	-0.1000	0.0000	0.0000	0.00	0.19	0.19	0.	-2326.
3	0.0	0.0	0.0	0.00	0.00	-0.1024	-0.1024	0.0000	0.0000	0.00	0.19	0.19	0.	-2441.
4	0.0	0.0	0.0	0.00	0.00	-0.0904	-0.0904	0.0000	0.0000	0.00	0.19	0.19	0.	-2526.
5	0.0	0.0	0.0	0.00	0.00	-0.0944	-0.0944	0.0000	0.0000	0.00	0.20	0.20	0.	-2705.
6	0.0	0.0	0.0	0.00	0.00	-0.0942	-0.0942	0.0000	0.0000	0.00	0.20	0.20	0.	-2691.
7	0.0	0.0	0.0	0.00	0.00	-0.1128	-0.1128	0.0000	0.0000	0.00	0.21	0.21	0.	-2804.
8	0.0	0.0	0.0	0.00	0.00	-0.1088	-0.1088	0.0000	0.0000	0.00	0.21	0.21	0.	-2963.
9	0.0	0.0	0.0	0.00	0.00	-0.1139	-0.1139	0.0000	0.0000	0.00	0.21	0.21	0.	-2983.
10	0.0	0.0	0.0	0.00	0.00	-0.1081	-0.1081	0.0000	0.0000	0.00	0.20	0.20	0.	-2801.
11	0.0	0.0	0.0	0.00	0.00	-0.1209	-0.1209	0.0000	0.0000	0.00	0.20	0.20	0.	-2659.
12	0.0	0.0	0.0	0.00	0.00	-0.1097	-0.1097	0.0000	0.0000	0.00	0.18	0.18	0.	-2296.
13	0.0	0.0	0.0	0.00	0.00	-0.1212	-0.1212	0.0000	0.0000	0.00	0.19	0.19	0.	-2329.
14	0.0	0.0	0.0	0.00	0.00	-0.1058	-0.1058	0.0000	0.0000	0.00	0.19	0.19	0.	-2238.
15	0.0	0.0	0.0	0.00	0.00	-0.0845	-0.0845	0.0000	0.0000	0.00	0.18	0.18	0.	-2051.
16	0.0	0.0	0.0	0.00	0.00	-0.1095	-0.1095	0.0000	0.0000	0.00	0.19	0.18	0.	-2119.
17	0.0	0.0	0.0	0.00	0.00	-0.1156	-0.1156	0.0000	0.0000	0.00	0.18	0.18	0.	-2046.
18	0.0	0.0	0.0	0.00	0.00	-0.1093	-0.1093	0.0000	0.0000	0.00	0.20	0.20	0.	-2398.
19	0.0	0.0	0.0	0.00	0.00	-0.1064	-0.1064	0.0000	0.0000	0.00	0.19	0.19	0.	-2439.
20	0.0	0.0	0.0	0.00	0.00	-0.1009	-0.1009	0.0000	0.0000	0.00	0.19	0.19	0.	-2446.
21	0.0	0.0	0.0	0.00	0.00	-0.0978	-0.0978	0.0000	0.0000	0.00	0.19	0.19	0.	-2414.
22	0.0	0.0	0.0	0.00	0.00	-0.1062	-0.1062	0.0000	0.0000	0.00	0.19	0.19	0.	-2427.
23	0.0	0.0	0.0	0.00	0.00	-0.1267	-0.1267	0.0000	0.0000	0.00	0.19	0.19	0.	-2556.
24	0.0	0.0	0.0	0.00	0.00	-0.1403	-0.1403	0.0000	0.0000	0.00	0.20	0.20	0.	-2561.
MEAN=	0.0	0.0	0.0	0.00	0.00	-0.1086	-0.1086	0.0000	0.0000	0.00	0.19	0.19	0.	-2486.

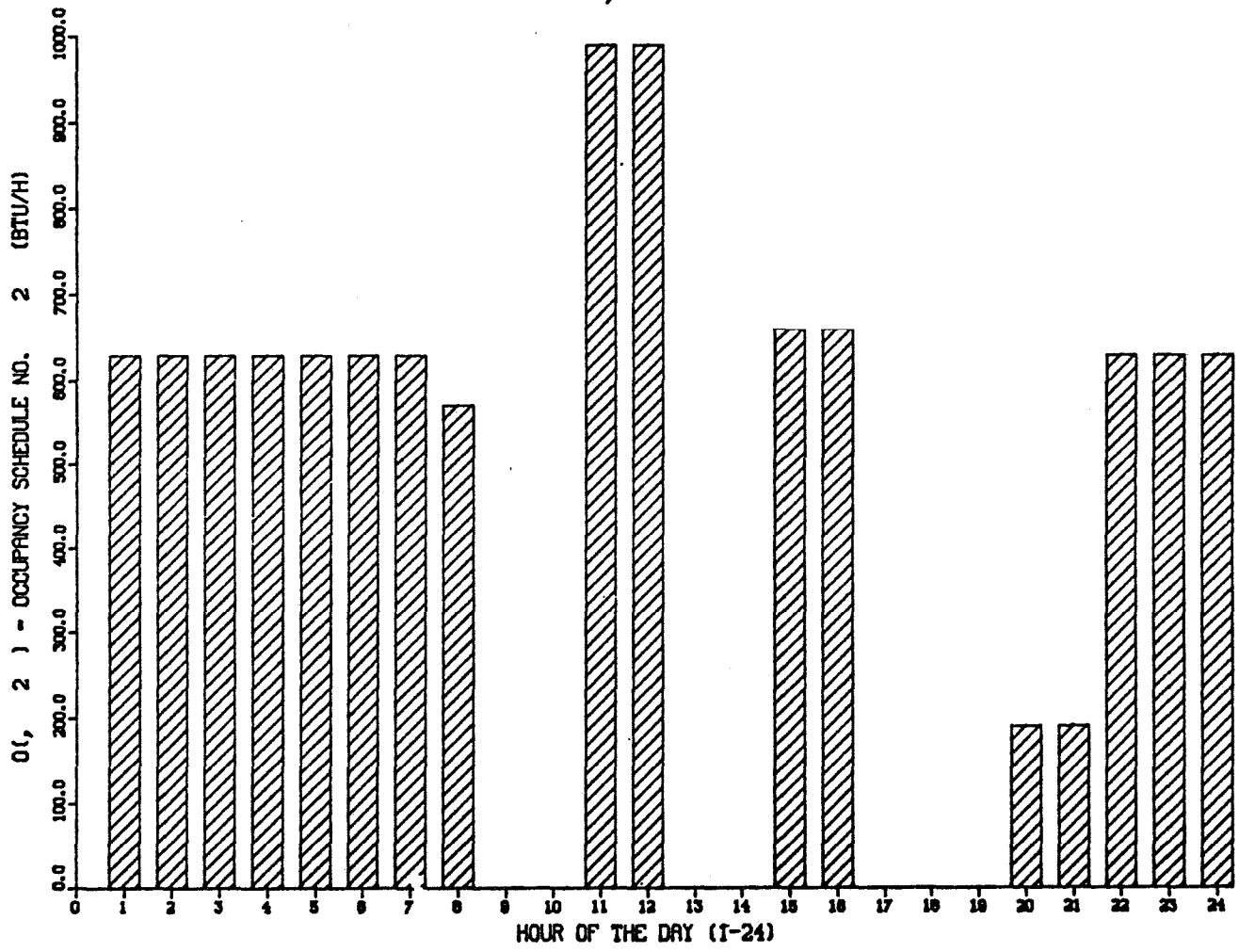
MEAN VALUES.AFTER 6 DAY(S)

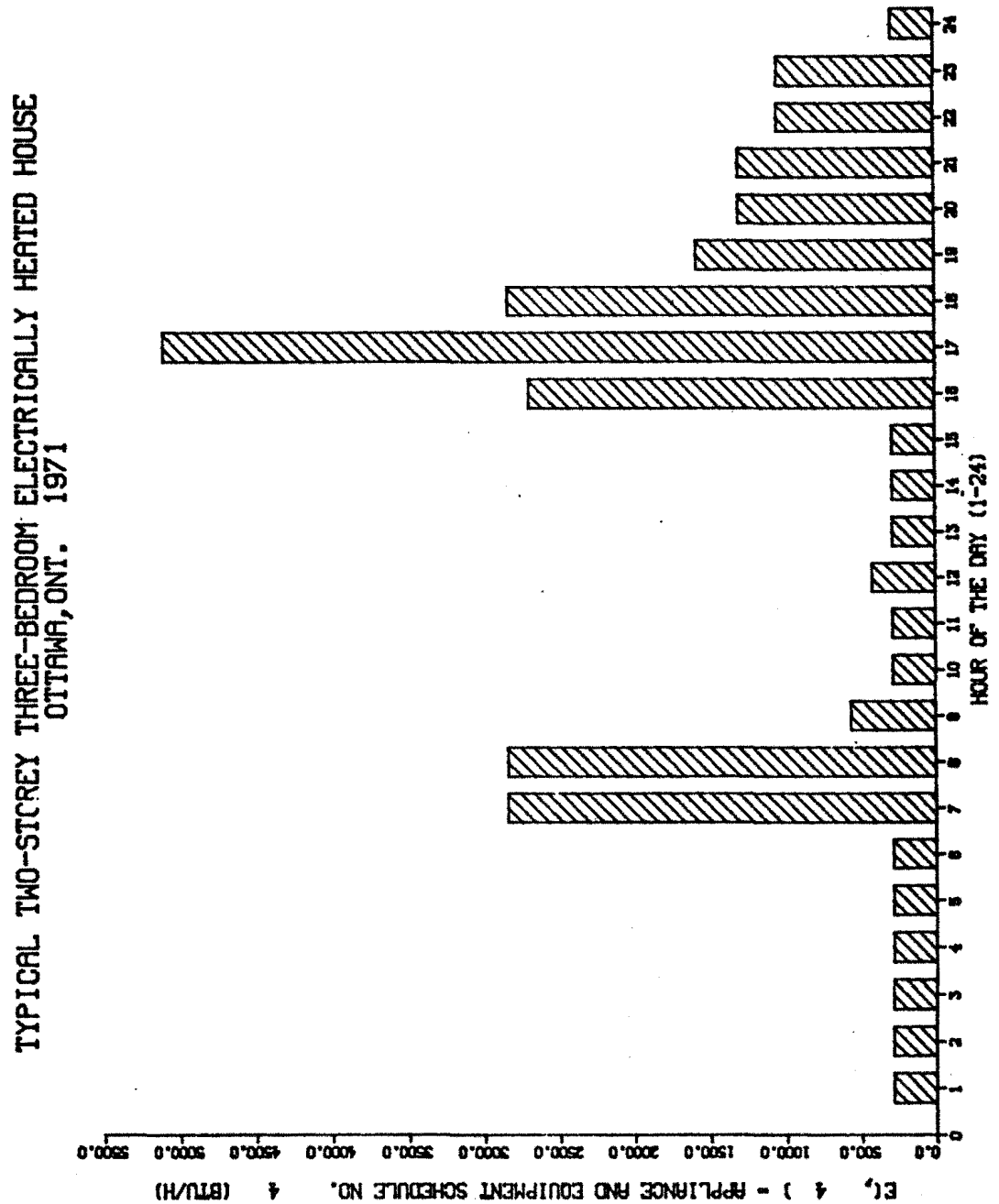
MEAN=	0.0	0.0	0.0	0.00	0.00	-0.1099	-0.1099	0.0000	0.0000	0.00	0.21	0.21	0.	-2749.

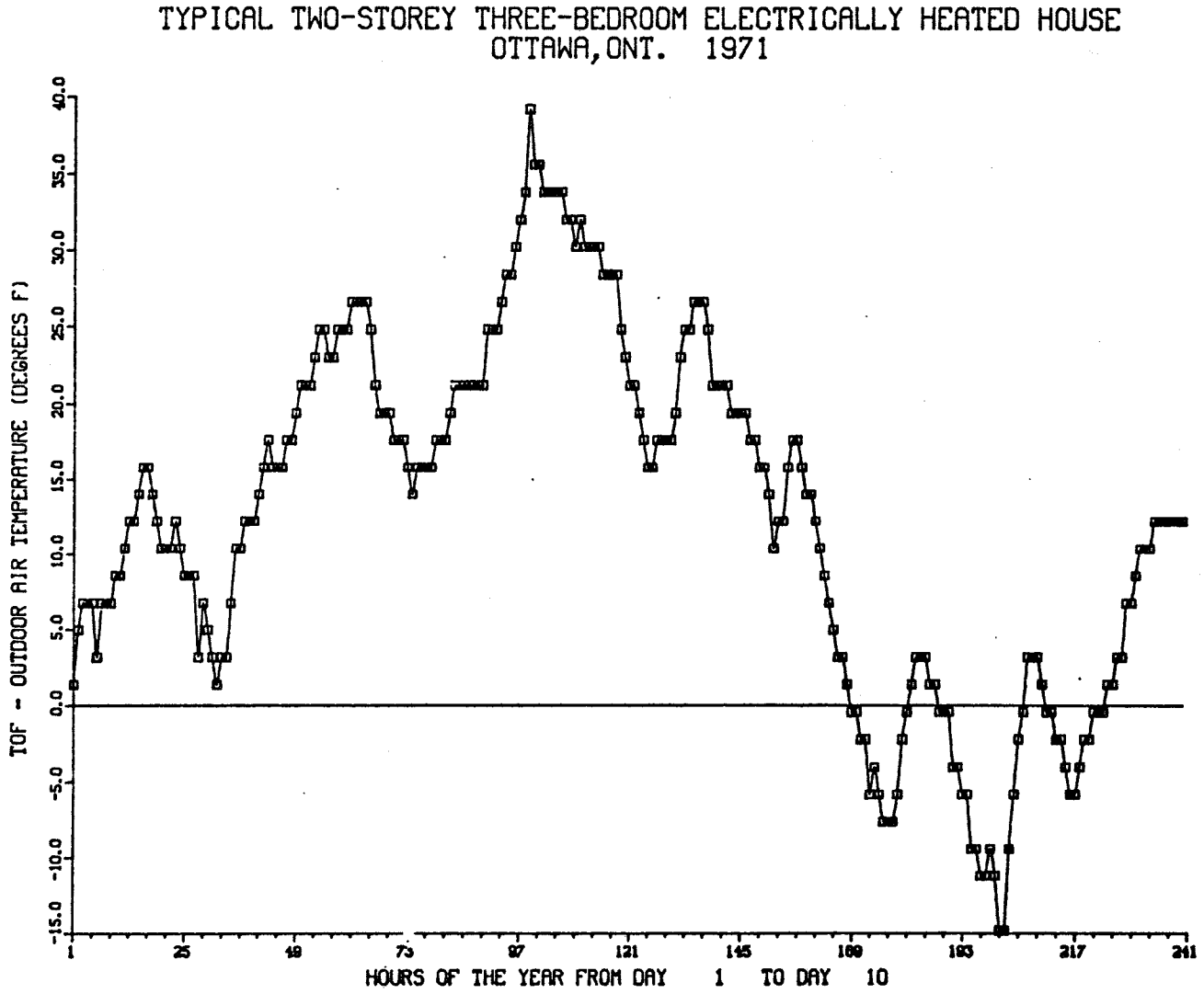
APPENDIX III

Partial ENCORE-CANADA Plotted Output for the Example

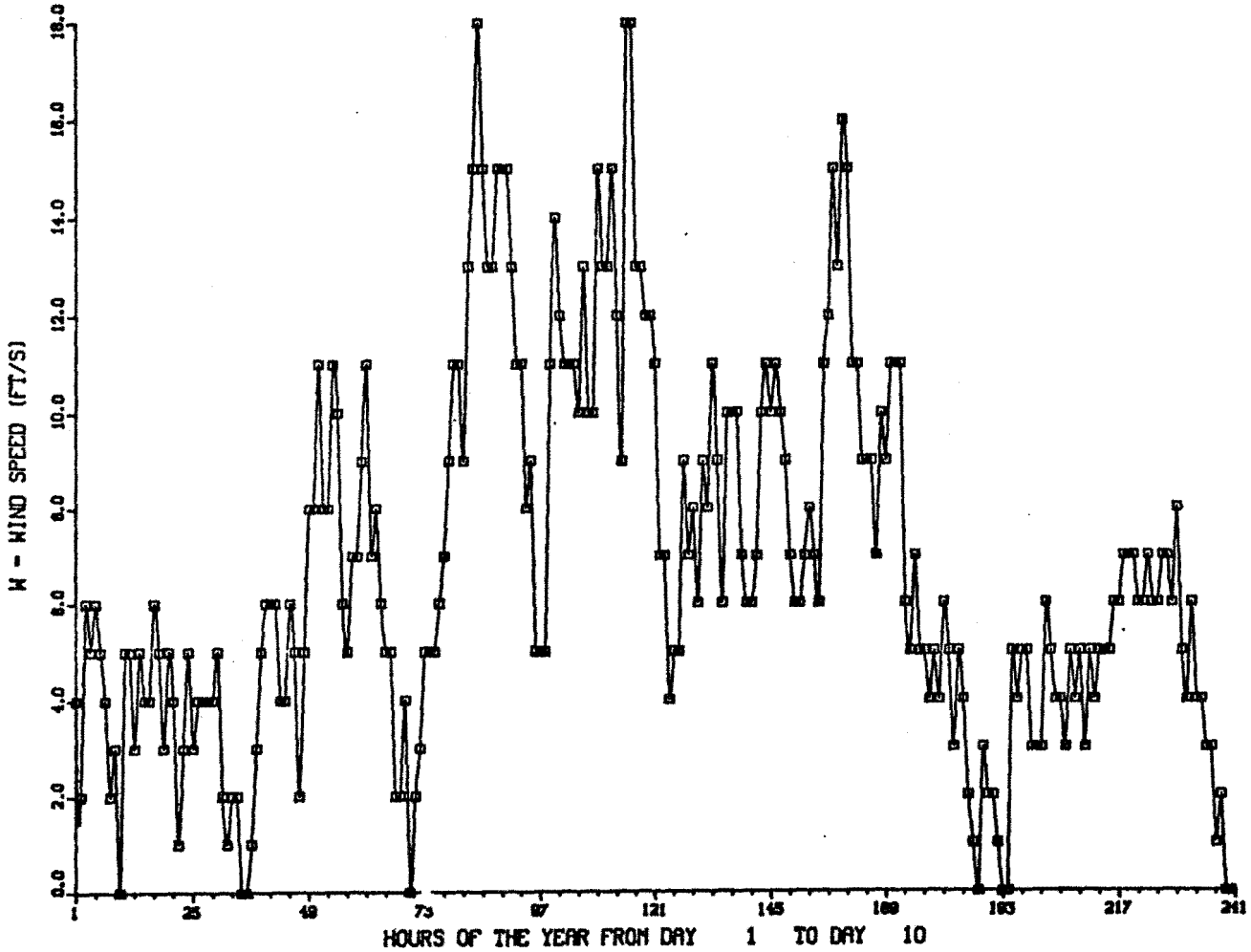
TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA, ONT. 1971

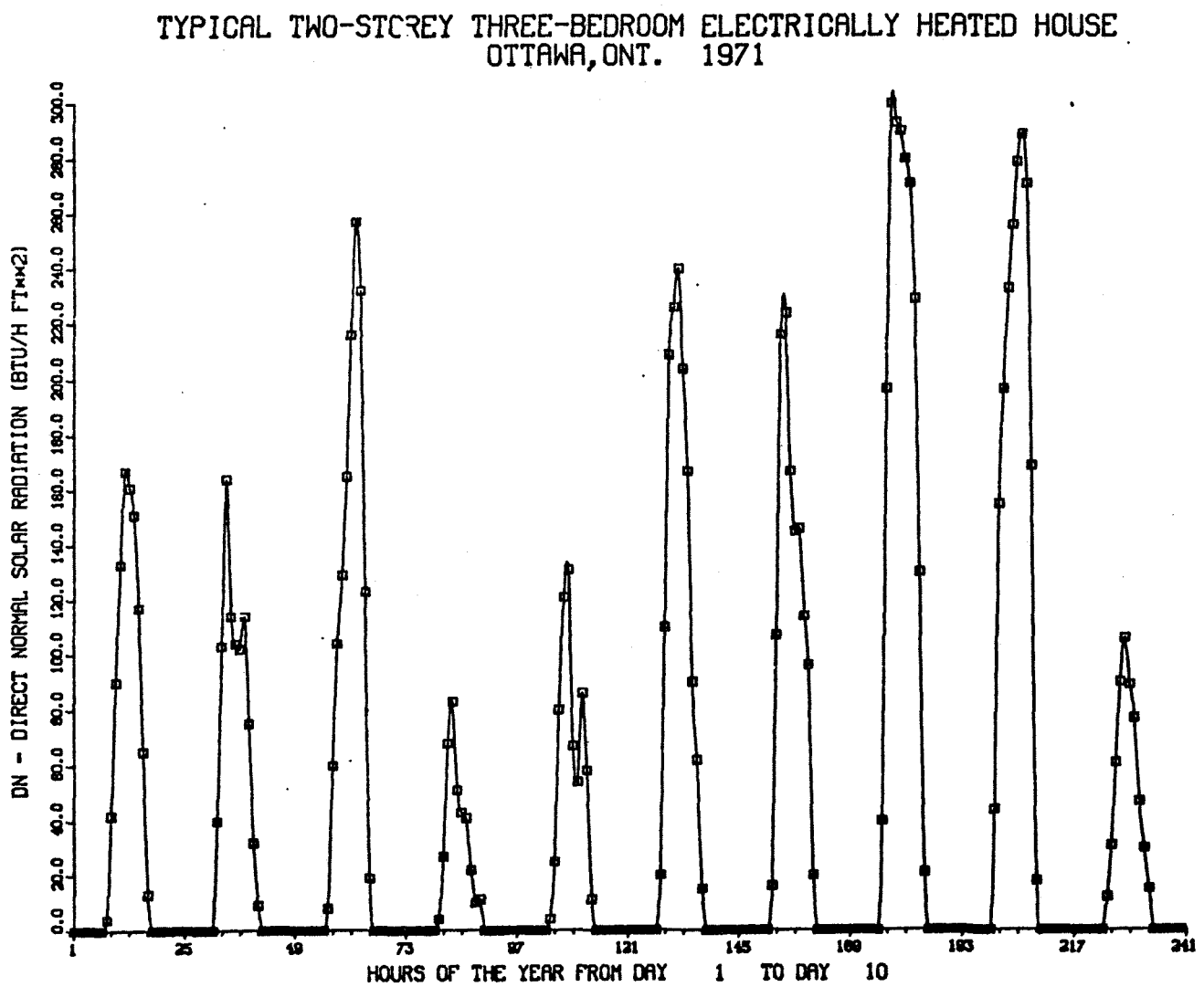


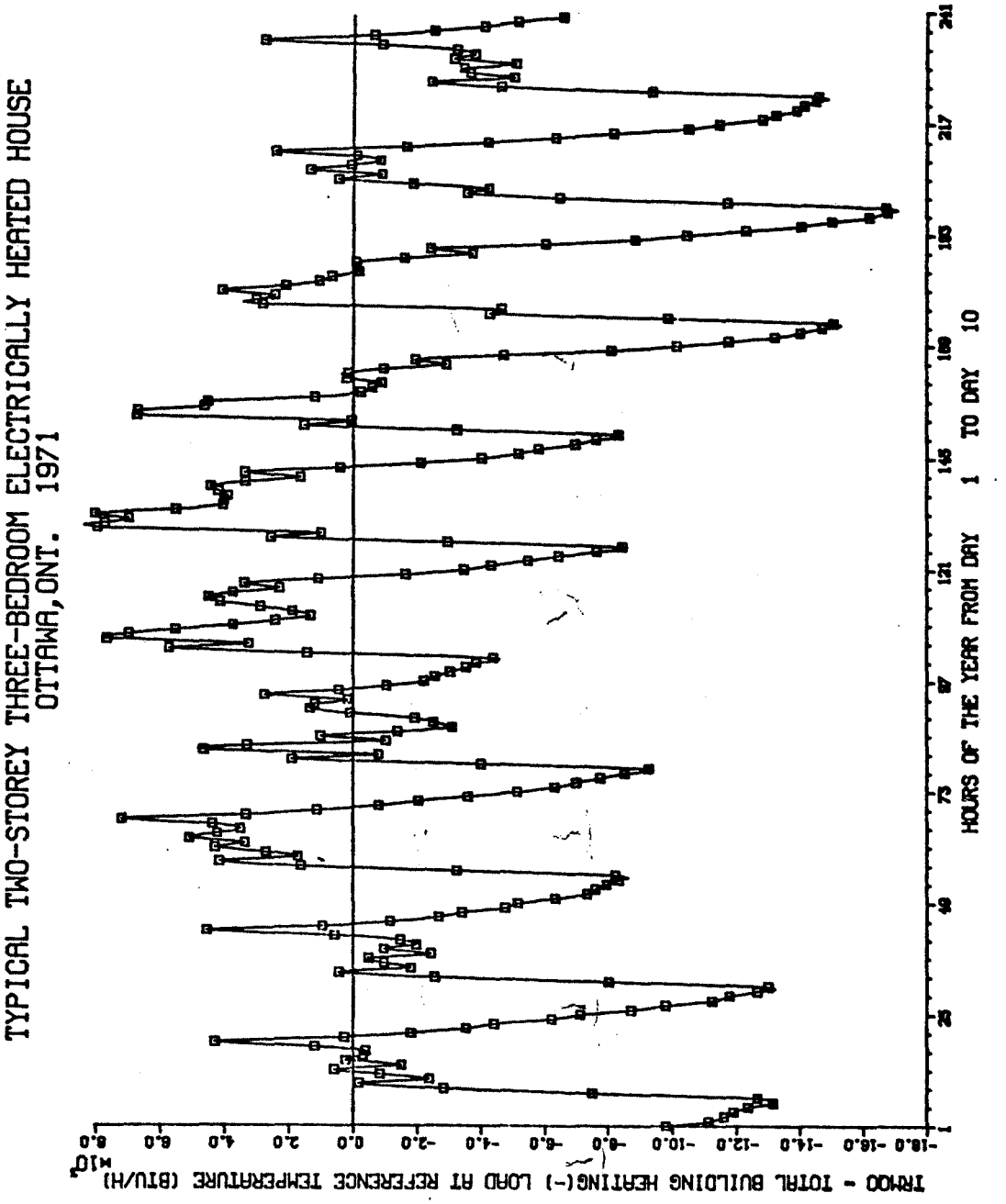

TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA, ONT. 1971
E(4) - APPLIANCE AND EQUIPMENT SCHEDULE NO. 4 (BTU/H)
0.0
500.0
1000.0
1500.0
2000.0
2500.0
3000.0
3500.0
4000.0
4500.0
5000.0
HOUR OF THE DAY (1-24)


TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA, ONT. 1971
TOF - OUTDOOR AIR TEMPERATURE (DEGREES F)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
-5.0
-10.0
-15.0
1
25
49
73
97
121
145
169
193
217
241
HOURS OF THE YEAR FROM DAY 1 TO DAY 10

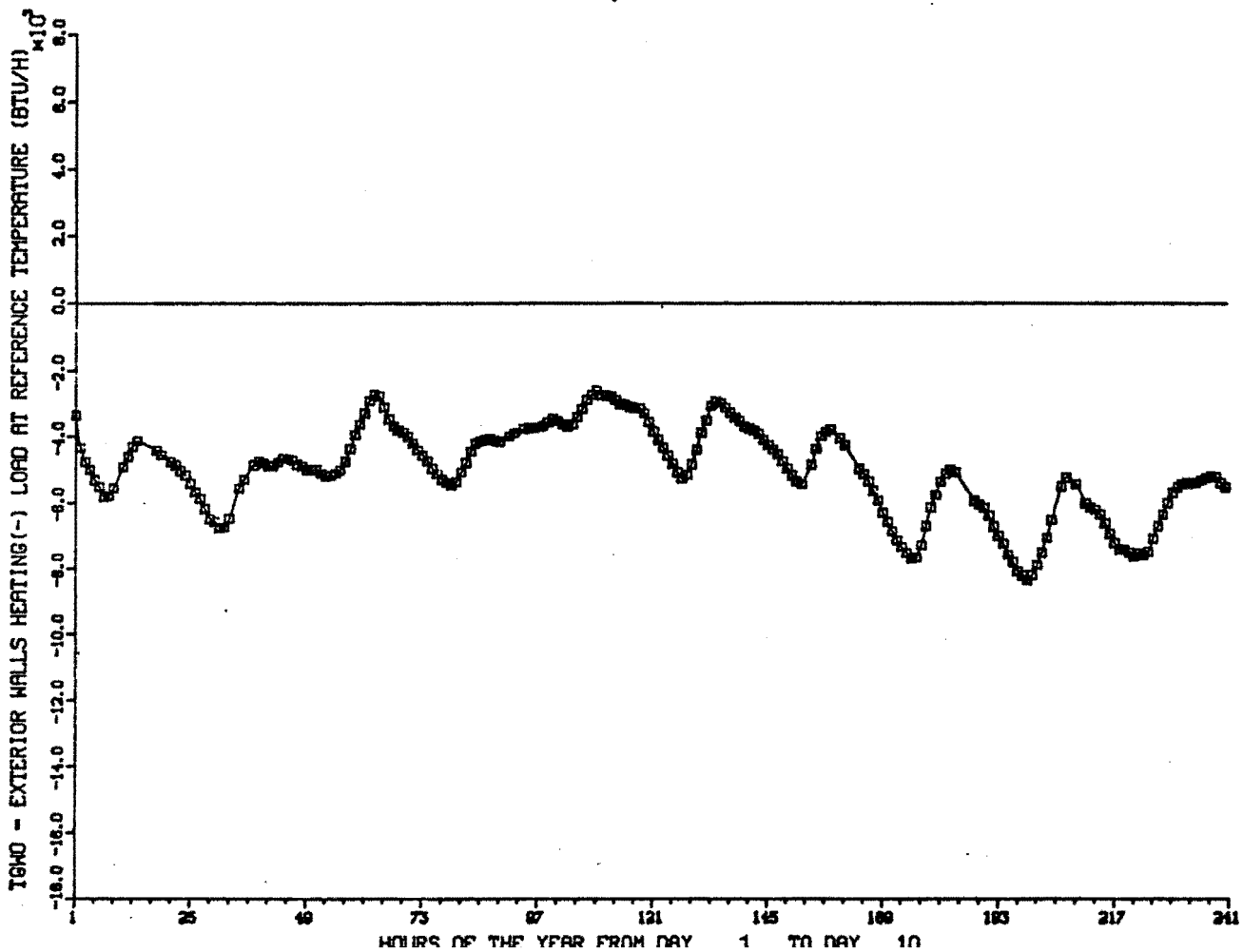
TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA, ONT. 1971



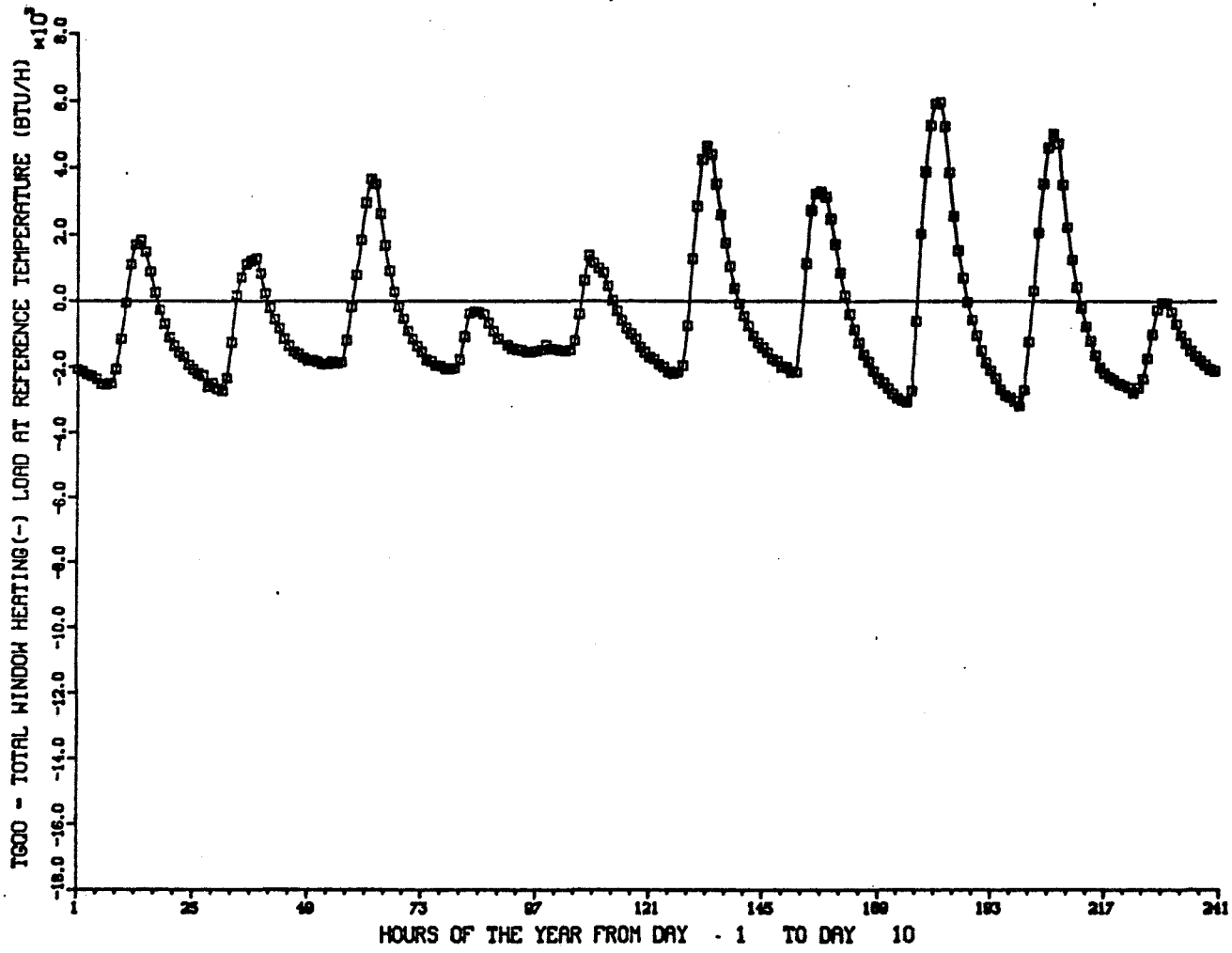

TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA, ONT. 1971
DN - DIRECT NORMAL SOLAR RADIATION (BTU/H FT**2)
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0
200.0
220.0
240.0
260.0
280.0
300.0
1
25
49
73
97
121
145
169
193
217
241
HOURS OF THE YEAR FROM DAY 1 TO DAY 10


TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA,ONT. 1971
TRNOD - TOTAL BUILDING HEATING(-) LOAD AT REFERENCE TEMPERATURE (BTU/H)
X10⁴
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
-6.0
-8.0
-10.0
-12.0
-14.0
-16.0
-18.0
1
25
49
73
97
121
145
169
193
217
241
HOURS OF THE YEAR FROM DAY 1 TO DAY 10

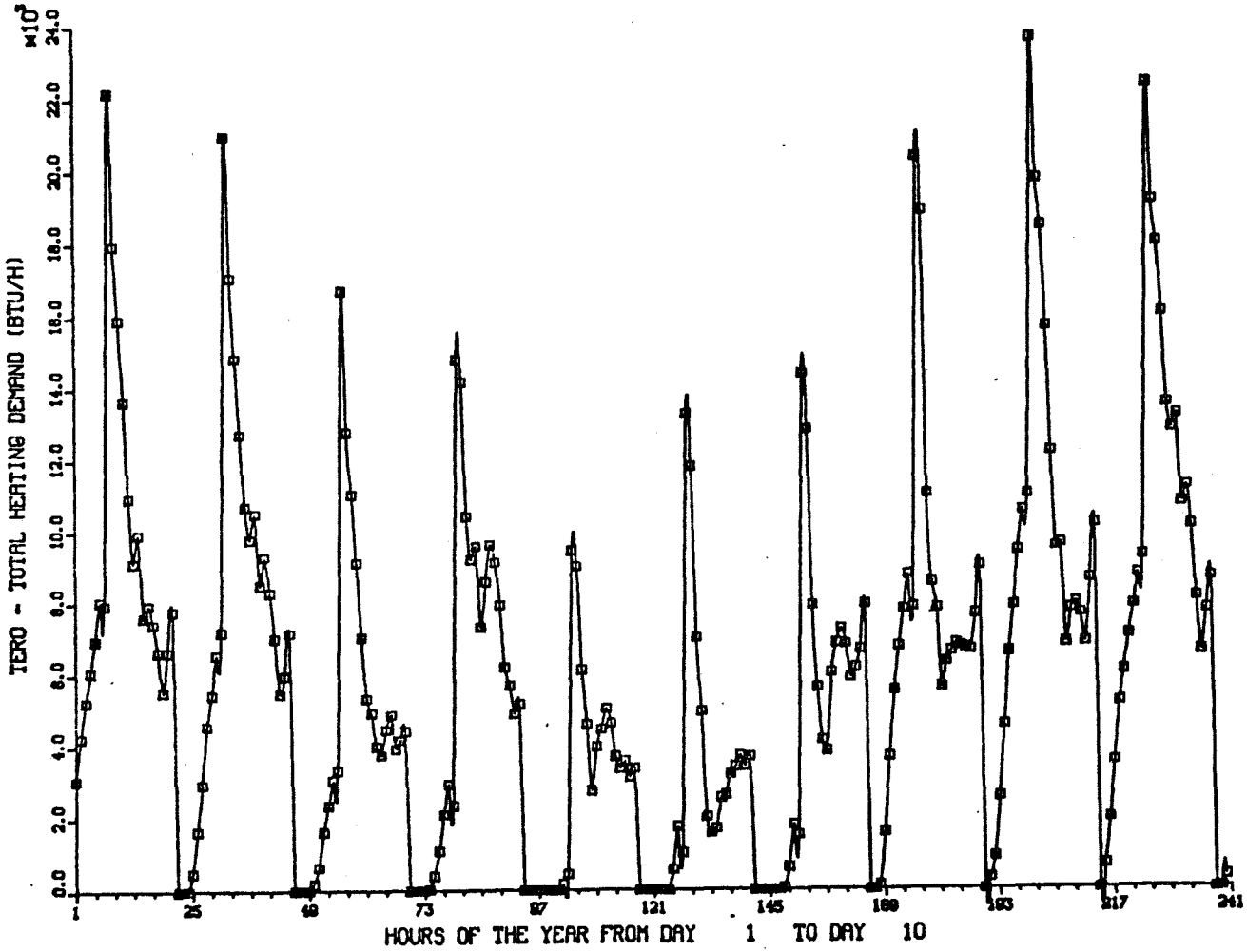
TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA, ONT. 1971

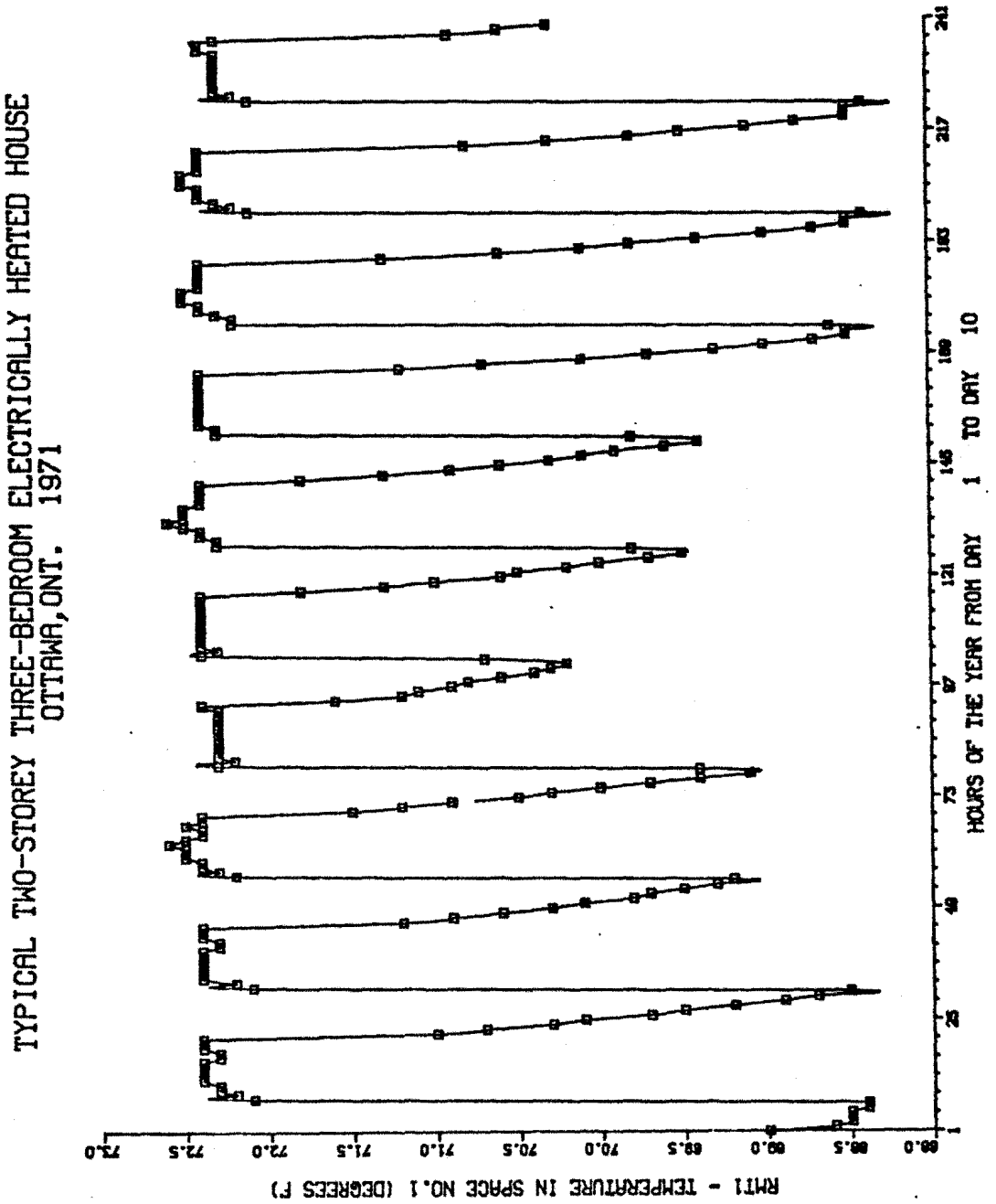


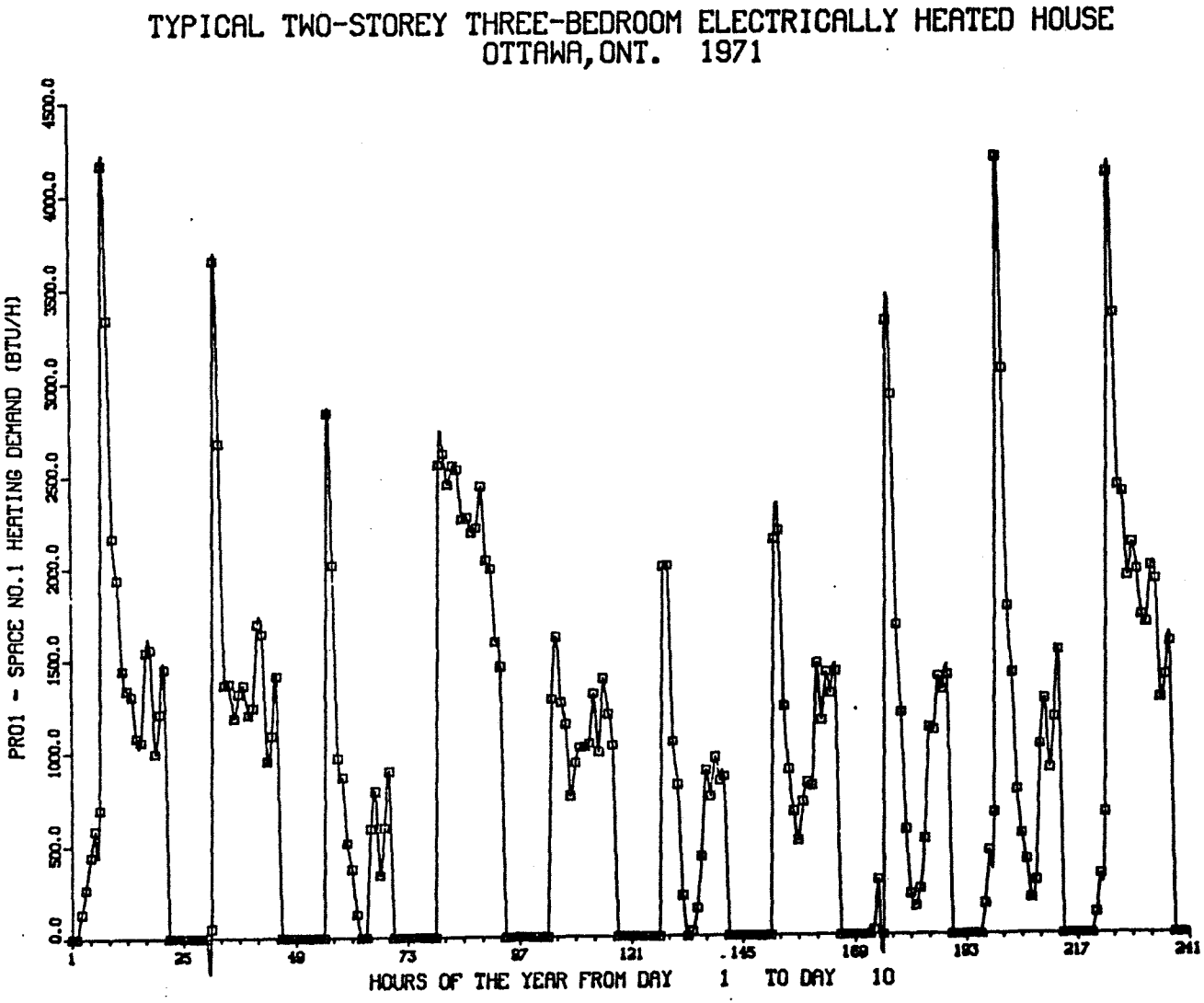
TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA, ONT. 1971

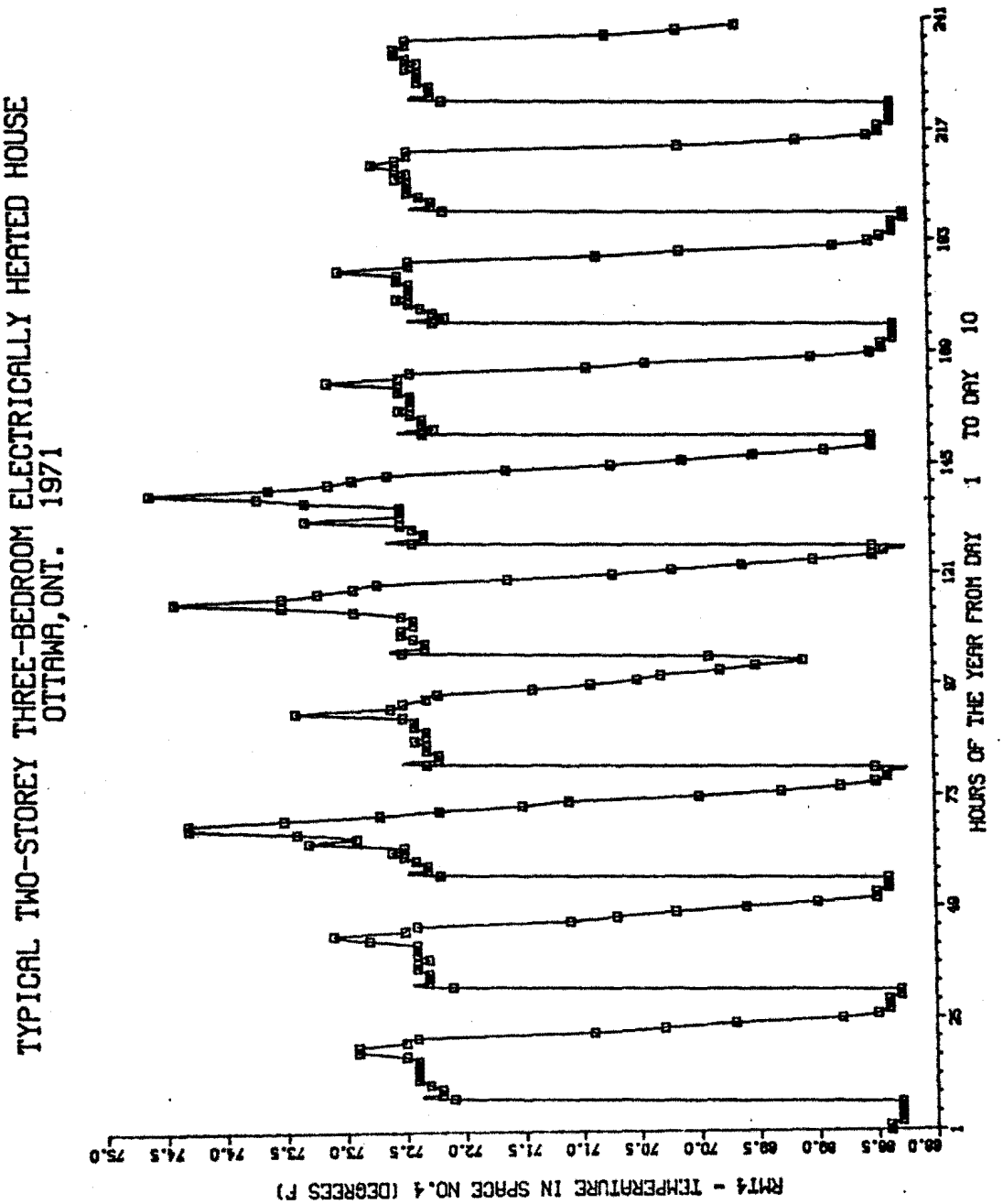


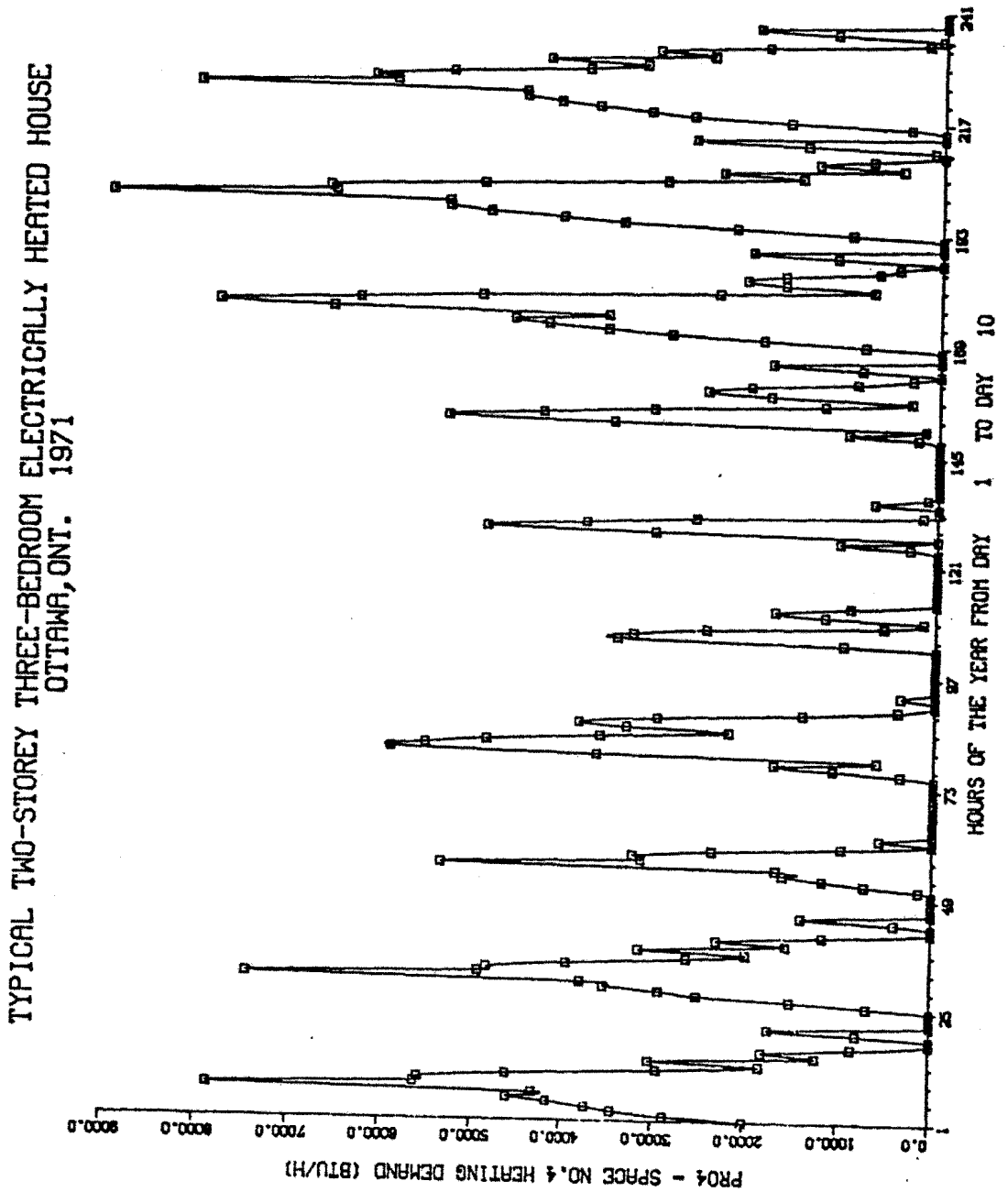
TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA, ONT. 1971




TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA,ONT. 1971
RMT1 - TEMPERATURE IN SPACE NO.1 (DEGREES F)
68.0
68.5
69.0
69.5
70.0
70.5
71.0
71.5
72.0
72.5
73.0
1
25
49
73
97
121
145
169
193
217
241
HOURS OF THE YEAR FROM DAY 1 TO DAY 10


TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA, ONT. 1971
PRO1 - SPACE NO.1 HEATING DEMAND (BTU/H)
0.0
500.0
1000.0
1500.0
2000.0
2500.0
3000.0
3500.0
4000.0
4500.0
1
25
49
73
97
121
145
169
193
217
241
HOURS OF THE YEAR FROM DAY 1 TO DAY 10


TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA,ONT. 1971
RM14 - TEMPERATURE IN SPACE NO.4 (DEGREES F)
88.0
88.5
89.0
89.5
70.0
70.5
71.0
71.5
72.0
72.5
73.0
73.5
74.0
74.5
75.0
1
25
49
73
97
121
145
169
193
217
241
HOURS OF THE YEAR FROM DAY 1 TO DAY 10


TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA,ONT. 1971
PR04 - SPACE NO.4 HEATING DEMAND (BTU/H)
0.0
1000.0
2000.0
3000.0
4000.0
5000.0
6000.0
7000.0
8000.0
9000.0
HOURS OF THE YEAR FROM DAY 1 TO DAY 10
1
25
49
73
97
121
145
169
193
217
241

TYPICAL TWO-STOREY THREE-BEDROOM ELECTRICALLY HEATED HOUSE
OTTAWA, ONT. 1971