IEA
SOLAR R&D

INTERNATIONAL ENERGY AGENCY

solar heating and
cooling programme

task VIII
passive and hybrid
solar low energy buildings

ANALYSIS
MODEL SURVEY

december 1983

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ANALYSIS MODEL SURVEY

Prepared by

Ove Jørgensen

December 1983

THERMAL INSULATION LABORATORY
TECHNICAL UNIVERSITY OF DENMARK

report no. 143

PREFACE

INTERNATIONAL ENERGY AGENCY

The International Energy Agency was formed in November 1974 to establish cooperation among a number of industrialized countries in the vital area of energy policy. It is an autonomous body within the framework of the Organization for Economic Cooperation and Development (OECD). Twenty-one countries are presently members, with the Commission of the European Communities also participating in the work of the IEA under a special arrangement.

One element of the IEA's programme involves cooperation in the research and development of alternative energy resources in order to reduce excessive dependence on oil. A number of new and improved energy technologies which have the potential of making significant contributions to global energy needs were identified for collaborative efforts. The IEA Committee on Energy Research and Development (CRD) comprising representatives from each member country, supported by a small Secretariat staff, is the focus of IEA RD&D activities. Four Working Parties (in Conservation, Fossil Fuels, Renewable Energy and Fusion) are charged with identifying new areas for cooperation and advising the CRD on policy matters in their respective technology areas.

Solar Heating and Cooling was one of the technologies selected for joint activities. During 1976-77, specific projects were identified in key areas of this field and a formal Implementing Agreement drawn up. The Agreement covers the obligations and rights of the Participants and outlines the scope of each project or "task" in annexes to the document. There are now eighteen signatories to the Agreement:

Australia	Italy
Austria	Japan
Belgium	Netherlands
Canada	New Zealand
Denmark	Norway
Commission of the European Communities	Spain
Federal Republic of Germany	Sweden
Greece	Switzerland
	United Kingdom
	United States

The overall programme is managed by an Executive Committee, while the management of the individual tasks is the responsibility of Operating Agents. The tasks of the IEA Solar Heating and Cooling Programme, their respective Operating Agents, and current status (ongoing or completed) are as follows:

Task I — Investigation of the Performance of Solar Heating and Cooling Systems - Technical University of Denmark (Completed).

Task II — Coordination of Research and Development on Solar Heating and Cooling - Solar Research Laboratory - GIRIN, Japan (Ongoing).

Task III — Performance Testing of Solar Collectors - KFA-Julich, F.R. Germany (Ongoing).

Task IV — Development of an Insolation Handbook and Instrument Package - U.S. Department of Energy (Completed).

Task V — Use of Existing Meteorological Information for Solar Energy Application - Swedish Meteorological and Hydrological Institute (Completed).

Task VI — Performance of Solar Heating, Cooling, and Hot Water Systems Using Evacuated Collectors - U.S. Department of Energy (Ongoing).

Task VII — Central Solar Heating Plants with Seasonal Storage - Swedish Council for Building Research (Ongoing).

Task VIII	Passive and Hybrid Solar Low Energy Buildings - U.S. Department of Energy (Ongoing).
Task IX	Solar Radiation and Pyranometry Studies - Canadian Atmospheric Environment Service (Ongoing).

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY BUILDINGS

The participants in Task VIII are involved in research to study the design integration issues associated with using passive and hybrid solar and energy conservation techniques in new residential buildings. The overall objective of Task VIII is to accelerate the development and use of passive and hybrid heated and cooled low-energy buildings in the participants' countries. The results will be an improved understanding of the design and performance of buildings using active and passive solar and energy conservation techniques, the interaction of these techniques, and their effective combination in various climatic regions and verification that passive and hybrid solar low energy buildings can substantially reduce the building load and consumption of none-renewable energy over that of conventional buildings while maintaning acceptable levels of year-round comfort. The subtasks of this project are:

0. Technology Baseline Definition
A. Performance Measurement and Analysis
B. Modeling and Simulation
C. Design Methods
D. Building Design, Construction and Evaluation

The participants in this Task are: Austria, Belgium, Canada, Denmark, Federal Republic of Germany, Italy, The Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, United States and United Kingdom.

This report documents work carried out under Subtask B of this Task.

Michael J. Holtz, A.I.A. Operating Agent
(On behalf of the U.S. Department of Energy)

LIST OF CONTENTS

1. EXECUTIVE SUMMARY

This document presents the findings and conclusions of a survey of the currently available building thermal analysis simulation models, their analysis capabilities, characteristics and limitations. Thirty-one models from ten different member countries of the IEA Solar Heating and Cooling Programme are included in this survey.

The survey was undertaken to serve two main objectives:

1. to assess the state of the art in order to identify what future model evaluation and developments are necessary; and
2. to create an overview of available building thermal analysis simulation tools which can serve as a guide for the selection of an appropriate model for a given problem.

A survey form was generated and distributed to the participating countries of Task VIII. The thirty-one completed and returned forms are all included as Appendix 1. In a second round the Subtask B representatives were asked to clarify what passive and hybrid systems the programs could simulate and the current status of model validation.

Chapter 3 summarizes the major findings of the survey in tabular form, thus making it possible to quickly assess the important features of the models.

The most important conclusion that can be drawn from the compiled information is that only a few programs can be used to simulate hybrid systems.* Another important point is that even though most of the programs have been written in FORTRAN, they

* A hybrid system can be defined as a system that incorporates both natural and forced heat (energy) transport phenomena.

are very machine-dependent and therefore not easily transferable. The third major conclusion is that most of the programs have been developed by researchers for research purposes; they do not represent energy analysis tools useful to building designers.

Chapter 4 includes a table on validation of the different models. From this table it appears that, aside from direct gain systems, the validation experience for passive systems is extremely limited. This table was part of the background material for the development of the validation activity plan within Subtask B. Results from this work will be documented in future reports.

To sum up, these conclusions direct future model development to focus on hybrid systems, to produce real computer-independent, user-friendly and design-oriented programs. Also, all of the models reported require further validation against measured data to increase confidence in their use.

The present survey has created an important overview of existing models and their capabilities and limitations, which provides valuable guidance for the planning of further model development efforts.

2. INTRODUCTION

Analysis models for passive and hybrid solar low energy buildings are computer simulation programs which have been designed for a detailed thermal analysis of a building and its components. The basis of these programs is a mathematical model of the total building as a thermal system. Usually this fundamental model is equipped with input and output routines, routines for calculating solar radiation input, routines for calculating energy flows into and out of the building, and, in some cases, routines for calculating HVAC system performance.

Of course there are many ways to set up a model, from the choice of basic mathematics to the creation of output data files. Since different people have different opinions and different needs, several different models exist and new models are being developed.

The development of a new model is very time-consuming, so if an existing model can cover ones needs, it is much more preferable to use that. The problem is to find out whether one of the existing models suits a given purpose, for example provides hourly temperature output plots for different rooms, handles water walls and attached sunspaces, performs an economic analysis, and so on.

The present survey attempts to provide the reader with sufficient information on the different models from the IEA Task VIII participating countries to decide which model can be used for which purpose. At the same time, it presents a clear picture of the state of art, which can be used to identify necessary future model developments.

METHODOLOGY

At the outset of this activity a survey form was developed and distributed to all the participating countries. A total number of 31 completed survey forms were returned. The following table shows the number of survey forms received from each country.

Country	Number of Survey Forms
Belgium	2
Canada	4
Denmark	1
Germany	1
Italy	3
Netherlands	2
Norway	2
Switzerland	8
United Kingdom	1
USA	7
Total	31

All the completed survey forms have been included in an Appendix to this report.

After the compilation of all the survey forms, the information was condensed into 5 summary tables presented in Chapter 3.

3. SURVEY SUMMARY TABLES

Five tables have been generated based on the information from the completed survey forms in order to present an overview of the information contained in the forms.

The tables have been ordered according to a logical search for a model:

- Which models are capable of handling my problem?
- Which of these are available and for what are they intended?
- What results do they provide?
- What input data is needed?
- What is the calculation procedure?

When one or more models have been tentatively identified by screening through the five tables, the next step is to find the completed survey forms for the selected models, to check the information, and finally, to contact the person or organization responsible for the distribution of the model.

APPLICATION, CAPABILITY / PROGRAM NAME	PASSIVE SYSTEMS				NUMBER OF ZONES				HEATING								COOLING										
	DIRECT GAIN	TROMBE WALL	ATTACHED SUNSPACE	HYBRID	> 25	10 - 25	2 - 10	1	LOADS	SPACE TEMPS.	ACTIVE SOLAR	SHADING	ECONOMICS	UNDERGROUND LOADS	MASS	HVAC SYSTEM	LOADS	SPACE TEMPS.	SHADING	ECONIMICS	UNDERGROUND LOADS	SLOPED GLAZING	MASS	HVAC SYSTEMS	PASSIVE COOLING	DAY LIGHTING	DHW
PASSIVE HOUSE DESIGN	●	●						●	●	●				●	●												
ENCORE - CANADA	●					●			●	●				●	●	●											
PASSIVE	●	●	●				●		●	●		●		●	●		●	●	●		●	●	●				
SIMNET	●	●	●	●			●		●	●					●		●	●				●	●				
BA4	●							●	●	●		●		●	●		●	●	●		●	●	●				
HAUSER	●								●	●		●			●											●	P
MORE	●					●			●	●		●			●	●	●	●	●			●	●	●	●		
SMP	●						●		●	●	●	●			●		●	●	●			●	●			●	
AZIZ	●							●	●	●	●	●			●	●	●	●	●			●	●			●	
BYVOK	●							●	●	●		●					●	●								●	
ENCORE	●					●			●	●		●			●	●										●	P
BFEP	●	●	●	●	●				●	●		●			●	●	●	●	●			●	●	●	●	●	
KLI	●				●				●	●		1)			●	●	●	●	1)			●	●				
PASSIM	●	●	●				●		●	●		●			●												
MODPAS	●		●				●		●	●		●			●			●	●				●				
IGLOU	●	●	●		●				●	●	●	●			●												
BAUDYN	●							●	●	●					●		●	●					●			●	
STEMOD/DYWAN	●	●	●		●				●	●							●	●									
MUR-DIODE	●	●						●	●	●																	
SOLTRAP	●			●				●	●	●					●												
HELIOS	●							●	●	●					●		●	●				●	●				P
BLAST 3.0	●	●			●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	A/P
DEROB IV	●	●	●				●		●	●		●		●	●	●	●	●	●		●	●	●	●	●		
DOE - 2.1 A	●				●				●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	A/P
EMPS 2.0	●	●	●				●		●	●		●		●	●	●	●	●	●		●	●	●	●	●	●	
SERI-RES 1.0	●	●	●				●		●	●		●		●	●		●	●	●		●	●	●		●		
TRNSYS 11.1	●	●			●				●	●	●	●	●		●	●	●	●	●	●		●	●	●	●		A
PASOLE	●	●	●	●		●			●	●		●		●	●		●	●	●		●	●	●				
LPB1	●				●				●	●		●		●	●		●	●	●		●	●	●		●		
SOLPA	●							●	●			●															
ESP	●	●	●				●		●	●		●			●		●	●	●			●	●			●	

A =ACTIVE, P=PASSIVE =THERMO SYPHON, 1) OVERHANG ONLY

Table 3.1 Summary of application and capability of the surveyed models

APPLICATION, CAPABILITY

Passive and hybrid systems

It is no surprise that all the thirty-one programs can be used to simulate direct gain systems. What is more interesting is that only half of the programs are able to simulate Trombe wall systems, and only twelve attached sunspaces.

Hybrid systems, combining features of active and passive (forced and natural heat transfer) solar components (primarily collector and storage), can only be simulated by four models, two of which are general network programs, that in principle can be set up to simulate anything. However, they cannot be used by the average engineer or architect. By employing some very advanced modelling, a few of the other models might also be used (SERI-RES, ESP) for the simulation of some hybrid systems. It should, however, be noted that at present there is a lack of knowledge of some of the most important parameters to be used for the simulation of hybrid systems, such as heat transfer coefficients in different block and channel geometries. Without any doubt, this is the field of development for the coming years.

Heating

All programs calculate heating loads and space temperatures. Active solar heating systems can be simulated by six of the programs. Underground loads seem to be a weak point in many of the models with only eleven claiming to be able to analyse this condition. It is striking that almost all the American programs can be used to simulate heating, ventilation and air-conditioning systems. This is obviously an area which has been given far greater attention in the US than in Western Europe.

Cooling

The pattern is very similar to that of heating. It is seen that a few programs do not include any cooling calculations at all.

Lighting

Eleven of the programs have routines for switching the artificial lighting on and off based on solar radiation incident on windows. Probably this ought to be included in all programs as the impact of artificial lighting can be significant on both heating and cooling loads.

DHW

Only few of the programs can be used for simulating active and/or passive solar domestic hot water systems.

Zones

Most of the programs have been designed to simulate more than two zones, but nine programs can still only deal with one zone.

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INTENDED USE & AVAILABILITY / PROGRAM NAME	INTENDED USERS				DEVELOPED FOR						ALSO USEFUL FOR								COMPUTER TYPE			COMPUTER VERSION AVAILABLE	SUP-PORT			RUN TIME CPU SEC			
	ARCHITECT	ENGINEER	TECHNICIAN	RESEARCH ANAL.	PRE-DESIGN	SITE ANALYSIS	SCHEMATICS	DESIGN DEVEL.	POST DESIGN SER.	RESEARCH	PRE-DESIGN	SITE ANALYSIS	SCHEMATICS	DESIGN DEVEL.	POST DESIGN SER.	RESEARCH	AVAILABLE	UNIT ')	MAIN FRAME	MINI	MICRO		USERS GUIDE	DATA MANUAL	OTHER	>1000	100 - 1000	5 - 100	<5
PASSIVE HOUSE DESIGN	●	●		●						●	●			●		●	●	E	●			AMDHAL			●			●	
ENCORE - CANADA				●						●					●	●	●	E	●			IBM	●				●		
PASSIVE				●						●			●	●		●	●	S			●	WANG					●		
SIMNET				●						●		●	●	●	●	●	●	S	●			IBM						●	
BA4		●		●						●				●	●	●	●	S	●			IBM	●					●	
HAUSER				●						●						●			●			SIEMENS							
MORE	●	●		●						●					●	●	●	S	●	●		VAX/UNIVAC	●				●		
SMP	●	●								●				●	●	●	●	S	●			IBM			●			●	
AZIZ	●	●			●						●						●	S	●			IBM			●			●	
BYVOK		●		●				●						●		●	●	S	●			UNIVAC	●	●				●	
ENCORE		●								●	●			●	●	●	●	S	●	●		UNIVAC/ND	●	●				●	
BEEP		●	●	●				●	●	●						●		S	●	●		SEVERAL	●				●	●	
KLI		●	●	●						●				●	●			S	●			BURROUGHS	●				●		
PASSIM		●		●						●				●	●	●	●	S		●		VAX			●		●		
MODPAS		●		●				●			●	●		●	●	●		S			●	HP 9845 B			●	●			
IGLOU	●	●			●						●	●					●	S		●		PRIME	●	●				●	
BAUDYN		●		●						●				●	●	●	●	S	●	●		CDC/PRIME	●						●
STEMOD/DYWAN	●									●	●				●	●	●	S	●			IBM							
MUR-DIODE				●						●						●		S	●			UNIVAC	●	●					
SOLTRAP		●		●				●		●		●		●	●	●	●	S		●		PRIME			●		●		
HELIOS		●	●	●						●		●		●		●	●	S	●			CDC	●	●			●		
BLAST 3.0	●	●		●				●			●	●	●	●	●	●	●	B	●			CDC	●	●				●	
DEROB IV	●	●		●						●	●	●	●	●	●	●	●	B	●			CDC	●				●		
DOE - 2.1 A	●	●		●				●			●	●	●	●	●	●	●	B	●			IBM/CDC	●	●				●	
EMPS 2.0		●		●						●	●			●		●	●	E				IBM/UNIVAC							
SERI-RES 1.0	●	●		●				●			●	●	●	●	●	●	●	B	●			CDC/PRIME	●				●		
TRNSYS 11.1		●		●						●		●		●	●	●	●	B	●			ANY	●				●		
PASOLE				●						●				●		●	●	B				ANY	●				●		
LPB1	●	●	●		●		●	●									●	S	●			IBM							
SOLPA	●	●			●		●	●									●	S	●			HP	●						
ESP	●	●		●						●	●	●	●	●	●	●	●	S	●	●		SEVERAL	●				●		

') E=ENGLISH, S=SI, B=BOTH

Table 3.2

Summary of intended use and availability of surveyed models

INTENDED USE AND AVAILABILITY

Intended use

Table 3.2 clearly shows that the majority of the programs have been developed for research purposes, and the intended users are therefore primarily engineers and researchers. Only nine of the programs have been developed for design development; however, most of the programs can be used for this purpose. About half of the programs are also said to be useful for post design services, whereas considerably few can be used for pre-design, site analysis and schematic design. Obviously, any complex model can be used for these purposes by setting up a simple building model using numerous default values. This, however, only makes sense provided a simplified model, capable of analyzing the same building configuration, does not exist. This approach has the advantage that moving from a simple building model with few modes to a more complex model for design development, can be done quite easily. With this in mind, probably more of the models can be said to be useful for the pre-design, site analysis and schematic phases.

Availability

Almost all of the programs are available on main frame computers only; two are run on micro-computers. IBM is the most common computer used; however, the spread is rather large with a tendency that many American programs are run on CDC-machines. This is really one of the most crucial points, as it is often not possible to transfer a computer program from one machine to the other even if the program has been written in "Standard" FORTRAN.

Support

Most of the programs are supported by a "users guide" at a minimum and for several a "data manual" exists.

Run time

The run time quoted is for an annual simulation of a single-zone, 100 square meter residence using an hourly time step. The range is rather broad: 5 - 1000 CPU-seconds. The number of CPU seconds is very machine-dependent. It can easily vary by a factor of 5 for the same program run on different machines.

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RESULTS, OUTPUT / PROGRAM NAME	LOAD DETERMINANTS			LOADS OUTPUT BY					TEMPERATURES			FUEL USE BY						
												MONTH		YEAR				
	COMPONENT	ZONE	BUILDING	HOUR	DAY	MONTH	SEASON	YEAR	AIR	SURFACE	GRAPHIC PLOT	CONSUMPTION	PEAK DEMAND	CONSUMPTION	PEAK DEMAND	SYSTEM COMPONENTS	ENERGY SYSTEM	TOTAL BUILDING ONLY
PASSIVE HOUSE DESIGN			●			●		●	●									
ENCORE - CANADA		●	●	●	●	●	●		●			●	●	●	●			
PASSIVE	●	●	●	●		●			●	●		●	●			●		
SIMNET		●	●	●	●	●		●	●	●								
BA4			●	●	●	●	●	●	●	●								
HAUSER	●		●	●	●			●	●	●				●				●
MORE	●			●					●			1)	1)					
SMP		●		●	●	●	●		●	●		●						
AZIZ		●	●	●	●	●	●		●			●						
BYVOK		●		●					●	●								
ENCORE	●	●	●	●	●	●		●	●			●		●				
BFEP	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
KLI		●	●	●	●	●	●		●	●	●							
PASSIM	●	●	●	●	●	●	●	●	●	●	●	2)						
MODPAS		●		●					●	●	●	●						
IGLOU	●	●	●	●	●	●	●	●	●	●		●	●					
BAUDYN	●			●					●	●								
STEMOD/DYWAN					●	●		●										
MUR-DIODE	●								●		●							
SOLTRAP	●	●		●	●	●	●	●	●	●	●	4)						
HELIOS	●		●	●		●			●	●	●	●	●					
BLAST 3.0	●	●	●	●	●	●	●	●	●			●	●	●	●	●	●	
DEROB IV	●	●	●	●		●		●	●	●								
DOE - 2.1 A	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
EMPS 2.0		●	●	●	●	●		●				●	●				●	
SERI-RES 1.0	●	●	●	●	●	●	●	●	●	●								
TRNSYS 11.1	●	●	●	●	●	●	●	●	●		●	●	●	●		●	●	
PASOLE	●	●	●	●	●	●	●	●	●	●								
LPB1	●	●	●	●					●			●	●	●	●			
SOLPA	●			●					●	●								
ESP		●		●	●	●	●	●	●	●	●							

1) HOURLY, 2) DAILY, 3) 6 MINUTES, 4) HOURLY & DAILY

Table 3.3 Summary of results and output of surveyed models

RESULTS - OUTPUT

Temperature profiles, loads and, if an HVAC system is included in the simulation, energy consumption are the fundamental outputs of these programs. Depending on the program, these variables can be given by component, zone or total building and for time-intervals of one hour, one day, one week, one month and one year. For a selected number of these possible outputs, table 3.3 shows whether or not they can be delivered by the programs.

Loads

The fact that most of these programs have been developed for detailed analysis shows up in the table. Hourly loads are given by almost all of the programs and for those that simulate multizone buildings, output is available for each zone or component.

Temperatures

All programs produce indoor air temperature as output, but it is interesting that as many as twenty also produce surface-temperatures. The existence of graphic plotting routines in a program is not that important as this tends to be very system-dependent. Obviously the possibility of producing output files with hourly data for subsequent data handling and plotting by other programs ought to be inherent in any of the programs.

Fuel consumption

When an HVAC system or plant is included in the simulation, monthly consumption and peak demand are obviously provided by most programs. Also, most programs provide energy consumption by system componenets separately.

INPUT DATA / PROGRAM NAME	FILE TYPE				REQUIRED / POSSIBLE INPUT DATA																								WEATHER DATA TYPE				
					PRE-DESIGN & SITE ANALYSIS DATA									SCHEMATIC DESIGN DATA					ARCH. DESIGN DATA				ENGINEERING DESIGN DATA										
	INTERACTIVE	INT. GRAPHIC	PREP. FILE	HAND CALCULATION	LOCATION	BUILDING TYPE	OCCUPANCY	BUILDING AREA	SPACE TEMP.	LOCAL ENERGY COSTS	GENERIC BUILDING SHAPE	LOCAL CODE REQUIREMENTS	LIGHTING REQUIREMENTS	BUILDING SURFACE AREAS	GLAZING AREAS & ORIENTAT.	ZONING	ROOM SHAPES	OPERATING SCHEDULES & PROFILES	BUILD., MATERIALS & ASSOCIATED DATA	BUILDING MASS DATA	SHADING COEF. & DAYLIGHT TRANS.	INTERIOR SURFACE DATA	MECHANICAL SYSTEM DESIGN	CONTROL	ELECTRICAL SYSTEM DESIGN	CONTROL	LIGHTING SYSTEM DESIGN	CONTROL	<HOURLY	TYPICAL DAY	HOURLY	DAILY	MONTHLY
PASSIVE HOUSE DESIGN	●				●	●	●	●	●	●				●	●		●		●	●	●	●									●		
ENCORE - CANADA	●													●	●	●		●	●	●	●		●	●							●		
PASSIVE			●		●	●	●	●						●	●	●	●	●	●	●	●	●	●	●							●		
SIMNET			●		●			●	●		●	●		●	●	●			●	●		●									●		
BA4			●		●	●	●	●	●					●	●			●	●	●	●	●									●		
HAUSER					●	●	●	●	●				●	●	●	●	●	●	●		●	●					●	●			●		
MORE			●		●		●	●	●					●	●	●	●	●	●	●	●	●								●	●		
SMP			●		●	●	●	●	●		●	●	●	●	●	●	●	●	●	●	●	●		●		●		●		●	●		
AZIZ			●		●	●	●	●	●		●	●	●	●	●			●	●	●	●	●		●		●		●		●	●		
BYVOK			●		●		●							●	●		●	●	●	●	●	●	●	●			●			●			
ENCORE			●		●	●	●	●						●	●	●	●	●	●	●	●	●	●	●			●	●			●		
BEEP			●		GENERAL NETWORK PROGRAM																										●		
KLI	●		●																●	●				●							●		
PASSIM	●	●	●		GENERAL NETWORK PROGRAM																										●		
MODPAS		●	●		●	●	●	●						●	●	●	●	●	●	●	●	●								●	●		
IGLOU	●		●		●		●	●	●				●	●	●	●	●	●	●	●	●	●		●		●		●		●			
BAUDYN			●		●			●	●			●	●	●	●				●	●	●	●								●			
STEMOD/DYWAN	●				●	●		●	●			●		●	●				●		●									●			
MUR-DIODE			●		●				●					●	●				●	●	●	●							●				
SOLTRAP	●	●	●		●			●	●					●	●			●	●	●										●			
HELIOS			●		●		●	●			●			●	●	●		●	●	●	●	●	●	●							●		
BLAST 3.0			●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●					●		
DEROB IV			●		●			●	●		●	●		●	●	●	●		●	●		●									●		
DOE - 2.1 A			●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●	●					●		
EMPS 2.0			●		●	●	●	●	●					●	●		●	●	●	●	●	●									●		
SERI-RES 1.0	●				●			●	●		●	●		●	●	●		●	●	●	●		●	●							●		
TRNSYS 11.1			●		●	●	●	●	●	●	●	●							●	●	●	●	●	●							●		
PASOLE			●		GENERAL NETWORK PROGRAM																									●	●		
LPB1	●		●		●	●	●	●	●		●			●	●	●		●	●	●	●	●									●		
SOLPA	●		●		●		●		●						●				●		●										●		
ESP	●	●			●		●		●					●	●	●	●	●	●		●	●			●	●					●		

Table 3.4

Summary of input data for surveyed models

INPUT DATA

File type

Eleven programs create files through interactive data input but most of them require the preparation of an input file to be read by the program while it is executed.

Required/possible input data

The high density of the dots in the middle of Table 3.4 shows that most of the programs accept schematic design and architectural design data as input. This indicates that most of the programs can be used to analyse the impact of varying these data. The nature of these data is that they are very concise: for example building surface areas, building material data, building mass data etc. This is very much in line with the typical computer model of a house: a "shoebox" with windows. Only a few programs accept data on the generic building shape or building type.

Weather data

Hourly data are used in all cases, except for one which requires data given at smaller time intervals. For the rest of the programs, hourly weather data can be given for a "typical" day, or as a typical meteorological year, TMY, or any weather data file of hourly values. The data variables needed for a given program has to be explored with the program distributor. Typical data variables needed are two radiation data variables, wind speed, ambient temperature and dew point temperature.

CALCULATION PROCEDURES / PROGRAM NAME	PROGRAM LANGUAGE			HEAT TRANSFER			INTEGRATION			SOLAR ORIENTATION				SHADING				ROOM TEMPERATURES					U-VALUES			INFILTRATION			INTERNAL LOADS			VENTILATION		
	FORTRAN	BASIC	ALGOL	FINITE DIFFERENCE	RESPONSE FACTOR	STEADY STATE	SIMPLE EULER	IMPLICIT	OTHER	ANY, INCL. SLOPED	DIFFUSE, DIRECT, RE-RAD	DIFFUSE, DIRECT	TOTAL	ANY SOLAR OBSTRUCT.	OVERHANG ONLY	DAYLY & SEASONAL SW.	SEASONAL SWITCHING	SURFACES & AIR	AIR ONLY	INPUT SCHEDULES BY USER	FIXED BY TOOL	VARIED BY TOOL	CHANGED WITH WIND SPEED	REMAIN CONSTANT	MOVEABLE INSULATION	AIR CHANGE/HOUR	CRACK METHOD	VARIED WITH WIND SPEED	SENSIBLE & LATENT SEPER.	SENSIBLE & LATENT TOTAL	SENSIBLE ONLY	SENSIBLE	LATENT	VARIES BY SCHEDULE, COMM.
PASSIVE HOUSE DESIGN	●			●			●	●		●		●		●		●		●		●					●	●			●					●
ENCORE - CANADA	●				●					●		●							●	●			●		●	●		●			●			
PASSIVE		●		●			●			●	●				●		●	●				●	●					●			●	●		
SIMNET	●			●				●		●		●							●		●		●	●	●	●					●	●		
BA4	●			●			●			●	●			●		●		●		●				●		●					●	●		
HAUSER	●			●			●			●	●			●					●	●					●									
MORE	●				●					●	●			●		●			●				●			●		●	●					●
SMP	●			●						●	●			●			●	●				●	●					●			●			●
AZIZ	●			●						●	●			●			●	●				●	●					●			●			●
BYVOK			●		●						●				●			●			●			●							●	●		
ENCORE	●				●							●		●					●	●				●			●	●			●	●		
BEEP	●			3)					●	●	●			●		●		●		●			●	●	●	●		●	●			●		●
KLI			●	●				●		●	●				●	●			●	●			●			●					●	●		
PASSIM	●			●				●		●		●		●		●			●	●					●	●			●					
MODPAS		●		●				●		●	●							●		●		●		●		●					●			
IGLOU	●								●	●	●			●		●		●		●			●			●		●	●			●		
BAUDYN	●				●							●						●				●												●
STEMOD/DYWAN		●		●							●			●		●				●						●								
MUR-DIODE	●			●			●				●								●			●		●		●					●	●		
SOLTRAP	●			●			●				●							●		●				●	●	●					●			
HELIOS	●				●					●	●							●				●	●		●			●			●			●
BLAST 3.0	●				●					●	●			●		●		●		●		●	●	●	●	●		●	●			●		●
DEROB IV	●			●				●		●	●			●		●			●	●		●	●		●	●					●	●		
DOE - 2.1 A	●				●					●	●			●		●			●	●		●	●	●	●	●	●	●	●	●	●	●		●
EMPS 2.0	●			●					●	●				●		●		●		●			●		●		●		●			●	●	
SERI-RES 1.0	●			●			●			●		●	●		●	●			●	●		●		●	●	●		●	●			●	●	●
TRNSYS 11.1	●			●	●	●		●	●	●	●			●	●	●			●			●	●		●	●			●			●	●	●
PASOLE	●			●				●		●	●				●	●		●		●		●	●	●	●	●		●						
LPB1	●				●			●		●				●		●		●		●				●		●			●					
SOLPA	●					●				●					●	●				●					●									
ESP	●			●					●	●				●				●		●			●				●	●			●	●		

1) ANY, FINITE ELEMENT METHOD 2) VERTICAL ONLY 3) FINITE ELEMENT

Table 3.5

Summary of calculation procedures for surveyed models

CALCULATION PROCEDURES

Programming language

FORTRAN is the most common language employed in the programs surveyed. Three of the models have been programmed in BASIC and two in ALGOL. However, this does not mean that the 25 FORTRAN programs can be run by any machine having a FORTRAN-compiler. The compiler is very machine-dependent, so before requesting a program it is necessary to determine on which computers the program has been running. This information is included in the survey forms but should also be checked with the authors to avoid any difficulties in implementing the program.

Heat transfer

Heat transfer is primarily modelled by finite differences but also to quite a large extent by response factors.

Solar orientation and shading

Most of the programs have routines for the calculation of solar radiation on any given surface, but when it comes to shading, only half of them can take wing-walls or any other obstruction into account.

Room temperatures

Surface and air temperatures are calculated by half of the programs and air only by the other half.

U-values

Again, half of the programs include the effect of wind speed on building U-values and half of them can also deal with moveable insulation.

Infiltration

A given air change per hour is the most common way of handling infiltration but 13 programs vary infiltration with wind speed.

Internal loads

9 programs handle sensible and latent internal loads separately while 15 consider sensible loads only.

Ventilation

Ventilation is primarily calculated as a sensible heat exchange; only two programs include latent heat exchange as well.

4. STATUS OF VALIDATION OF MODELS USED IN THE PARTICIPATING COUNTRIES

Model development is not finished after the programming phase. The model must be checked in every possible way to ensure that it is a reliable tool. The ultimate check of a model is a comparison to reality. For thermal analysis models this involves a comparison to measured data from either test cells or real houses. However, the process of validating a model against measured data is a very tedious process which is often complicated by the lack of adequate performance data. For these reasons the Task VIII participants considered it important to establish, at the outset of the work in Subtask B, the status of validation of the models used in the member countries.

Table. 4.1 was generated at one of the early working group meetings (Summer 1982) and has since been updated by the participants. It appears that the number of fully documented validation studies is very limited. DEROB, BLAST and SERI-RES are the only programs which have been validated for Trombe walls and attached sunspaces and only about seven of the programs have been validated for direct gain system data. The table provides clear indication that further work is needed in this area.

Table 4.1

IEA SOLAR HEATING AND COOLING PROGRAMME, TASK VIII, SUBTASK B

Analysis capabilities and validation experiences on highly instrumented facilities of the models used in the participating countries.

Elm-meeting, Switzerland, July, 1982

MODEL	COUNTRY	PASSIVE SYSTEM ANALYSIS CAPABILITY				VALIDATION EXPERIENCE							
						TEST CELLS				HOUSES			
		DG	TW	SS	TS	DG	TW	SS	TS	DG	TW	SS	TS
TRNSYS	Austria	X	X	X		O	O	O					
ENCORE	Canada	X		?									
BA4	Denmark	X								●			
HAUSER	Germany	X	X	X	X					●			
MORE (Fiat)	Italy	X											
NBSLD	Italy	X											
KLI	Netherlands	X	X	X						O			
BFEP	Netherlands	X	X	X									
ENCORE	Norway	X		?						O		O	
VARUM	Norway	X		?		●							
ESP	United Kingdom	X	X	X	X					●			
BRIS	Sweden	X	?	X									
STANWAD	Sweden	X											
DEROB	Switzerland	X	X	X	?	●		●		●		●	
SERI-RES	Switzerland	X	X	X	?	●	●			●	●	●	
SERI-RES	U.S.A.	X	X	X	?	●	●	●		●			
BLAST	U.S.A.	X	X	X	X	●	●			●		●	
DOE-2.1	U.S.A.	X		?		●				●			

? possible, not known

O some work made - not documented - or work underway

● validation study performed

DG: Direct Gain
TW: Trombe Wall
SS: Sunspace
TS: Thermo-syphon system

BIBLIOGRAPHY

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4. Burt, Hill, Kosar, Rittelman Assoc. (1983). International Energy Agency, Solar Heating and Cooling Programme, Task VIII, Subtask C. Design Tool Survey.

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APPENDIX 1

COMPLETED SURVEY FORMS

LPB1

BELGIUM

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: LPB1

DEVELOPED BY: Laboratoire de Physique du Batiment: Universite' de Liege Faculte des Sciences Applique'es 15, Avenue des Tilleuls - Bat D1 4000 Liege Belgique

DATE DEVELOPED: 81

DATE OF LAST REVISION: 83

AVAILABLE THROUGH: Laboratoire de Physique du Batiment: Universite de Liege, Faculte des Sciences, Applique'es 15, Avenue des Tilleuls - Bat D1 4000 Liege Belgique

PHONE NO.: 041/590180 ext 367

SUPPORTED BY: The SPPS Rue de la Sciences no. 8 1040 Bruxelles - Belgique

PHONE NO.: 02/2304400

BRIEF DESCRIPTION: LPB1 is a programme designed to compute thermal loads and temperatures in a building. This is done taking all capacity effects into account, thus in a dynamic way.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

- ☐ MAIN FRAME COMPUTER
  - ☐ CARD DECK
  - ☐ TAPE
  - ☐ TIME SHARING
  - ☐ LISTING - HARD COPY
  - (COMPLETE SECTIONS 1, 2, 3)
- ☐ MICRO-COMPUTER
  - ☐ DISC
  - ☐ TAPE
  - ☐ LISTING
  - ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT
  - (COMPLETE SECTIONS 1, 2, 4)
- ☐ HAND CALCULATOR
  - ☐ MAGNETIC CARD
  - ☐ LISTING
  - ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT
  - (COMPLETE SECTIONS 1, 2, 5)
- ☐ GRAPHIC OR MANUAL
  - ☐ TEMPLATES, CHARTS, TABLES
  - ☐ BOOK
  - ☐ DEVICE
  - (COMPLETE SECTIONS 1, 2, 6)

LPB1 BELGIUM

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☒ ARCHITECT ☒ ENGINEER ☒ TECHNICIAN ☐ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☒ PRE-DESIGN ☐ SITE ANALYSIS ☒ SCHEMATICS ☒ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☐ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☐ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☒ SHADING
- ☒ SYSTEM DESIGN
- ☐ ECONOMICS
- ☒ UNDERGROUND LOADS
- ☒ MASS

☒ COOLING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE CLNG.
- ☒ SHADING
- ☒ SYSTEM DESIGN
- ☐ ECONOMICS
- ☒ UNDERGROUND LOADS
- ☒ SLOPED GLAZING
- ☒ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	☒	☐
BUILDING TYPE AND SCHEDULE	☐	☐	☒	☐
OCCUPANCY RATES	☐	☐	☒	☐
BUILDING AREA	☐	☐	☒	☐
SPACE TEMPERATURES	☐	☐	☒	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☒	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☒	☐
GLAZING AREAS & ORIENTATIONS	☐	☐	☒	☐
ZONING	☐	☐	☒	☐
ROOM SHAPES	☐	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☐	☒	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	☒	☐
BUILDING MASS DATA	☐	☐	☒	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☒	☐
INTERIOR SURFACE DATA	☐	☐	☒	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

LPB1 BELGIUM

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: [x] HOURLY TAPE [ ] TYPICAL DAY [ ] MONTHLY DATA [ ] ANNUAL DATA [ ] MONTHLY DEGREE DAYS [ ] ANNUAL DEGREE DAYS [ ] AVE. MONTHLY MIN. AND MAX. [ ] AVE. MONTHLY TEMP. [ ] DAILY

SOLAR DATA: [x] HOURLY TAPE [ ] TYPICAL DAY PROFILE [ ] MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: [x] ANY ORIEN. INCL. SLOPED [ ] ANY VERT. & HORIZ. [ ] HORIZ. & 4 CARDINAL DIREC. [ ] SLOPED FACING SOUTH [ ] SURFACE REFLECTANCE

DAYLIGHT CALC: [ ] HOUR-BY-HOUR [ ] TYPICAL CLEAR & CLOUDY DAY/MONTH [ ] TYPICAL DAY/MONTH [ ] ANNUAL AVERAGE [ ] OTHER ______

CALCULATION PROCEDURES:

LANGUAGE: [x] FORTRAN [ ] BASIC [ ] MACHINE LANGUAGE [ ] OTHER ______ [ ] GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: [x] INTERACTIVE [ ] INTERACTIVE GRAPHIC [x] PREPARE FILE [ ] HAND CALCULATION

UNITS OF CALCULATION: [x] SI UNITS [ ] ENGLISH [ ] BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	[ ] FINITE DIFFERENCE	[x] RESPONSE FACTOR	[ ] STEADY STATE
SOLAR COMP. CALCULATED:	[x] DIFFUSE/DIRECT/RE-RADIATED	[ ] DIFFUSE/DIRECT	[ ] TOTAL
INTEGRATION:	[ ] SIMPLE EULER	[x] IMPLICIT	[ ] OTHER
SHADING:	[x] ANY SOLAR OBSTRUCTION	[ ] OVERHANG ONLY	[ ] NO SHADING
MOVABLE SHADING:	[x] DAILY & SEASONAL SWITCHING	[ ] SEASONAL SWITCHING	[ ] NOT CALCULATED
MASS EFFECT IS CALCULATED:	[x] TRANSIENT HEAT FLOW	[ ] TIME CONSTANT FACTORS	[ ] ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	[x] SURFACE & AIR	[ ] AIR ONLY	[ ] NOT CALCULATED
INSIDE TEMPERATURE:	[x] INPUT SCHEDULE BY USER	[ ] FIXED BY TOOL	[ ] VARIED BY TOOL
U-VALUES:	[ ] CHANGE W/WIND SPEED	[x] REMAIN CONSTANT	[ ] MOVABLE INSULATION
INFILTRATION:	[x] AIR CHANGE PER HOUR	[ ] CRACK METHOD	[ ] VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	[x] SENSIBLE & LATENT SEPARATE	[ ] SENS. & LAT. TOTAL	[ ] SENSIBLE ONLY
VENTILATION:	[ ] SENSIBLE	[ ] LATENT	[ ] VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	[x] SKY, REFL. & DIRECT	[ ] SKY & REFL.	[ ] SKY ONLY
ZONES PER RUN:	[x] > 25 [ ] 10 - 25	[ ] 2 - 10	[ ] 1 ONLY
SYSTEM MODELING:	[ ] SYSTEM EFFIC. INPUT	[ ] SYSTEM OPTIMIZING	[ ] COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	[ ] ANNUAL COST	[ ] SIMPLE PAYBACK	[ ] LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: [x] COMPONENT [x] ZONE [x] BUILDING

LOADS OUTPUT BY: [x] HOUR [ ] DAY [ ] MONTH [ ] SEASON [ ] YEAR

TEMPERATURES: [x] AIR [x] SURFACE [ ] GRAPHIC PLOT

FUEL USE BY: [x] MONTHLY CONSUMPTION [x] MONTHLY PEAK DEMAND [ ] OTHER ______ [x] ANNUAL CONSUMPTION [x] ANNUAL PEAK DEMAND [ ] OTHER ______ [ ] SYSTEM COMPONENTS [ ] ENERGY SYSTEMS [ ] TOTAL BUILDING ONLY

LPB1 BELGIUM

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE:	☒ IBM	☐ CDC	☐ UNIVAC	☐ OTHER ________
CORE REQUIRED:	☒ > 500K	☐ 100 - 500 K	☐ 25 - 100 K	☐ < 25 K
SUPPORT:	☐ USER'S GUIDE	☐ DATA MANUAL		☐ OTHER ________
EQUIPMENT:	☐ CRT	☐ PRINTER	☐ TEXTRONIX	☐ OTHER ________

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST: ?

IN-OFFICE EQUIPMENT:	CRT ________	PRINTER ________	
SOFTWARE PURCHASE:	CARD DECK ________	TAPE ________	LISTING ________
SUPPORT INFORMATION:	USER'S GUIDE ________	DATA MANUAL ________	OTHER ________
TIME TO INPUT AND DEBUG:	________ MAN-DAYS	________ MAN-HOURS	

RUN COST/TIME: ?

INPUT SET-UP TIME:	________ MAN-DAYS	________ MAN-HOURS		
TYPICAL* RUN TIME:	☐ > 1 HR.	☐ 60 M - 30 M	☐ 30 M - 10 M	☐ < 10 M
TYPICAL* CPU TIME:	☐ > 1000 SEC.	☐ 100 - 1000 SEC.	☐ 5 - 100 SEC.	☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

Laboratoire de Physique du Batiment.
Universite' de Liege, Faculte' des
Sciences Applique'es 15 Avenue des
Sciences Tilleuls - Bat Dl
4000 Liege Belgique

SOLPA BELGIUM

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: SOLPA

DEVELOPED BY: A De Herde - E Gratia
Unite' d'architecture
Batiment Vinci
Place du Levant 1
1348 Louvain-la-Neuve BELGIQUE

DATE DEVELOPED: 1981

DATE OF LAST REVISION: 1981

AVAILABLE THROUGH: A De Herde
Unite' d'architecture, Bat.Vinci
Place du Levant 1
1348 Louvain-la-Neuve BELGIQUE

PHONE NO.: 010/418181 ect 2139

SUPPORTED BY: A. De Herde
Unite' d'architecture, Bat.Vinci
Place du Levant 1
1348 Louvain-la-Neuve - Belgique

PHONE NO.: 010/418181 ext 2139

BRIEF DESCRIPTION: This design tool calculates the performances of a window with a "porch roof". It calculates, hour by hour, the shaded surface and the balance sheet.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☐ TIME SHARING
- ☒ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

SOLPA BELGIUM

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

[x] ARCHITECT [x] ENGINEER [ ] TECHNICIAN [ ] RESEARCH ANALYST [x] Builder

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

[x] PRE-DESIGN [ ] SITE ANALYSIS [x] SCHEMATICS [x] DESIGN DEVEL. [ ] POST-DESIGN SERV. [ ] RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

[ ] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [ ] DESIGN DEVEL. [ ] POST-DESIGN SERV. [ ] RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

[x] HEATING
- [x] LOADS
- [ ] SPACE TEMPS.
- [ ] HVAC SYSTEMS
- [x] PASSIVE SOLAR
- [ ] ACTIVE SOLAR
- [x] SHADING
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] UNDERGROUND LOADS
- [ ] MASS

[ ] COOLING
- [ ] LOADS
- [ ] SPACE TEMPS.
- [ ] HVAC SYSTEMS
- [ ] PASSIVE CLNG.
- [ ] SHADING
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] UNDERGROUND LOADS
- [ ] SLOPED GLAZING
- [ ] MASS

[ ] LIGHTING
- [ ] LOADS
- [ ] FC (LUX) LEVELS
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] DAYLIGHTING FC (LUX) LEVELS
- [ ] ARTIFICIAL LTNG. REDUCTION

[ ] DHW
- [ ] LOADS
- [ ] SOLAR ACTIVE
- [ ] SOLAR PASSIVE
- [ ] ECONOMICS

[ ] MISCELLANEOUS
- [ ] FANS
- [ ] PUMPS
- [ ] MISC. ELECTRICAL
- [ ] ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	[ ]	[ ]	[x]	[ ]
BUILDING TYPE AND SCHEDULE	[ ]	[ ]	[ ]	[ ]
OCCUPANCY RATES	[ ]	[ ]	[x]	[ ]
BUILDING AREA	[ ]	[ ]	[ ]	[ ]
SPACE TEMPERATURES	[ ]	[ ]	[x]	[ ]
LOCAL ENERGY COSTS	[ ]	[ ]	[ ]	[ ]
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	[ ]	[ ]	[ ]	[ ]
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	[ ]	[ ]	[ ]	[ ]
LIGHTING REQUIREMENTS	[ ]	[ ]	[ ]	[ ]
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	[ ]	[ ]	[ ]	[ ]
GLAZING AREAS & ORIENTATIONS	[ ]	[ ]	[x]	[ ]
ZONING	[ ]	[ ]	[ ]	[ ]
ROOM SHAPES	[ ]	[ ]	[ ]	[ ]
OPERATING SCHEDULES & PROFILES	[ ]	[ ]	[ ]	[ ]
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	[ ]	[ ]	[x]	[ ]
BUILDING MASS DATA	[ ]	[ ]	[ ]	[ ]
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	[ ]	[ ]	[x]	[ ]
INTERIOR SURFACE DATA	[ ]	[ ]	[ ]	[ ]
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
MECHANICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]
LIGHTING SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
LIGHTING SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]

SOLPA BELGIUM

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SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☐ SURFACE REFLECTANCE

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☐ OTHER ________

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☒ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☐ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☒ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☒ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION	☒ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☒ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☐ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☒ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☐ SURFACE & AIR	☐ AIR ONLY	☒ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☐ VARIED BY TOOL
U-VALUES:	☐ CHANGE W/WIND SPEED	☐ REMAIN CONSTANT	☒ MOVABLE INSULATION
INFILTRATION:	☐ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☐ SENSIBLE ONLY
VENTILATION:	☐ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☒ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☐ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☐ ZONE ☐ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☐ DAY ☐ MONTH ☐ SEASON ☐ YEAR

TEMPERATURES: ☐ AIR ☐ SURFACE ☐ GRAPHIC PLOT

FUEL USE BY: ☐ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER ________ ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ________ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

SOLPA BELGIUM

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SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☐ UNIVAC ☒ OTHER Hewlett Packard

CORE REQUIRED: ☐ > 500K ☐ 100 - 500 K ☒ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ______

EQUIPMENT: ☒ CRT ☒ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST: ?

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS

RUN COST/TIME: ?

INPUT SET-UP TIME: ______ MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☐ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

Laboratoire de Coinie Ciul
Batiment Vinci Place du Levant
1348 Louvain-la-Neuve Belgique

PASSIVE HOUSE DESIGN CANADA

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

Michael Glover
Solar Energy Program
National Research Council
Bldg. R-92
Ottawa, Ontario
K1A OR6

GENERAL:

TOOL NAME: Passive House Design

DEVELOPED BY: M. Zaheeruddin and R.R. Gilpin
Dept. of Mechanical Engineering
The University of Alberta
EDMONTON, Alberta T6G 2G8

DATE DEVELOPED: July 1980

DATE OF LAST REVISION: July 1981

AVAILABLE THROUGH: M. Zaheeruddin
Department of Mechanical Engineering
The University of Alberta
EDMONTON, Canada.

PHONE NO.: (403) 432-3251

SUPPORTED BY:
~~Department of Mechanical Engineering~~

PHONE NO.:

BRIEF DESCRIPTION: The Passive House Design simulates the dynamic response of the house to variations in radiation fluxes and ambient air temperatures. The program can investigate the effect of thermal mass in the structure and contribution of soil mass surrounding the basement.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

- [x] MAIN FRAME COMPUTER
  - [ ] CARD DECK
  - [x] TAPE
  - [ ] TIME SHARING
  - [ ] LISTING - HARD COPY

  (COMPLETE SECTIONS 1, 2, 3)
- [ ] MICRO-COMPUTER
  - [ ] DISC
  - [ ] TAPE
  - [ ] LISTING
  - [ ] RECALL ONLY MEMORY-INTEGRATED CIRCUIT

  (COMPLETE SECTIONS 1, 2, 4)
- [ ] HAND CALCULATOR
  - [ ] MAGNETIC CARD
  - [ ] LISTING
  - [ ] RECALL ONLY MEMORY INTEGRATED CIRCUIT

  (COMPLETE SECTIONS 1, 2, 5)
- [ ] GRAPHIC OR MANUAL
  - [ ] TEMPLATES, CHARTS, TABLES
  - [ ] BOOK
  - [ ] DEVICE

  (COMPLETE SECTIONS 1, 2, 6)

PASSIVE HOUSE DESIGN — CANADA

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☒ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☒ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR *
- ☐ ACTIVE SOLAR
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☒ UNDERGROUND LOADS
- ☒ MASS

☐ COOLING
- ☐ LOADS
- ☐ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☐ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

* GIVE DETAILS:
- x - direct gain
- x - trombe wall
- - attached sunspace
- - other

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	☒	☐
BUILDING TYPE AND SCHEDULE	☐	☐	☒	☐
OCCUPANCY RATES	☐	☐	☒	☐
BUILDING AREA	☐	☐	☒	☐
SPACE TEMPERATURES	☐	☐	☒	☐
LOCAL ENERGY COSTS	☐	☐	☒	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☒	☐
GLAZING AREAS & ORIENTATIONS	☐	☐	☒	☐
ZONING	☐	☐	☐	☐
ROOM SHAPES	☐	☐	☒	☐
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	☒	☐
BUILDING MASS DATA	☐	☐	☐	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☒	☐
INTERIOR SURFACE DATA	☐	☐	☐	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

PASSIVE HOUSE DESIGN — CANADA

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA:	■ HOURLY TAPE	□ TYPICAL DAY	□ MONTHLY DATA	□ ANNUAL DATA	□ MONTHLY DEGREE DAYS
	□ ANNUAL DEGREE DAYS	□ AVE. MONTHLY MIN. AND MAX.	□ AVE. MONTHLY TEMP.	□ DAILY	
SOLAR DATA:	■ HOURLY TAPE	□ TYPICAL DAY PROFILE	□ MONTHLY AVE. DAILY & TOTAL		
SOLAR ORIENS. CALC:	■ ANY ORIEN. INCL. SLOPED	□ ANY VERT. & HORIZ.	□ HORIZ. & 4 CARDINAL DIREC.		
	□ SLOPED FACING SOUTH	□ SURFACE REFLECTANCE			
DAYLIGHT CALC:	■ HOUR-BY-HOUR	□ TYPICAL CLEAR & CLOUDY DAY/MONTH	□ TYPICAL DAY/MONTH		
	□ ANNUAL AVERAGE	□ OTHER ____________			

CALCULATION PROCEDURES:

LANGUAGE:	■ FORTRAN	□ BASIC	□ MACHINE LANGUAGE	□ OTHER ________	□ GRAPHS, CHARTS & SIMPLE CALC.
USER TYPE:	■ INTERACTIVE	□ INTERACTIVE GRAPHIC	□ PREPARE FILE	□ HAND CALCULATION	
UNITS OF CALCULATION:	□ SI UNITS	■ ENGLISH	□ BOTH		

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	■ FINITE DIFFERENCE	□ RESPONSE FACTOR	□ STEADY STATE
SOLAR COMP. CALCULATED:	□ DIFFUSE/DIRECT/RE-RADIATED	■ DIFFUSE/DIRECT	□ TOTAL
INTEGRATION:	■ SIMPLE EULER	■ IMPLICIT	□ OTHER
SHADING:	□ ANY SOLAR OBSTRUCTION	■ OVERHANG ONLY	□ NO SHADING
MOVABLE SHADING:	■ DAILY & SEASONAL SWITCHING	□ SEASONAL SWITCHING	□ NOT CALCULATED
MASS EFFECT IS CALCULATED:	■ TRANSIENT HEAT FLOW	□ TIME CONSTANT FACTORS	□ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	■ SURFACE & AIR	□ AIR ONLY	□ NOT CALCULATED
INSIDE TEMPERATURE:	■ INPUT SCHEDULE BY USER	□ FIXED BY TOOL	□ VARIED BY TOOL
U-VALUES:	□ CHANGE W/WIND SPEED	□ REMAIN CONSTANT	■ MOVABLE INSULATION
INFILTRATION:	■ AIR CHANGE PER HOUR	□ CRACK METHOD	□ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	■ SENSIBLE & LATENT SEPARATE	□ SENS. & LAT. TOTAL	□ SENSIBLE ONLY
VENTILATION:	□ SENSIBLE	□ LATENT	■ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	□ SKY, REFL. & DIRECT	□ SKY & REFL.	□ SKY ONLY
ZONES PER RUN:	□ > 25 □ 10 - 25	□ 2 - 10	■ 1 ONLY
SYSTEM MODELING:	□ SYSTEM EFFIC. INPUT	□ SYSTEM OPTIMIZING	□ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	□ ANNUAL COST	□ SIMPLE PAYBACK	□ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS:	□ COMPONENT	□ ZONE	■ BUILDING		
LOADS OUTPUT BY:	□ HOUR	□ DAY	■ MONTH	□ SEASON	■ YEAR
TEMPERATURES:	■ AIR	□ SURFACE	□ GRAPHIC PLOT		
FUEL USE BY:	□ MONTHLY CONSUMPTION	□ ANNUAL CONSUMPTION	□ SYSTEM COMPONENTS		
	□ MONTHLY PEAK DEMAND	□ ANNUAL PEAK DEMAND	□ ENERGY SYSTEMS		
	□ OTHER ________	□ OTHER ________	□ TOTAL BUILDING ONLY		

PASSIVE HOUSE DESIGN

CANADA

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☐ UNIVAC ☐ OTHER AMDHAL V/470

CORE REQUIRED: ☐ > 500K ☐ 100 - 500 K ■ 25 - 100 K ☐ < 25 K

SUPPORT: ☐ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ____

EQUIPMENT: ☐ CRT ■ PRINTER ☐ TEXTRONIX ☐ OTHER ____

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST: Not known

IN-OFFICE EQUIPMENT: CRT ____ PRINTER ____

SOFTWARE PURCHASE: CARD DECK ____ TAPE ____ LISTING ____

SUPPORT INFORMATION: USER'S GUIDE ____ DATA MANUAL ____ OTHER ____

TIME TO INPUT AND DEBUG: ____ MAN-DAYS ____ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ____ MAN-DAYS 1 MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ■ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

ENCORE - CANADA

CANADA

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SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

Michael Glover
Solar Energy Program
National Research Council
Bldg. R-92
Ottawa, Ontario
K1A OR6

GENERAL:

TOOL NAME: Encore-Canada

DEVELOPED BY: A. Konrad
Division of Building Research
National Research Council of Canada
Ottawa, Ontario. K1A OR6

DATE DEVELOPED: August 1978

DATE OF LAST REVISION: 1980

AVAILABLE THROUGH:
Thermal Performance Section
Division of Building Research
National Research Council of Canada

PHONE NO.: Ottawa, K1A OR6 (613) 993-1421

SUPPORTED BY:
Thermal Performance Section
Division of Building Research
National Research Council of Canada

PHONE NO.: Ottawa, K1A OR6 (613) 993-1421

BRIEF DESCRIPTION: The Encore-Canada program performs ~~a dynamic simulation of energy use on an~~ hourly basis using real weather data. Internal heat storage is taken into account. Air infiltration calculations are based on mass flow balance. Solar effects are included. Temperature variation from room to room is permitted provided that electric heaters controlled by proportioning thermostats are used. Oil-fired furnace heated

(continued over)

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☐ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☐ TAPE
- ☐ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

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SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

COMMENTS:

houses with hot air distribution systems can also be simulated. Internal heat gains (occupancy, lighting, appliances, hot water) are described by 24-hour schedules. Heat transfer through basement walls and floor is computed on the basis of a yearly cycle of ground surface sol-air temperature and constant basement indoor temperature.

ENCORE-CANADA CANADA

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SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ☐ ENGINEER ☐ TECHNICIAN ■ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ■ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ■ POST-DESIGN SERV. ■ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

■ HEATING
- ■ LOADS
- ■ SPACE TEMPS.
- ■ HVAC SYSTEMS
- ■ PASSIVE SOLAR *
- ☐ ACTIVE SOLAR
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ■ UNDERGROUND LOADS
- ■ MASS

☐ COOLING
- ☐ LOADS
- ☐ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☐ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

* GIVE DETAILS:
- x – direct gain
- – trombe wall
- – attached sunspace
- – other

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION – ASSOCIATED WEATHER DATA	☐	☐	☐	☐
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☐	☐	☐	☐
BUILDING AREA	☐	☐	☐	☐
SPACE TEMPERATURES	☐	☐	☐	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☐	■
GLAZING AREAS & ORIENTATIONS	☐	☐	☐	■
ZONING	☐	☐	☐	■
ROOM SHAPES	☐	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☐	☐	■
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ϵ, ETC.)	☐	☐	☐	■
BUILDING MASS DATA	☐	☐	☐	■
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☐	■
INTERIOR SURFACE DATA	☐	☐	☐	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	■
MECHANICAL SYSTEM CONTROL	☐	☐	☐	■
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

WEATHER DATA:

TEMPERATURE DATA: [x] HOURLY TAPE [ ] TYPICAL DAY [ ] MONTHLY DATA [ ] ANNUAL DATA [ ] MONTHLY DEGREE DAYS [ ] ANNUAL DEGREE DAYS [ ] AVE. MONTHLY MIN. AND MAX. [ ] AVE. MONTHLY TEMP. [ ] DAILY

SOLAR DATA: [x] HOURLY TAPE [ ] TYPICAL DAY PROFILE [ ] MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: [x] ANY ORIEN. INCL. SLOPED [ ] ANY VERT. & HORIZ. [ ] HORIZ. & 4 CARDINAL DIREC. [ ] SLOPED FACING SOUTH [ ] SURFACE REFLECTANCE

DAYLIGHT CALC: [ ] HOUR-BY-HOUR [ ] TYPICAL CLEAR & CLOUDY DAY/MONTH [ ] TYPICAL DAY/MONTH [ ] ANNUAL AVERAGE [ ] OTHER ____________

CALCULATION PROCEDURES:

LANGUAGE: [x] FORTRAN [ ] BASIC [ ] MACHINE LANGUAGE [ ] OTHER ________ [ ] GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: [x] INTERACTIVE [ ] INTERACTIVE GRAPHIC [ ] PREPARE FILE [ ] HAND CALCULATION

UNITS OF CALCULATION: [ ] SI UNITS [ ] ENGLISH [x] BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	[ ] FINITE DIFFERENCE	[x] RESPONSE FACTOR	[ ] STEADY STATE
SOLAR COMP. CALCULATED:	[ ] DIFFUSE/DIRECT/RE-RADIATED	[x] DIFFUSE/DIRECT	[ ] TOTAL
INTEGRATION:	[ ] SIMPLE EULER	[ ] IMPLICIT	[ ] OTHER
SHADING:	[ ] ANY SOLAR OBSTRUCTION	[ ] OVERHANG ONLY	[x] NO SHADING
MOVABLE SHADING:	[x] DAILY & SEASONAL SWITCHING	[ ] SEASONAL SWITCHING	[ ] NOT CALCULATED
MASS EFFECT IS CALCULATED:	[x] TRANSIENT HEAT FLOW	[ ] TIME CONSTANT FACTORS	[ ] ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	[ ] SURFACE & AIR	[x] AIR ONLY	[ ] NOT CALCULATED
INSIDE TEMPERATURE:	[x] INPUT SCHEDULE BY USER	[ ] FIXED BY TOOL	[ ] VARIED BY TOOL
U-VALUES:	[x] CHANGE W/WIND SPEED	[ ] REMAIN CONSTANT	[x] MOVABLE INSULATION
INFILTRATION:	[ ] AIR CHANGE PER HOUR	[ ] CRACK METHOD	[x] VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	[ ] SENSIBLE & LATENT SEPARATE	[ ] SENS. & LAT. TOTAL	[x] SENSIBLE ONLY
VENTILATION:	[ ] SENSIBLE	[ ] LATENT	[ ] VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	[ ] SKY, REFL. & DIRECT	[ ] SKY & REFL.	[ ] SKY ONLY
ZONES PER RUN:	[ ] > 25 [x] 10 - 25	[x] 2 - 10	[ ] 1 ONLY
SYSTEM MODELING:	[x] SYSTEM EFFIC. INPUT	[ ] SYSTEM OPTIMIZING	[ ] COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	[ ] ANNUAL COST	[ ] SIMPLE PAYBACK	[ ] LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: [ ] COMPONENT [x] ZONE [x] BUILDING

LOADS OUTPUT BY: [x] HOUR [x] DAY [x] MONTH [x] SEASON [ ] YEAR

TEMPERATURES: [x] AIR [ ] SURFACE [ ] GRAPHIC PLOT

FUEL USE BY: [x] MONTHLY CONSUMPTION [ ] MONTHLY PEAK DEMAND [ ] OTHER ________ [ ] ANNUAL CONSUMPTION [ ] ANNUAL PEAK DEMAND [ ] OTHER ________ [ ] SYSTEM COMPONENTS [ ] ENERGY SYSTEMS [ ] TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ■ IBM ☐ CDC ☐ UNIVAC ☐ OTHER ______

CORE REQUIRED: ☐ > 500K ☐ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ■ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER Conversational Front-end

EQUIPMENT: ☐ CRT ■ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: 1/2 MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ■ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ■ 100 - 1000 SEC. ☐ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

______ ______

______ ______

______ ______

______ ______

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

Michael Glover
Solar Energy Program
National Research Council
Bldg. R-92
Ottawa, Ontario
K1A 0R6

GENERAL:

TOOL NAME: PassivE

DEVELOPED BY: Okins, Leipciger, Cuplinskas, Kaminker and Associates Limited For: Ontario Ministry of Energy

DATE DEVELOPED: 1979

DATE OF LAST REVISION: February 1982

AVAILABLE THROUGH: Okins, Leipciger, Cuplinskas, Kaminker and Associates Limited, TORONTO, Ontario

PHONE NO.: (416) 445-8255

SUPPORTED BY:

PHONE NO.:

BRIEF DESCRIPTION: The PassivE program performs a dynamic simulation of energy use on an hourly basis by the finite differences model. Transit heat flow is assumed through mass components. Up to three zones can be modeled including coupling effects between zones. Non-linear film and radiative coefficients are re-calculated hourly. Interior surfaces are grouped into separate categories according to capacitance and conductivity.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☐ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☐ TAPE
- ☐ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☒ MICRO-COMPUTER
- ☒ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT
- ☒ Cassette

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

□ ARCHITECT □ ENGINEER □ TECHNICIAN ■ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

□ PRE-DESIGN □ SITE ANALYSIS □ SCHEMATICS □ DESIGN DEVEL. □ POST-DESIGN SERV. ■ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

□ PRE-DESIGN □ SITE ANALYSIS ■ SCHEMATICS ■ DESIGN DEVEL. □ POST-DESIGN SERV. ■ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

■ HEATING
- ■ LOADS
- ■ SPACE TEMPS.
- □ HVAC SYSTEMS
- ■ PASSIVE SOLAR *
- □ ACTIVE SOLAR
- ■ SHADING
- ■ SYSTEM DESIGN
- □ ECONOMICS
- ■ UNDERGROUND LOADS
- ■ MASS

■ COOLING
- ■ LOADS
- ■ SPACE TEMPS.
- □ HVAC SYSTEMS
- □ PASSIVE CLNG.
- ■ SHADING
- ■ SYSTEM DESIGN
- □ ECONOMICS
- ■ UNDERGROUND LOADS
- ■ SLOPED GLAZING
- ■ MASS

□ LIGHTING
- □ LOADS
- □ FC (LUX) LEVELS
- □ SYSTEM DESIGN
- □ ECONOMICS
- □ DAYLIGHTING FC (LUX) LEVELS
- □ ARTIFICIAL LTNG. REDUCTION

□ DHW
- □ LOADS
- □ SOLAR ACTIVE
- □ SOLAR PASSIVE
- □ ECONOMICS

□ MISCELLANEOUS
- □ FANS
- □ PUMPS
- □ MISC. ELECTRICAL
- □ ELEV. & ESCALATOR

* GIVE DETAILS:
- x- direct gain
- x- trombe wall
- x- attached sunspace
- \- other

INPUT DATA REQUIRED: RESEARCH TOOL

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	□	□	■	□
BUILDING TYPE AND SCHEDULE	□	□	■	□
OCCUPANCY RATES	□	□	■	□
BUILDING AREA	□	□	■	□
SPACE TEMPERATURES	□	□	□	□
LOCAL ENERGY COSTS	□	□	□	□
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	□	□	□	□
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	□	□	□	□
LIGHTING REQUIREMENTS	□	□	□	□
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	□	□	■	□
GLAZING AREAS & ORIENTATIONS	□	□	■	□
ZONING	□	□	■	□
ROOM SHAPES	□	□	■	□
OPERATING SCHEDULES & PROFILES	□	□	■	□
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	□	□	■	□
BUILDING MASS DATA	□	□	■	□
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	□	□	■	□
INTERIOR SURFACE DATA	□	□	■	□
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	□	□	■	□
MECHANICAL SYSTEM CONTROL	□	□	■	□
ELECTRICAL SYSTEM DESIGN	□	□	□	□
ELECTRICAL SYSTEM CONTROL	□	□	□	□
LIGHTING SYSTEM DESIGN	□	□	□	□
LIGHTING SYSTEM CONTROL	□	□	□	□

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

WEATHER DATA:

TEMPERATURE DATA:	■ ~~HOURLY TAPE~~ Disk or Cassette	□ TYPICAL DAY	□ MONTHLY DATA	□ ANNUAL DATA
	□ MONTHLY DEGREE DAYS	□ ANNUAL DEGREE DAYS	□ AVE. MONTHLY MIN. AND MAX.	□ AVE. MONTHLY TEMP.
	□ DAILY			
SOLAR DATA:	■ ~~HOURLY TAPE~~ Disk or Cassette	□ TYPICAL DAY PROFILE	□ MONTHLY AVE. DAILY & TOTAL	
SOLAR ORIENS. CALC:	■ ANY ORIEN. INCL. SLOPED	□ ANY VERT. & HORIZ.	□ HORIZ. & 4 CARDINAL DIREC.	
	□ SLOPED FACING SOUTH	■ SURFACE REFLECTANCE		
DAYLIGHT CALC:	□ HOUR-BY-HOUR	□ TYPICAL CLEAR & CLOUDY DAY/MONTH	□ TYPICAL DAY/MONTH	
	□ ANNUAL AVERAGE	□ OTHER ________		

CALCULATION PROCEDURES:

LANGUAGE:	□ FORTRAN	■ BASIC	□ MACHINE LANGUAGE	□ OTHER ________
	□ GRAPHS, CHARTS & SIMPLE CALC.			
USER TYPE:	□ INTERACTIVE	□ INTERACTIVE GRAPHIC	■ PREPARE FILE	□ HAND CALCULATION
UNITS OF CALCULATION:	■ SI UNITS	□ ENGLISH	□ BOTH	

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	■ FINITE DIFFERENCE	□ RESPONSE FACTOR	□ STEADY STATE
SOLAR COMP. CALCULATED:	■ DIFFUSE/DIRECT/RE-RADIATED	□ DIFFUSE/DIRECT	□ TOTAL
INTEGRATION:	■ SIMPLE EULER	□ IMPLICIT	□ OTHER
SHADING:	□ ANY SOLAR OBSTRUCTION	■ OVERHANG ONLY	□ NO SHADING
MOVABLE SHADING:	□ DAILY & SEASONAL SWITCHING	■ SEASONAL SWITCHING	□ NOT CALCULATED
MASS EFFECT IS CALCULATED:	■ TRANSIENT HEAT FLOW	□ TIME CONSTANT FACTORS	□ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	■ SURFACE & AIR	□ AIR ONLY	□ NOT CALCULATED
INSIDE TEMPERATURE:	□ INPUT SCHEDULE BY USER	□ FIXED BY TOOL	■ VARIED BY TOOL
U-VALUES:	■ CHANGE W/WIND SPEED	□ REMAIN CONSTANT	□ MOVABLE INSULATION
INFILTRATION:	□ AIR CHANGE PER HOUR	□ CRACK METHOD	■ VARIES W/WIND SPEED & Temp.
INTERNAL LOADS INCLUDE:	□ SENSIBLE & LATENT SEPARATE	□ SENS. & LAT. TOTAL	■ SENSIBLE ONLY
VENTILATION:	■ SENSIBLE	□ LATENT	□ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	□ SKY, REFL. & DIRECT	□ SKY & REFL.	□ SKY ONLY
ZONES PER RUN:	□ > 25	□ 10 - 25	■ 2 - 10
	□ 1 ONLY		
SYSTEM MODELING:	□ SYSTEM EFFIC. INPUT	■ SYSTEM OPTIMIZING	■ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	□ ANNUAL COST	□ SIMPLE PAYBACK	□ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS:	■ COMPONENT	■ ZONE	■ BUILDING	
LOADS OUTPUT BY:	■ HOUR	□ DAY	■ MONTH	□ SEASON
	□ YEAR			
TEMPERATURES:	■ AIR	■ SURFACE	□ GRAPHIC PLOT	
FUEL USE BY:	■ MONTHLY CONSUMPTION	□ ANNUAL CONSUMPTION	■ SYSTEM COMPONENTS	
	■ MONTHLY PEAK DEMAND	□ ANNUAL PEAK DEMAND	□ ENERGY SYSTEMS	
	□ OTHER ________	□ OTHER ________	□ TOTAL BUILDING ONLY	

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

4 SECTION

FOR DESIGN TOOLS REQUIRING A MICRO-COMPUTER

HARDWARE:

MANUFACTURER AND MODEL NUMBER: Wang 2200 MVP (Mini)

RANDOM ACCESS MEMORY (RAM) REQUIRED: 12.5 K

DOES THIS TOOL REQUIRE A PRINTER? ■ YES ☐ NO

SUPPORT: ☐ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ____

COSTS:

FIRST COST:

MICRO-COMPUTER: ____

SOFTWARE: ROM IC ____ DISC ____ TAPE ____ LISTING ____

SUPPORT INFORMATION: USER'S GUIDE ____ DATA MANUAL ____ OTHER ____

TIME TO INPUT AND DEBUG: ____ MAN-DAYS ____ MAN-HOURS

RUN COST/TIME:

TYPICAL* INPUT SET-UP TIME: 1 MAN-DAYS ____ MAN-HOURS

TYPICAL* RUN TIME: ____ HRS. 2.0 MIN.

TYPICAL* PRINT TIME: ____ HRS. 0.1 MIN.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

SIMNET

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

Michael Glover
Solar Energy Program
National Research Council
Bldg. R-92
Ottawa, Ontario
K1A OR6

GENERAL:

TOOL NAME: SIMNET

DEVELOPED BY: Robin Barker
Margo Mandy
Watershed Energy Systems
97 Six Point Road
TORONTO, Ontario. M8Z 2X3

DATE DEVELOPED: January 1982

DATE OF LAST REVISION: June 1982

AVAILABLE THROUGH: University of Guelph,
GUELPH, Ontario.

PHONE NO.: (519) 824-4120

SUPPORTED BY:

PHONE NO.:

BRIEF DESCRIPTION: The SIMNET program performs a dynamic simulation on an hourly basis using real meteorological input. The program is similar to PASOLE program. In addition to simulating passive solar systems (direct gain, trombe wall and attached SUN space systems) the program simulates hybrid passive systems incorporating isolated rock storage which is either blower or heat pump charged.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

- ☒ MAIN FRAME COMPUTER
  - ☐ CARD DECK
  - ☒ TAPE
  - ☒ TIME SHARING
  - ☐ LISTING - HARD COPY
  - (COMPLETE SECTIONS 1, 2, 3)
- ☐ MICRO-COMPUTER
  - ☐ DISC
  - ☐ TAPE
  - ☐ LISTING
  - ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT
  - (COMPLETE SECTIONS 1, 2, 4)
- ☐ HAND CALCULATOR
  - ☐ MAGNETIC CARD
  - ☐ LISTING
  - ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT
  - (COMPLETE SECTIONS 1, 2, 5)
- ☐ GRAPHIC OR MANUAL
  - ☐ TEMPLATES, CHARTS, TABLES
  - ☐ BOOK
  - ☐ DEVICE
  - (COMPLETE SECTIONS 1, 2, 6)

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ■ ENGINEER ☐ TECHNICIAN ■ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ■ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ■ SITE ANALYSIS ■ SCHEMATICS ■ DESIGN DEVEL. ■ POST-DESIGN SERV. ■ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

■ HEATING
- ■ LOADS
- ■ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ■ PASSIVE SOLAR *
- ☐ ACTIVE SOLAR
- ☐ SHADING
- ■ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ■ MASS

■ COOLING
- ■ LOADS
- ■ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ■ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ■ SLOPED GLAZING
- ■ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

* GIVE DETAILS:
- X– direct gain
- X– trombe wall
- X– attached sunspace
- X– other (hybrid)

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	■	☐
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☐	☐	☐	☐
BUILDING AREA	☐	☐	■	☐
SPACE TEMPERATURES	☐	☐	■	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	■	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	■	☐
LIGHTING REQUIREMENTS	☐	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	■	☐
GLAZING AREAS & ORIENTATIONS	☐	☐	■	☐
ZONING	☐	☐	■	☐
ROOM SHAPES	☐	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	■	☐
BUILDING MASS DATA	☐	☐	■	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☐	☐
INTERIOR SURFACE DATA	☐	☐	■	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA:	■ HOURLY TAPE ☐ ANNUAL DEGREE DAYS	☐ TYPICAL DAY ☐ AVE. MONTHLY MIN. AND MAX.	☐ MONTHLY DATA ☐ ANNUAL DATA ☐ AVE. MONTHLY TEMP.	☐ MONTHLY DEGREE DAYS ☐ DAILY
SOLAR DATA:	■ HOURLY TAPE	☐ TYPICAL DAY PROFILE	☐ MONTHLY AVE. DAILY & TOTAL	
SOLAR ORIENS. CALC:	■ ANY ORIEN. INCL. SLOPED ☐ SLOPED FACING SOUTH	☐ ANY VERT. & HORIZ. ☐ SURFACE REFLECTANCE	☐ HORIZ. & 4 CARDINAL DIREC.	
DAYLIGHT CALC:	☐ HOUR-BY-HOUR ☐ ANNUAL AVERAGE	☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ OTHER ____________	☐ TYPICAL DAY/MONTH	

CALCULATION PROCEDURES:

LANGUAGE:	■ FORTRAN	☐ BASIC	☐ MACHINE LANGUAGE	☐ OTHER ________	☐ GRAPHS, CHARTS & SIMPLE CALC.
USER TYPE:	☐ INTERACTIVE	☐ INTERACTIVE GRAPHIC	■ PREPARE FILE	☐ HAND CALCULATION	
UNITS OF CALCULATION:	■ SI UNITS	☐ ENGLISH	☐ BOTH		

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	■ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☐ DIFFUSE/DIRECT/RE-RADIATED	■ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	■ IMPLICIT	☐ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	■ NO SHADING
MOVABLE SHADING:	☐ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	■ NOT CALCULATED
MASS EFFECT IS CALCULATED:	■ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☐ SURFACE & AIR	■ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☐ INPUT SCHEDULE BY USER	■ FIXED BY TOOL	☐ VARIED BY TOOL
U-VALUES:	■ CHANGE W/WIND SPEED	■ REMAIN CONSTANT	■ MOVABLE INSULATION
INFILTRATION:	■ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	■ SENSIBLE ONLY
VENTILATION:	■ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	■ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	■ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS:	☐ COMPONENT	■ ZONE	■ BUILDING		
LOADS OUTPUT BY:	■ HOUR	■ DAY	■ MONTH	☐ SEASON	■ YEAR
TEMPERATURES:	■ AIR	■ SURFACE	☐ GRAPHIC PLOT		
FUEL USE BY:	☐ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER ________	☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ________	☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY		

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ■ IBM ☐ CDC ☐ UNIVAC ☐ OTHER ____

CORE REQUIRED: ☐ > 500K ☐ 100 - 500 K ■ 25 - 100 K ☐ < 25 K

SUPPORT: ☐ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ____

EQUIPMENT: ☐ CRT ■ PRINTER ☐ TEXTRONIX ☐ OTHER ____

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ____ PRINTER X

SOFTWARE PURCHASE: CARD DECK ____ TAPE x LISTING X

SUPPORT INFORMATION: USER'S GUIDE ____ DATA MANUAL ____ OTHER ____

TIME TO INPUT AND DEBUG: 1 MAN-DAYS ____ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ____ MAN-DAYS 1/2 MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ■ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

Robin Barker
97 Six Point Road
TORONTO, (Ontario).
M8Z 2X3 (416) 233-3241

BA4 DENMARK

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: BA4

DEVELOPED BY: Hans Lund
Thermal Insulation Laboratory
Technical University of Denmark
Building 118 - DK-2800 Lyngby
Denmark

DATE DEVELOPED:

DATE OF LAST REVISION:

AVAILABLE THROUGH:
Thermal Insulation Laboratory

PHONE NO.:

SUPPORTED BY:

PHONE NO.:

BRIEF DESCRIPTION: The programme calculates for a room half-hour values during a whole year of room temperatures, utilizing a simplified method. Further it can calculate heating and cooling loads, taking into account sun radiation, fixed and movable sun shading devices, varying ventilation and infiltration, electric lighting and other heat sources in the room, etc.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

- ☒ MAIN FRAME COMPUTER
  - ☒ CARD DECK
  - ☒ TAPE
  - ☒ TIME SHARING
  - ☒ LISTING - HARD COPY
  - (COMPLETE SECTIONS 1, 2, 3)
- ☐ MICRO-COMPUTER
  - ☐ DISC
  - ☐ TAPE
  - ☐ LISTING
  - ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT
  - (COMPLETE SECTIONS 1, 2, 4)
- ☐ HAND CALCULATOR
  - ☐ MAGNETIC CARD
  - ☐ LISTING
  - ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT
  - (COMPLETE SECTIONS 1, 2, 5)
- ☐ GRAPHIC OR MANUAL
  - ☐ TEMPLATES, CHARTS, TABLES
  - ☐ BOOK
  - ☐ DEVICE
  - (COMPLETE SECTIONS 1, 2, 6)

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☒ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☒ UNDERGROUND LOADS
- ☒ MASS

☒ COOLING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☒ UNDERGROUND LOADS
- ☒ SLOPED GLAZING
- ☒ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☒	☒	☒
BUILDING TYPE AND SCHEDULE	☐	☒	☒	☒
OCCUPANCY RATES	☐	☒	☒	☒
BUILDING AREA	☐	☒	☒	☒
SPACE TEMPERATURES	☐	☒	☒	☒
LOCAL ENERGY COSTS	☒	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☒	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☒	☐	☐	☐
LIGHTING REQUIREMENTS	☒	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☒	☒	☒
GLAZING AREAS & ORIENTATIONS	☐	☒	☒	☒
ZONING	☒	☐	☐	☐
ROOM SHAPES	☒	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☒	☒	☒
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☒	☒	☒
BUILDING MASS DATA	☐	☒	☒	☒
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☒	☒	☒
INTERIOR SURFACE DATA	☐	☒	☒	☒
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☒	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☒	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☒	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☒	☐	☐	☐
LIGHTING SYSTEM DESIGN	☒	☐	☐	☐
LIGHTING SYSTEM CONTROL	☒	☐	☐	☐

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: [X] HOURLY TAPE [ ] TYPICAL DAY [ ] MONTHLY DATA [ ] ANNUAL DATA [ ] MONTHLY DEGREE DAYS [ ] ANNUAL DEGREE DAYS [ ] AVE. MONTHLY MIN. AND MAX. [ ] AVE. MONTHLY TEMP. [ ] DAILY

SOLAR DATA: [X] HOURLY TAPE [ ] TYPICAL DAY PROFILE [ ] MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: [X] ANY ORIEN. INCL. SLOPED [X] ANY VERT. & HORIZ. [ ] HORIZ. & 4 CARDINAL DIREC. [ ] SLOPED FACING SOUTH [ ] SURFACE REFLECTANCE

DAYLIGHT CALC: [ ] HOUR-BY-HOUR [ ] TYPICAL CLEAR & CLOUDY DAY/MONTH [ ] TYPICAL DAY/MONTH [ ] ANNUAL AVERAGE [ ] OTHER ______

CALCULATION PROCEDURES:

LANGUAGE: [X] FORTRAN [ ] BASIC [ ] MACHINE LANGUAGE [ ] OTHER ______ [ ] GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: [ ] INTERACTIVE [ ] INTERACTIVE GRAPHIC [X] PREPARE FILE [ ] HAND CALCULATION

UNITS OF CALCULATION: [X] SI UNITS [ ] ENGLISH [ ] BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	[X] FINITE DIFFERENCE	[ ] RESPONSE FACTOR	[ ] STEADY STATE
SOLAR COMP. CALCULATED:	[X] DIFFUSE/DIRECT/RE-RADIATED	[ ] DIFFUSE/DIRECT	[ ] TOTAL
INTEGRATION:	[X] SIMPLE EULER	[ ] IMPLICIT	[ ] OTHER
SHADING:	[ ] ANY SOLAR OBSTRUCTION X	[X] OVERHANG ONLY	[ ] NO SHADING
MOVABLE SHADING: X other	[ ] DAILY & SEASONAL SWITCHING	[ ] SEASONAL SWITCHING	[ ] NOT CALCULATED
MASS EFFECT IS CALCULATED:	[X] TRANSIENT HEAT FLOW	[ ] TIME CONSTANT FACTORS	[ ] ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	[X] SURFACE & AIR	[ ] AIR ONLY	[ ] NOT CALCULATED
INSIDE TEMPERATURE:	[X] INPUT SCHEDULE BY USER	[ ] FIXED BY TOOL	[ ] VARIED BY TOOL
U-VALUES:	[ ] CHANGE W/WIND SPEED	[X] REMAIN CONSTANT	[X] MOVABLE INSULATION
INFILTRATION:	[X] AIR CHANGE PER HOUR	[ ] CRACK METHOD	[ ] VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	[ ] SENSIBLE & LATENT SEPARATE	[ ] SENS. & LAT. TOTAL	[X] SENSIBLE ONLY
VENTILATION:	[X] SENSIBLE	[ ] LATENT	[ ] VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	[ ] SKY, REFL. & DIRECT	[ ] SKY & REFL.	[ ] SKY ONLY
ZONES PER RUN:	[ ] > 25 / [ ] 10 - 25	[ ] 2 - 10	[X] 1 ONLY
SYSTEM MODELING:	[ ] SYSTEM EFFIC. INPUT	[ ] SYSTEM OPTIMIZING	[ ] COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	[ ] ANNUAL COST	[ ] SIMPLE PAYBACK	[ ] LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: [ ] COMPONENT [ ] ZONE [X] BUILDING

LOADS OUTPUT BY: [X] HOUR [X] DAY [X] MONTH [X] SEASON [X] YEAR

TEMPERATURES: [X] AIR [X] SURFACE [ ] GRAPHIC PLOT

FUEL USE BY: [ ] MONTHLY CONSUMPTION [ ] MONTHLY PEAK DEMAND [ ] OTHER ______ [ ] ANNUAL CONSUMPTION [ ] ANNUAL PEAK DEMAND [ ] OTHER ______ [ ] SYSTEM COMPONENTS [ ] ENERGY SYSTEMS [ ] TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☒ IBM ☐ CDC ☐ UNIVAC ☐ OTHER ______

CORE REQUIRED: ☐ > 500K ☒ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ______

EQUIPMENT: ☒ CRT ☒ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE 100 $ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE 10 $ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: 5 MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ______ MAN-DAYS 4 MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☒ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☒ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

______ ______
______ ______
______ ______
______ ______

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII – PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B – MODELLING & SIMULATION
SUBTASK C – DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: HAUSer

DEVELOPED BY: Dr.-Ing. Gerd Hauser

c/o UNIVERSITÄT ESSEN
- Gesamthochschule -
~~Fachbereich Bauwesen~~
o. Prof. Dr.-Ing. Karl Gertis
Universitätsstraße 2 - Postfach 6843
~~D-4300 Essen 1~~

DATE DEVELOPED: 1974-1976

DATE OF LAST REVISION: 1982

AVAILABLE THROUGH:

PHONE NO.:

SUPPORTED BY:

PHONE NO.:

BRIEF DESCRIPTION: Time-step method for the calculation of the transient thermal behaviour of buildings of any size and construction.
Testing report: Hauser, G.: Verfahren zur Berechnung des Temperaturverhaltens und Energieverbrauchs von Gebäuden. KI 6 (1978), H. 2, S. 53-56.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☐ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☐ TAPE
- ☒ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ☐ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☒ MASS

☐ COOLING
- ☐ LOADS
- ☐ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☐ MASS

☒ LIGHTING
- ☒ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☒ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☒ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☒	☐	☐
BUILDING TYPE AND SCHEDULE	☐	☒	☐	☐
OCCUPANCY RATES	☐	☒	☐	☐
BUILDING AREA	☐	☒	☐	☐
SPACE TEMPERATURES	☐	☒	☐	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☒	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☒	☐	☐
GLAZING AREAS & ORIENTATIONS	☐	☒	☐	☐
ZONING	☐	☒	☐	☐
ROOM SHAPES	☐	☒	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☒	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☒	☐	☐
BUILDING MASS DATA	☐	☐	☐	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☒	☐	☐
INTERIOR SURFACE DATA	☐	☒	☐	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☒	☐	☐
LIGHTING SYSTEM CONTROL	☐	☒	☐	☐

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☒ SURFACE REFLECTANCE

DAYLIGHT CALC: ☒ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☐ OTHER ____________

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☐ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☐ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☒ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☐ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☒ SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	☒ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☐ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☐ SURFACE & AIR	☒ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☐ VARIED BY TOOL
U-VALUES:	☐ CHANGE W/WIND SPEED	☐ REMAIN CONSTANT	☒ MOVABLE INSULATION
INFILTRATION:	☐ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☐ SENSIBLE ONLY
VENTILATION:	☐ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☒ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

ZONES PER RUN: ☒ > 25 ☐ 10 - 25 ☐ 2 - 10 ☐ 1 ONLY

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☐ ZONE ☒ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☒ DAY ☐ MONTH ☐ SEASON ☒ YEAR

TEMPERATURES: ☒ AIR ☒ SURFACE ☐ GRAPHIC PLOT

FUEL USE BY: ☐ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER ________ ☒ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ________ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☒ TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☐ UNIVAC ☒ OTHER TR 445/Siemens

CORE REQUIRED: ☐ > 500K ☒ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ☐ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ____

EQUIPMENT: ☐ CRT ☒ PRINTER ☐ TEXTRONIX ☐ OTHER ____

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ____ PRINTER ____

SOFTWARE PURCHASE: CARD DECK ____ TAPE ____ LISTING ____

SUPPORT INFORMATION: USER'S GUIDE ____ DATA MANUAL ____ OTHER ____

TIME TO INPUT AND DEBUG: ____ MAN-DAYS ____ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ____ MAN-DAYS ____ MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☐ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

____ ____
____ ____
____ ____
____ ____

MORE ITALY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING
SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: More

DEVELOPED BY: B. Boni, M. Dalponte, R. Rozzi, Fiat Engineering via Belfiore 23 - Torino -

DATE DEVELOPED:

DATE OF LAST REVISION:

AVAILABLE THROUGH: CNR

PHONE NO.:

SUPPORTED BY: Dr. Franco Vivona
Direzione CNR/PFE
Via Nizza 128
00198 Roma

PHONE NO.: 06-854389

BRIEF DESCRIPTION: More is a sophisticated simulation tool to analyze transient loads using transfer functions. (Please find enclosed paper)

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☐ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

[x] ARCHITECT [x] ENGINEER [ ] TECHNICIAN [x] RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

[ ] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [ ] DESIGN DEVEL. [ ] POST-DESIGN SERV. [x] RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

[ ] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [ ] DESIGN DEVEL. [x] POST-DESIGN SERV. [x] RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

[x] HEATING
- [x] LOADS
- [x] SPACE TEMPS.
- [x] HVAC SYSTEMS
- [x] PASSIVE SOLAR
- [ ] ACTIVE SOLAR
- [x] SHADING
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] UNDERGROUND LOADS
- [x] MASS

[x] COOLING
- [x] LOADS
- [x] SPACE TEMPS.
- [x] HVAC SYSTEMS
- [x] PASSIVE CLNG.
- [x] SHADING
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] UNDERGROUND LOADS
- [x] SLOPED GLAZING
- [x] MASS

[ ] LIGHTING
- [ ] LOADS
- [ ] FC (LUX) LEVELS
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] DAYLIGHTING FC (LUX) LEVELS
- [ ] ARTIFICIAL LTNG. REDUCTION

[ ] DHW
- [ ] LOADS
- [ ] SOLAR ACTIVE
- [ ] SOLAR PASSIVE
- [ ] ECONOMICS

[ ] MISCELLANEOUS
- [ ] FANS
- [ ] PUMPS
- [ ] MISC. ELECTRICAL
- [ ] ELEV. & ESCALATOR

INPUT DATA REQUIRED:

PRE-DESIGN AND SITE ANALYSIS DATA	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
LOCATION - ASSOCIATED WEATHER DATA	[ ]	[x]	[ ]	[ ]
BUILDING TYPE AND SCHEDULE	[x]	[ ]	[ ]	[ ]
OCCUPANCY RATES	[ ]	[x]	[ ]	[ ]
BUILDING AREA	[ ]	[x]	[ ]	[ ]
SPACE TEMPERATURES	[ ]	[x]	[ ]	[ ]
LOCAL ENERGY COSTS	[ ]	[ ]	[ ]	[ ]
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	[ ]	[ ]	[ ]	[ ]
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	[ ]	[ ]	[ ]	[ ]
LIGHTING REQUIREMENTS	[ ]	[ ]	[ ]	[ ]

SCHEMATIC DESIGN DATA	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
BUILDING SURFACE AREAS	[ ]	[x]	[ ]	[ ]
GLAZING AREAS & ORIENTATIONS	[ ]	[x]	[ ]	[ ]
ZONING	[ ]	[x]	[ ]	[ ]
ROOM SHAPES	[ ]	[x]	[ ]	[ ]
OPERATING SCHEDULES & PROFILES	[ ]	[x]	[ ]	[ ]

ARCHITECTURAL DESIGN DEVELOPMENT DATA	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	[ ]	[x]	[ ]	[ ]
BUILDING MASS DATA	[ ]	[x]	[ ]	[ ]
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	[ ]	[x]	[ ]	[ ]
INTERIOR SURFACE DATA	[ ]	[x]	[ ]	[ ]

ENGINEERING DESIGN DEVELOPMENT DATA	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
MECHANICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
MECHANICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]
LIGHTING SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
LIGHTING SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: [X] HOURLY TAPE [X] TYPICAL DAY [ ] MONTHLY DATA [ ] ANNUAL DATA [ ] MONTHLY DEGREE DAYS [ ] ANNUAL DEGREE DAYS [ ] AVE. MONTHLY MIN. AND MAX. [ ] AVE. MONTHLY TEMP. [ ] DAILY

SOLAR DATA: [X] HOURLY TAPE [X] TYPICAL DAY PROFILE [ ] MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: [ ] ANY ORIEN. INCL. SLOPED [ ] ANY VERT. & HORIZ. [X] HORIZ. ~~& 4 CARDINAL DIREC.~~ [ ] SLOPED FACING SOUTH [ ] SURFACE REFLECTANCE

DAYLIGHT CALC: [X] HOUR-BY-HOUR [ ] TYPICAL CLEAR & CLOUDY DAY/MONTH [ ] TYPICAL DAY/MONTH [ ] ANNUAL AVERAGE [ ] OTHER ____

CALCULATION PROCEDURES:

LANGUAGE: [X] FORTRAN [ ] BASIC [ ] MACHINE LANGUAGE [ ] OTHER ____ [ ] GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: [ ] INTERACTIVE [ ] INTERACTIVE GRAPHIC [X] PREPARE FILE [ ] HAND CALCULATION

UNITS OF CALCULATION: [X] SI UNITS [ ] ENGLISH [ ] BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	[ ] FINITE DIFFERENCE	[X] RESPONSE FACTOR	[ ] STEADY STATE
SOLAR COMP. CALCULATED:	[X] DIFFUSE/DIRECT/RE-RADIATED	[ ] DIFFUSE/DIRECT	[ ] TOTAL
INTEGRATION:	[ ] SIMPLE EULER	[ ] IMPLICIT	[ ] OTHER
SHADING:	[X] ANY SOLAR OBSTRUCTION	[ ] OVERHANG ONLY	[ ] NO SHADING
MOVABLE SHADING:	[X] DAILY & SEASONAL SWITCHING	[ ] SEASONAL SWITCHING	[ ] NOT CALCULATED
MASS EFFECT IS CALCULATED:	[X] TRANSIENT HEAT FLOW	[ ] TIME CONSTANT FACTORS	[ ] ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	[ ] SURFACE & AIR	[X] AIR ONLY	[ ] NOT CALCULATED
INSIDE TEMPERATURE:	[ ] INPUT SCHEDULE BY USER	[ ] FIXED BY TOOL	[ ] VARIED BY TOOL
U-VALUES:	[X] CHANGE W/WIND SPEED	[ ] REMAIN CONSTANT	[ ] MOVABLE INSULATION
INFILTRATION:	[X] AIR CHANGE PER HOUR	[ ] CRACK METHOD	[X] VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	[X] SENSIBLE & LATENT SEPARATE	[ ] SENS. & LAT. TOTAL	[ ] SENSIBLE ONLY
VENTILATION:	[ ] SENSIBLE	[ ] LATENT	[X] VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	[ ] SKY, REFL. & DIRECT	[ ] SKY & REFL.	[ ] SKY ONLY
ZONES PER RUN:	[ ] > 25 [X] 10 - 25	[ ] 2 - 10	[ ] 1 ONLY
SYSTEM MODELING:	[ ] SYSTEM EFFIC. INPUT	[ ] SYSTEM OPTIMIZING	[ ] COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	[ ] ANNUAL COST	[ ] SIMPLE PAYBACK	[ ] LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: [X] COMPONENT [ ] ZONE [ ] BUILDING

LOADS OUTPUT BY: [X] HOUR [ ] DAY [ ] MONTH [ ] SEASON [ ] YEAR

TEMPERATURES: [X] AIR [ ] SURFACE [ ] GRAPHIC PLOT

FUEL USE BY: [ ] MONTHLY CONSUMPTION [ ] MONTHLY PEAK DEMAND [ ] OTHER hourly [ ] ANNUAL CONSUMPTION [ ] ANNUAL PEAK DEMAND [ ] OTHER ____ [ ] SYSTEM COMPONENTS [ ] ENERGY SYSTEMS [ ] TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☒ UNIVAC ☐ OTHER DIGITAL VAX 11/780

CORE REQUIRED: ☐ > 500K ☒ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ____

EQUIPMENT: ☒ CRT ☒ PRINTER ☒ TEXTRONIX ☒ OTHER PLOTTER

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ____ PRINTER ____

SOFTWARE PURCHASE: CARD DECK ____ TAPE ____ LISTING ____

SUPPORT INFORMATION: USER'S GUIDE ____ DATA MANUAL ____ OTHER ____

TIME TO INPUT AND DEBUG: ____ MAN-DAYS ____ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: 1-2 MAN-DAYS ____ MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☒ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☒ 100 - 1000 SEC. ☐ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

Ing. Bruno Boni
c/o Fiat Engineering
Via Belfiore 23
Torino

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 4

FOR DESIGN TOOLS REQUIRING A MICRO-COMPUTER

HARDWARE:

MANUFACTURER AND MODEL NUMBER: HP 9845/B

RANDOM ACCESS MEMORY (RAM) REQUIRED: 140 K

DOES THIS TOOL REQUIRE A PRINTER? ☒ YES ☐ NO

SUPPORT: ☒ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ______

COSTS:

FIRST COST:

MICRO-COMPUTER: ~ 50.000.000 Lire

SOFTWARE: ROM IC ______ DISC ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

TYPICAL* INPUT SET-UP TIME: 1 MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME: > 1 HRS. ______ MIN.

TYPICAL* PRINT TIME: - HRS. ______ MIN.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

5 SECTION

FOR DESIGN TOOLS REQUIRING A HAND-HELD CALCULATOR

HARDWARE:

MANUFACTURER AND MODEL NUMBER: TEXAS INSTRUM. TI-59

DOES THIS TOOL REQUIRE A PRINTER? ☒ YES ☐ NO

SUPPORT: ☒ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ______

COSTS:

FIRST COST:

HARDWARE:	CALCULATOR	______	PRINTER	______		
SOFTWARE:	MAGNETIC CARD	______	LISTING	______	OTHER	______
SUPPORT INFORMATION:	USER'S GUIDE	______	DATA MANUAL	______	OTHER	______

RUN COST/TIME:

TYPICAL* INPUT SET-UP TIME: ______ HRS. ______ MIN.

TYPICAL* RUN TIME: ______ HRS. ______ MIN.

TYPICAL* PRINT TIME: ______ HRS. ______ MIN.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (√) IN SECTION 2.

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: SMP (Passive Modules Simulation)

DEVELOPED BY: FEDERICO BUTERA
SERGIO FARRUGGIA
GIANFRANCO RIZZO
GIANNI SILVESTRINI

DATE DEVELOPED: 1980

DATE OF LAST REVISION: JUNE 1982

AVAILABLE THROUGH:
FEDERICO BUTERA
ISTITUTO DI FISICA TECNICA
VIALE DELLE SCIENZE - PALERMO (ITALY)

PHONE NO.: 091 - 488780

SUPPORTED BY: CONSIGLIO NAZIONALE DELLE RICERCHE

PHONE NO.:

BRIEF DESCRIPTION: The model simulates the thermal behaviour of one or two rooms thermally connected.
Direct gain, Trombe wall and sunspaces can be analyzed.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

- ☒ MAIN FRAME COMPUTER
  - ☐ CARD DECK
  - ☒ TAPE
  - ☒ TIME SHARING
  - ☒ LISTING - HARD COPY

  (COMPLETE SECTIONS 1, 2, 3)
- ☐ MICRO-COMPUTER
  - ☐ DISC
  - ☐ TAPE
  - ☐ LISTING
  - ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

  (COMPLETE SECTIONS 1, 2, 4)
- ☐ HAND CALCULATOR
  - ☐ MAGNETIC CARD
  - ☐ LISTING
  - ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

  (COMPLETE SECTIONS 1, 2, 5)
- ☐ GRAPHIC OR MANUAL
  - ☐ TEMPLATES, CHARTS, TABLES
  - ☐ BOOK
  - ☐ DEVICE

  (COMPLETE SECTIONS 1, 2, 6)

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ENERGY DESIGN TOOLS
& ANALYSIS MODELS

1 SECTION

COMMENTS:

A subroutine may be activated in order to evaluate the comfort conditions.

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

[X] ARCHITECT [X] ENGINEER [ ] TECHNICIAN [ ] RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

[ ] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [ ] DESIGN DEVEL. [ ] POST-DESIGN SERV. [X] RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

[ ] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [X] DESIGN DEVEL. [X] POST-DESIGN SERV. [X] RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

[X] HEATING
- [X] LOADS
- [X] SPACE TEMPS.
- [X] HVAC SYSTEMS
- [X] PASSIVE SOLAR
- [X] ACTIVE SOLAR
- [X] SHADING
- [X] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] UNDERGROUND LOADS
- [X] MASS

[X] COOLING
- [X] LOADS
- [X] SPACE TEMPS.
- [ ] HVAC SYSTEMS
- [ ] PASSIVE CLNG.
- [X] SHADING
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] UNDERGROUND LOADS
- [X] SLOPED GLAZING
- [X] MASS

[X] LIGHTING
- [X] LOADS
- [ ] FC (LUX) LEVELS
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] DAYLIGHTING FC (LUX) LEVELS
- [ ] ARTIFICIAL LTNG. REDUCTION

[ ] DHW
- [ ] LOADS
- [ ] SOLAR ACTIVE
- [ ] SOLAR PASSIVE
- [ ] ECONOMICS

[ ] MISCELLANEOUS
- [ ] FANS
- [ ] PUMPS
- [ ] MISC. ELECTRICAL
- [ ] ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	[ ]	[ ]	[ ]	[X]
BUILDING TYPE AND SCHEDULE	[ ]	[ ]	[ ]	[X]
OCCUPANCY RATES	[ ]	[ ]	[X]	[ ]
BUILDING AREA	[ ]	[ ]	[X]	[ ]
SPACE TEMPERATURES	[ ]	[ ]	[ ]	[X]
LOCAL ENERGY COSTS	[X]	[ ]	[ ]	[ ]
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	[ ]	[ ]	[ ]	[X]
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	[ ]	[ ]	[ ]	[X]
LIGHTING REQUIREMENTS	[ ]	[ ]	[X]	[ ]
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	[ ]	[ ]	[ ]	[X]
GLAZING AREAS & ORIENTATIONS	[ ]	[ ]	[ ]	[X]
ZONING	[ ]	[ ]	[X]	[ ]
ROOM SHAPES	[ ]	[ ]	[ ]	[X]
OPERATING SCHEDULES & PROFILES	[ ]	[ ]	[ ]	[X]
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	[ ]	[ ]	[ ]	[X]
BUILDING MASS DATA	[ ]	[ ]	[ ]	[X]
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	[ ]	[ ]	[ ]	[X]
INTERIOR SURFACE DATA	[ ]	[ ]	[ ]	[X]
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	[X]	[ ]	[ ]	[ ]
MECHANICAL SYSTEM CONTROL	[ ]	[X]	[ ]	[ ]
ELECTRICAL SYSTEM DESIGN	[X]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM CONTROL	[ ]	[X]	[ ]	[ ]
LIGHTING SYSTEM DESIGN	[X]	[ ]	[ ]	[ ]
LIGHTING SYSTEM CONTROL	[ ]	[X]	[ ]	[ ]

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☒ HOURLY TAPE ☒ TYPICAL DAY ☒ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☒ AVE. MONTHLY MIN. AND MAX. ☒ AVE. MONTHLY TEMP. ☒ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☒ TYPICAL DAY PROFILE ☒ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ SLOPED FACING SOUTH ☐ ANY VERT. & HORIZ. ☒ SURFACE REFLECTANCE ☐ HORIZ. & 4 CARDINAL DIREC.

DAYLIGHT CALC: ☒ HOUR-BY-HOUR ☐ ANNUAL AVERAGE ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ OTHER ________ ☐ TYPICAL DAY/MONTH

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☒ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☐ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	☒ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☐ DAILY & SEASONAL SWITCHING	☒ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☒ SURFACE & AIR	☐ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☐ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☒ VARIED BY TOOL
U-VALUES:	☒ CHANGE W/WIND SPEED	☐ REMAIN CONSTANT	☐ MOVABLE INSULATION
INFILTRATION:	☐ AIR CHANGE PER HOUR	☐ CRACK METHOD	☒ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☒ SENSIBLE ONLY
VENTILATION:	☐ SENSIBLE	☐ LATENT	☒ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☒ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☒ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☒ SYSTEM OPTIMIZING	☒ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☐ COMPONENT ☒ ZONE ☐ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☒ DAY ☒ MONTH ☒ SEASON ☐ YEAR

TEMPERATURES: ☒ AIR ☒ SURFACE ☐ GRAPHIC PLOT

FUEL USE BY: ☒ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER ________ ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ________ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ■ IBM ☐ CDC ☐ UNIVAC ☐ OTHER ______

CORE REQUIRED: ☐ > 500K ■ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ☐ USER'S GUIDE ☐ DATA MANUAL ■ OTHER *Description of algorithms used*

EQUIPMENT: ☐ CRT ☐ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ______ MAN-DAYS 3 MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ■ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ■ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

ISTITUTO DI FISICA TECNICA
FACOLTA' DI INGEGNERIA
VIALE DELLE SCIENZE
90128 PALERMO (ITALY)

CUC
CENTRO UNIVERSITARIO DI CALCOLO
VIALE DELLE SCIENZE
90128 PALERMO (ITALY)

AZIZ ITALY

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING
SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: AZIZ

DEVELOPED BY: FEDERICO BUTERA
SERGIO FARRUGGIA
GIANFRANCO RIZZO
GIANNI SILVESTRINI

DATE DEVELOPED: 1980

DATE OF LAST REVISION: JUNE 1982

AVAILABLE THROUGH:
FEDERICO BUTERA
ISTITUTO DI FISICA TECNICA
VIALE DELLE SCIENZE - PALERMO (ITALY)

PHONE NO.: (091) - 488780

SUPPORTED BY: CONSIGLIO NAZIONALE DELLE RICERCHE

PHONE NO.:

BRIEF DESCRIPTION: AZIZ, derived from model SMP, is intended to be used during the first phases of multistorey buildings design process. The description of internal partitions is simplified in order to reduce the number of inputs. Passive systems may be simulated.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☒ TIME SHARING
- ☒ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

AZIZ ITALY

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

[x] ARCHITECT [x] ENGINEER [ ] TECHNICIAN [ ] RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

[x] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [ ] DESIGN DEVEL. [ ] POST-DESIGN SERV. [ ] RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

[x] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [ ] DESIGN DEVEL. [ ] POST-DESIGN SERV. [ ] RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

[x] HEATING
- [x] LOADS
- [x] SPACE TEMPS.
- [x] HVAC SYSTEMS
- [x] PASSIVE SOLAR
- [x] ACTIVE SOLAR
- [x] SHADING
- [x] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] UNDERGROUND LOADS
- [x] MASS

[x] COOLING
- [x] LOADS
- [x] SPACE TEMPS.
- [ ] HVAC SYSTEMS
- [ ] PASSIVE CLNG.
- [x] SHADING
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] UNDERGROUND LOADS
- [x] SLOPED GLAZING
- [x] MASS

[x] LIGHTING
- [x] LOADS
- [ ] FC (LUX) LEVELS
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] DAYLIGHTING FC (LUX) LEVELS
- [ ] ARTIFICIAL LTNG. REDUCTION

[ ] DHW
- [ ] LOADS
- [ ] SOLAR ACTIVE
- [ ] SOLAR PASSIVE
- [ ] ECONOMICS

[ ] MISCELLANEOUS
- [ ] FANS
- [ ] PUMPS
- [ ] MISC. ELECTRICAL
- [ ] ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	[ ]	[ ]	[ ]	[x]
BUILDING TYPE AND SCHEDULE	[ ]	[ ]	[x]	[ ]
OCCUPANCY RATES	[ ]	[ ]	[x]	[ ]
BUILDING AREA	[ ]	[ ]	[ ]	[x]
SPACE TEMPERATURES	[ ]	[ ]	[ ]	[x]
LOCAL ENERGY COSTS	[x]	[ ]	[ ]	[ ]
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	[ ]	[ ]	[x]	[ ]
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	[ ]	[ ]	[ ]	[x]
LIGHTING REQUIREMENTS	[ ]	[ ]	[x]	[ ]
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	[ ]	[ ]	[ ]	[x]
GLAZING AREAS & ORIENTATIONS	[ ]	[ ]	[ ]	[x]
ZONING	[x]	[ ]	[ ]	[ ]
ROOM SHAPES	[x]	[ ]	[ ]	[ ]
OPERATING SCHEDULES & PROFILES	[ ]	[ ]	[ ]	[x]
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	[ ]	[ ]	[ ]	[x]
BUILDING MASS DATA	[ ]	[ ]	[ ]	[x]
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	[ ]	[ ]	[ ]	[x]
INTERIOR SURFACE DATA	[ ]	[ ]	[ ]	[x]
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	[x]	[ ]	[ ]	[ ]
MECHANICAL SYSTEM CONTROL	[ ]	[x]	[ ]	[ ]
ELECTRICAL SYSTEM DESIGN	[x]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM CONTROL	[ ]	[x]	[ ]	[ ]
LIGHTING SYSTEM DESIGN	[x]	[ ]	[ ]	[ ]
LIGHTING SYSTEM CONTROL	[ ]	[x]	[ ]	[ ]

AZIZ ITALY

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SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☒ HOURLY TAPE ☒ TYPICAL DAY ☒ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☒ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☒ TYPICAL DAY PROFILE ☒ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ SLOPED FACING SOUTH ☐ ANY VERT. & HORIZ. ☒ SURFACE REFLECTANCE ☐ HORIZ. & 4 CARDINAL DIREC.

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ ANNUAL AVERAGE ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ OTHER ______ ☐ TYPICAL DAY/MONTH

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ______ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☒ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☐ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	☒ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☐ DAILY & SEASONAL SWITCHING	☒ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☒ SURFACE & AIR	☐ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☐ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☒ VARIED BY TOOL
U-VALUES:	☒ CHANGE W/WIND SPEED	☐ REMAIN CONSTANT	☐ MOVABLE INSULATION
INFILTRATION:	☐ AIR CHANGE PER HOUR	☐ CRACK METHOD	☒ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☒ SENSIBLE ONLY
VENTILATION:	☐ SENSIBLE	☐ LATENT	☒ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☒ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☐ 2 - 10	☒ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☒ SYSTEM OPTIMIZING	☒ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☐ COMPONENT ☒ ZONE ☒ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☒ DAY ☒ MONTH ☒ SEASON ☐ YEAR

TEMPERATURES: ☒ AIR ☐ SURFACE ☐ GRAPHIC PLOT

FUEL USE BY: ☒ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER ______ ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ______ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

AZIZ ITALY

IEA
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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A. MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☒ IBM ☐ CDC ☐ UNIVAC ☐ OTHER ______

CORE REQUIRED: ☐ > 500K ☒ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ☐ USER'S GUIDE ☐ DATA MANUAL ☒ OTHER *Description of algorithms used*

EQUIPMENT: ☐ CRT ☐ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ______ MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☒ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☒ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

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BYVOK NORWAY

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

Ove Jørgensen
Laboratoriet for Varmeisol
Danmarks Tekniske Højskole
Bygning 118
2800 Lyngby - Danmark

GENERAL:

TOOL NAME: BYVOK

DEVELOPED BY: B.T. Larsen, Norwegian Building Research Institute, Oslo, Norway

DATE DEVELOPED: 1970

DATE OF LAST REVISION: 1972

AVAILABLE THROUGH: Norwegian Institute of Technology Trondheim, Norway

PHONE NO.: (075) 94000

SUPPORTED BY: Department of Heating, Ventilating and Sanitary Engineering, Norwegian Institute of Technology

PHONE NO.: (075) 94000

BRIEF DESCRIPTION: For one day the program calculates hourly heating or cooling loads of a room (zone) using the response factor method. The program also calculates hourly temperatures of the room surfaces and the room air if the room is ventilated by unconditioned outdoor air.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☐ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

BYVOK NORWAY

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

COMMENTS:

Program is a computer implementation of:

1. D.G. Stephenson and G.P. Mitalas:
   Cooling load calculations by thermal response factor method.
   Ashrae transactions, vol. 73, part 1, 1967.

2. G.P. Mitalas and D.G. Stephenson:
   Room thermal response factors.
   Ashrae transactions, vol. 73, part 1, 1967.

3. K. Kimura and D.G. Stephenson:
   Solar Radiation on cloudy days
   Ashrae transactions, vol. 75, part 1, 1969.

4. K. Kimura and D.G. Stephenson:
   Theoretical Study of cooling load caused by lights.
   Ashrae transactions, vol. 74, part 2, 1968.

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☐ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ MASS

☒ COOLING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☐ MASS

☒ LIGHTING
- ☒ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☒	☐	☐
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☐	☒	☐	☐
BUILDING AREA	☐	☐	☐	☐
SPACE TEMPERATURES	☐	☐	☐	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☒	☐	☐
GLAZING AREAS & ORIENTATIONS	☐	☒	☐	☐
ZONING	☐	☐	☐	☐
ROOM SHAPES	☐	☒	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☒	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☒	☐	☐
BUILDING MASS DATA	☐	☒	☐	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☒	☐	☐
INTERIOR SURFACE DATA	☐	☒	☐	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☒	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☒	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☒	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

BYVOK NORWAY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☐ HOURLY TAPE ☒ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☐ HOURLY TAPE ☒ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☐ ANY ORIEN. INCL. SLOPED ☐ SLOPED FACING SOUTH ☐ ANY VERT. & HORIZ. ☐ SURFACE REFLECTANCE ☐ HORIZ. & 4 CARDINAL DIREC.

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ ANNUAL AVERAGE ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ OTHER ______ ☐ TYPICAL DAY/MONTH

CALCULATION PROCEDURES:

LANGUAGE: ☐ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☒ OTHER Algol ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☐ FINITE DIFFERENCE	☒ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☐ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION	☒ OVERHANG ~~ONLY~~ & fins	☐ NO SHADING
MOVABLE SHADING:	☐ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☒ SURFACE & AIR	☐ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☐ INPUT SCHEDULE BY USER	☒ FIXED BY TOOL	☐ VARIED BY TOOL
U-VALUES:	☐ CHANGE W/WIND SPEED	☒ REMAIN CONSTANT	☐ MOVABLE INSULATION
INFILTRATION:	☐ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☒ SENSIBLE ONLY
VENTILATION:	☒ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☐ 2 - 10	☒ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☐ COMPONENT ☒ ZONE ☐ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☐ DAY ☐ MONTH ☐ SEASON ☐ YEAR

TEMPERATURES: ☒ AIR ☒ SURFACE ☐ GRAPHIC PLOT

FUEL USE BY: ☐ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER ______ ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ______ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

BYVOK NORWAY

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☒ UNIVAC ☐ OTHER ____

CORE REQUIRED: ☐ > 500K ☐ 100 - 500 K ☒ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☒ DATA MANUAL ☐ OTHER ____

EQUIPMENT: ☒ CRT ☒ PRINTER ☐ TEXTRONIX ☐ OTHER ____

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ____ PRINTER ____

SOFTWARE PURCHASE: CARD DECK ____ TAPE ____ LISTING ____

SUPPORT INFORMATION: USER'S GUIDE ____ DATA MANUAL ____ OTHER ____

TIME TO INPUT AND DEBUG: ____ MAN-DAYS ____ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ____ MAN-DAYS 4 MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☒ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☒ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

____ ____

____ ____

____ ____

____ ____

ENCORE NORWAY

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:
Ove Jørgensen
Laboratoriet for Varmeisoler
Danmarks Tekniske Højskole
Bygning 118
2800 Lyngby - Danmark

GENERAL:

TOOL NAME: ENCORE

DEVELOPED BY:
B.T. Larsen
Norwegian Building
Research Institute, O
Oslo, Norway

DATE DEVELOPED: 1977

DATE OF LAST REVISION: 1983

AVAILABLE THROUGH:
Norwegian Building
Research Institute
Oslo , Norway

PHONE NO.: (02) 46 98 80

SUPPORTED BY:
Hans Engelbretsen
Norwegian Building Res. Inst.

PHONE NO.: (02) 46 98 80

BRIEF DESCRIPTION: Encore is a program for calculating energy consumption of Residential buildings. Within certain limits (max.20 rooms, 50 surfaces, etc.) Buildings of any shape and room subdivision can be analysed. Calculations are done hour by hour according to the "transfer function method" of Ashrae. Contrary to most energy programs, infiltration is calculated using the principle of mass balance. Both stack and wind forces are taken into account.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☐ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

ENCORE NORWAY

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SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☒ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☒ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☒ HVAC SYSTEMS
- ☐ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☒ MASS

☐ COOLING
- ☐ LOADS
- ☐ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☐ MASS

☒ LIGHTING
- ☒ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☒ DHW
- ☒ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☒	☐	☐
BUILDING TYPE AND SCHEDULE	☐	☒	☐	☐
OCCUPANCY RATES	☐	☒	☐	☐
BUILDING AREA	☐	☒	☐	☐
SPACE TEMPERATURES	☐	☐	☐	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☒	☐	☐
GLAZING AREAS & ORIENTATIONS	☐	☒	☐	☐
ZONING	☐	☒	☐	☐
ROOM SHAPES	☐	☒	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☒	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☒	☐	☐
BUILDING MASS DATA	☐	☒	☐	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☒	☐	☐
INTERIOR SURFACE DATA	☐	☒	☐	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☒	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☒	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☒	☐	☐
LIGHTING SYSTEM CONTROL	☐	☒	☐	☐

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA:	☒ HOURLY TAPE	☐ TYPICAL DAY	☐ MONTHLY DATA	☐ ANNUAL DATA	☐ MONTHLY DEGREE DAYS
	☐ ANNUAL DEGREE DAYS	☐ AVE. MONTHLY MIN. AND MAX.		☐ AVE. MONTHLY TEMP.	☐ DAILY
SOLAR DATA:	☒ HOURLY TAPE	☐ TYPICAL DAY PROFILE		☐ MONTHLY AVE. DAILY & TOTAL	
SOLAR ORIENS. CALC:	☐ ANY ORIEN. INCL. SLOPED ☐ SLOPED FACING SOUTH	☐ ANY VERT. & HORIZ. ☐ SURFACE REFLECTANCE		☐ HORIZ. & 4 CARDINAL DIREC.	
DAYLIGHT CALC:	☐ HOUR-BY-HOUR ☐ ANNUAL AVERAGE	☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ OTHER ______		☐ TYPICAL DAY/MONTH	

CALCULATION PROCEDURES:

LANGUAGE:	☒ FORTRAN	☐ BASIC	☐ MACHINE LANGUAGE	☐ OTHER ______	☐ GRAPHS, CHARTS & SIMPLE CALC.
USER TYPE:	☐ INTERACTIVE	☐ INTERACTIVE GRAPHIC	☒ PREPARE FILE	☐ HAND CALCULATION	
UNITS OF CALCULATION:	☒ SI UNITS	☐ ENGLISH	☐ BOTH		

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☐ FINITE DIFFERENCE	☒ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☐ DIFFUSE/DIRECT/RE-RADIATED	☒ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION	☒ OVERHANG ~~ONLY~~ & fins	☐ NO SHADING
MOVABLE SHADING:	☐ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☐ TRANSIENT HEAT FLOW	☒ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☐ SURFACE & AIR	☒ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☐ VARIED BY TOOL
U-VALUES:	☐ CHANGE W/WIND SPEED	☒ REMAIN CONSTANT	☐ MOVABLE INSULATION
INFILTRATION:	☐ AIR CHANGE PER HOUR	☒ CRACK METHOD	☒ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☒ SENSIBLE ONLY
VENTILATION:	☒ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☒ 10 - 25	☐ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☒ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS:	☒ COMPONENT	☒ ZONE	☒ BUILDING		
LOADS OUTPUT BY:	☒ HOUR	☒ DAY	☒ MONTH	☐ SEASON	☒ YEAR
TEMPERATURES:	☒ AIR	☐ SURFACE	☐ GRAPHIC PLOT		
FUEL USE BY:	☒ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER ______	☒ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ______	☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY		

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☒ UNIVAC ☒ OTHER ND-10/5 MINI COMPUTER ND-100

CORE REQUIRED: ☐ > 500K ☐ 100 - 500 K ☒ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☒ DATA MANUAL ☐ OTHER ______

EQUIPMENT: ☒ CRT ☒ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE X *) (see comments) LISTING ______

SUPPORT INFORMATION: USER'S GUIDE Nkr. 100,- DATA MANUAL Nkr.150,- OTHER ______

TIME TO INPUT AND DEBUG: 2 MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ______ MAN-DAYS 3 MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☒ < 10 M

Univac
TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☒ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

______ ______
______ ______
______ ______
______ ______

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SURVEY FORM FOR
ENERGY DESIGN TOOLS
& ANALYSIS MODELS

3 SECTION

COMMENTS:

Price of program depends on buyer category:
Research Institutions are given considerably reduced price.
Commercial companies pays Nkr. 15000,- (approx., depending on support).

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: KLI

DEVELOPED BY: FAGO - Eindhoven
University of Technology

DATE DEVELOPED: since 1971

DATE OF LAST REVISION: June 1982

AVAILABLE THROUGH: University of Technology
P.o.Box 513,
5600 MB EINDHOVEN

PHONE NO.: 040 - 47 24 00

SUPPORTED BY:

PHONE NO.:

BRIEF DESCRIPTION: KLI is a computermodel with which the dynamic thermal environment in buildings can be simulated under the influence of the outdoor-climate and any present heat-sources inside the building.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☐ TAPE
- ☒ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

KLI THE NETHERLANDS

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ■ ENGINEER ■ TECHNICIAN ■ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ■ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ■ DESIGN DEVEL. ■ POST-DESIGN SERV. ■ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

■ HEATING
- ■ LOADS
- ■ SPACE TEMPS.
- ■ HVAC SYSTEMS
- ■ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ■ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ■ MASS

■ COOLING
- ■ LOADS
- ■ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ■ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ■ SLOPED GLAZING
- ■ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	☐	☐
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☐	☐	☐	☐
BUILDING AREA	☐	☐	☐	☐
SPACE TEMPERATURES	☐	☐	☐	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☐	☐
GLAZING AREAS & ORIENTATIONS	☐	☐	☐	☐
ZONING	☐	☐	☐	☐
ROOM SHAPES	☐	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	■	☐	■
BUILDING MASS DATA	☐	■	☐	■
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☐	☐
INTERIOR SURFACE DATA	☐	☐	☐	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	■	☐	■
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: [x] HOURLY TAPE [ ] TYPICAL DAY [ ] MONTHLY DATA [ ] ANNUAL DATA [ ] MONTHLY DEGREE DAYS [ ] ANNUAL DEGREE DAYS [ ] AVE. MONTHLY MIN. AND MAX. [ ] AVE. MONTHLY TEMP. [ ] DAILY

SOLAR DATA: [x] HOURLY TAPE [ ] TYPICAL DAY PROFILE [ ] MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: [x] ANY ORIEN. INCL. SLOPED [ ] ANY VERT. & HORIZ. [ ] HORIZ. & 4 CARDINAL DIREC. [ ] SLOPED FACING SOUTH [ ] SURFACE REFLECTANCE

DAYLIGHT CALC: [x] HOUR-BY-HOUR [ ] TYPICAL CLEAR & CLOUDY DAY/MONTH [ ] TYPICAL DAY/MONTH [ ] ANNUAL AVERAGE [ ] OTHER ________

CALCULATION PROCEDURES:

LANGUAGE: [ ] FORTRAN [ ] BASIC [ ] MACHINE LANGUAGE [x] OTHER ALGOT 60 [ ] GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: [x] INTERACTIVE [ ] INTERACTIVE GRAPHIC [x] PREPARE FILE [ ] HAND CALCULATION

UNITS OF CALCULATION: [x] SI UNITS [ ] ENGLISH [ ] BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	[x] FINITE DIFFERENCE	[ ] RESPONSE FACTOR	[ ] STEADY STATE
SOLAR COMP. CALCULATED:	[x] DIFFUSE/DIRECT/RE-RADIATED	[ ] DIFFUSE/DIRECT	[ ] TOTAL
INTEGRATION:	[ ] SIMPLE EULER	[x] IMPLICIT	[ ] OTHER
SHADING:	[ ] ANY SOLAR OBSTRUCTION	[x] OVERHANG ONLY	[ ] NO SHADING
MOVABLE SHADING:	[x] DAILY & SEASONAL SWITCHING	[ ] SEASONAL SWITCHING	[ ] NOT CALCULATED
MASS EFFECT IS CALCULATED:	[x] TRANSIENT HEAT FLOW	[ ] TIME CONSTANT FACTORS	[ ] ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	[ ] SURFACE & AIR	[x] AIR ONLY	[ ] NOT CALCULATED
INSIDE TEMPERATURE:	[x] INPUT SCHEDULE BY USER	[ ] FIXED BY TOOL	[ ] VARIED BY TOOL
U-VALUES:	[x] CHANGE W/WIND SPEED	[ ] REMAIN CONSTANT	[ ] MOVABLE INSULATION
INFILTRATION:	[x] AIR CHANGE PER HOUR	[ ] CRACK METHOD	[ ] VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	[ ] SENSIBLE & LATENT SEPARATE	[ ] SENS. & LAT. TOTAL	[x] SENSIBLE ONLY
VENTILATION:	[x] SENSIBLE	[ ] LATENT	[ ] VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	[ ] SKY, REFL. & DIRECT	[ ] SKY & REFL.	[ ] SKY ONLY
ZONES PER RUN:	[x] > 25 [ ] 10 - 25	[ ] 2 - 10	[ ] 1 ONLY
SYSTEM MODELING:	[ ] SYSTEM EFFIC. INPUT	[ ] SYSTEM OPTIMIZING	[ ] COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	[ ] ANNUAL COST	[ ] SIMPLE PAYBACK	[ ] LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: [ ] COMPONENT [x] ZONE [x] BUILDING

LOADS OUTPUT BY: [x] HOUR [x] DAY [x] MONTH [x] SEASON [ ] YEAR

TEMPERATURES: [x] AIR [x] SURFACE [x] GRAPHIC PLOT

FUEL USE BY: [ ] MONTHLY CONSUMPTION [ ] MONTHLY PEAK DEMAND [ ] OTHER ________ [ ] ANNUAL CONSUMPTION [ ] ANNUAL PEAK DEMAND [ ] OTHER ________ [ ] SYSTEM COMPONENTS [ ] ENERGY SYSTEMS [ ] TOTAL BUILDING ONLY

THE NETHERLANDS

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: [ ] IBM [ ] CDC [ ] UNIVAC [ ] OTHER BURROUGHS

CORE REQUIRED: [ ] > 500K [X] 100 - 500 K [ ] 25 - 100 K [ ] < 25 K

SUPPORT: [X] USER'S GUIDE [ ] DATA MANUAL [ ] OTHER PLOTTER

EQUIPMENT: [X] CRT [X] PRINTER [ ] TEXTRONIX [X] OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING: NOT FOR SALE

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: 0,5-1 MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME: [ ] > 1 HR. [ ] 60 M - 30 M [ ] 30 M - 10 M [X] < 10 M

TYPICAL* CPU TIME: [ ] > 1000 SEC. [X] 100 - 1000 SEC. (ONE YEAR OUTPUT) [ ] 5 - 100 SEC. [ ] < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

BFEP

THE NETHERLANDS

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: BFEP

DEVELOPED BY: Augenbroe, G.L.M.
Building Physics Group
Dept. of Civil Engineering
Delft University of Technology
Delft, The Netherlands

DATE DEVELOPED: started: 1979

DATE OF LAST REVISION: version 2.1, may 1982

AVAILABLE THROUGH: Augenbroe, G.L.M.
adress: Building Physics Group
Dept. of Civil Engineering
Delft University of Technology, postbus 5048
2600 GA DELFT, The Neth.

PHONE NO.: 015-783386

SUPPORTED BY: same as above
BFEP is implemented on an AMDAHL 470V/7B at the computer-centre of the Delft Univ. of Technology

PHONE NO.:

BRIEF DESCRIPTION: BFEP is a finite element-based computer-program intended for the calculation of temperatures in buildings. It consists of a library of FORTRAN-coded subroutines. Due to the modular approach, the user can define any load, climate, control, algorithm, etc. in a user-written main program and additional user-subroutines. Alternatively the user can simply select standard options by supplying appropriate input data. The actual computation stage is preceded by seperate input preparation stage, the latter thus lending itself to interactive processing and data generation in any suited computer environment. As might be obvious from the above it is felt necessary to elaborate on the purpose and intended use of BFEP: (continued on attached sheet)

TOOL HARDWARE & AVAILABLE FORMS:

- [x] MAIN FRAME COMPUTER
  - [ ] CARD DECK
  - [x] TAPE
  - [ ] TIME SHARING
  - [x] LISTING - HARD COPY
  - (COMPLETE SECTIONS 1, 2, 3)
- [ ] MICRO-COMPUTER
  - [ ] DISC
  - [ ] TAPE
  - [ ] LISTING
  - [ ] RECALL ONLY MEMORY-INTEGRATED CIRCUIT
  - (COMPLETE SECTIONS 1, 2, 4)
- [ ] HAND CALCULATOR
  - [ ] MAGNETIC CARD
  - [ ] LISTING
  - [ ] RECALL ONLY MEMORY INTEGRATED CIRCUIT
  - (COMPLETE SECTIONS 1, 2, 5)
- [ ] GRAPHIC OR MANUAL
  - [ ] TEMPLATES, CHARTS, TABLES
  - [ ] BOOK
  - [ ] DEVICE
  - (COMPLETE SECTIONS 1, 2, 6)

BFEP THE NETHERLANDS

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ■ ENGINEER ■ TECHNICIAN ■ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ■ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ■ DESIGN DEVEL. ■ POST-DESIGN SERV. ■ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

■ HEATING
- ■ LOADS
- ■ SPACE TEMPS.
- ■ HVAC SYSTEMS
- ■ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ■ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ■ MASS

■ COOLING
- ■ LOADS
- ■ SPACE TEMPS.
- ■ HVAC SYSTEMS
- ■ PASSIVE CLNG.
- ■ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ■ SLOPED GLAZING
- ■ MASS

■ LIGHTING
- ■ LOADS
- ■ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ■ DAYLIGHTING FC (LUX) LEVELS
- ■ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

GENERAL NETWORK PROGRAM

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION – ASSOCIATED WEATHER DATA	☐	☐	☐	☐
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☐	☐	☐	☐
BUILDING AREA	☐	☐	☐	☐
SPACE TEMPERATURES	☐	☐	☐	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☐	☐
GLAZING AREAS & ORIENTATIONS	☐	☐	☐	☐
ZONING	☐	☐	☐	☐
ROOM SHAPES	☐	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	☐	☐
BUILDING MASS DATA	☐	☐	☐	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☐	☐
INTERIOR SURFACE DATA	☐	☐	☐	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

full year (365 d) or synthetical reference year (56d) or any other (user-defined)

TEMPERATURE DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☐ SURFACE REFLECTANCE

DAYLIGHT CALC: ☒ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☒ OTHER any; user-defined

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ______ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE and user-software ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☒ FINITE ~~DIFFERENCE~~ elements	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☐ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☒ OTHER : pred-corr. or any other
SHADING:	☐ ANY SOLAR OBSTRUCTION (in prep)	☐ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☒ DAILY & SEASONAL SWITCHING any user-def. controls	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☒ SURFACE & AIR	☐ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☐ VARIED BY TOOL
U-VALUES:	☒ CHANGE W/WIND SPEED (if so desired)	☒ REMAIN CONSTANT	☒ MOVABLE INSULATION
INFILTRATION:	☒ AIR CHANGE PER HOUR	☐ CRACK METHOD	☒ VARIES W/WIND SPEED (if so desired)
INTERNAL LOADS INCLUDE:	☒ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☐ SENSIBLE ONLY
VENTILATION:	☒ SENSIBLE	☐ LATENT	☒ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☒ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☒ > 25	☐ 10 - 25	☐ 2 - 10 ☐ 1 ONLY
SYSTEM MODELING:	☒ SYSTEM EFFIC. INPUT	☒ SYSTEM OPTIMIZING	☒ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☒ ZONE ☒ BUILDING

LOADS OUTPUT BY: ☒ HOUR; or any desired interval ☐ DAY ☐ MONTH ☐ SEASON ☐ YEAR

TEMPERATURES: ☒ AIR ☒ SURFACE and internal ☒ GRAPHIC PLOT

FUEL USE BY: ☒ MONTHLY CONSUMPTION ☒ MONTHLY PEAK DEMAND ☒ OTHER ______ ☒ ANNUAL CONSUMPTION ☒ ANNUAL PEAK DEMAND ☒ OTHER any energy demand ☒ SYSTEM COMPONENTS ☒ ENERGY SYSTEMS ☒ TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☒ IBM ☐ CDC (in prep) ☐ UNIVAC ☐ OTHER HP 1000 (in prep)

CORE REQUIRED: ☐ > 500K ☒ 100 - 500 K (large system) ☒ 25 - 100 K (small -) ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☐ DATA MANUAL ☒ OTHER theor. manual

EQUIPMENT: ☒ CRT ☒ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT -- PRINTER - -

SOFTWARE PURCHASE: CARD DECK -- TAPE $3500 (appr) LISTING included

SUPPORT INFORMATION: USER'S GUIDE included DATA MANUAL ______ OTHER theor. man. (incl)

TIME TO INPUT AND DEBUG: 1-5 MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: from several MAN-DAYS to 1 MAN-HOURS, dependent on {problem-size, user experience}

TYPICAL* RUN TIME: ☒ > 1 HR. (turn-around time incl) ☐ 60 M - 30 M ☐ 30 M - 10 M ☒ < 10 M (not incl)

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☒ 100 - 1000 SEC. (highly accurate) ☒ 5 - 100 SEC. (acceptable acc) ☐ < 5 SEC.
comput-interval: 365 days

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

Not available

Note: BFEP is primarily developed for Batch-processing, during which data from the so-called input-model is read from a standard input file. The BFEP approach enables ~~this file to be filled during a (hardware-dependent) interactive pre-processing stage.~~ As yet experience in this area is lacking.

IEA, Task VIII, suppl. 1

THE NETHERLANDS
BFEP

PURPOSE OF BFEP

The major distinction of BFEP as apposed to similar programs is that the user has to perform his own modelling tasks before any BFEP-calculations are performed. In this way its fruitful use is limited to a group of users, equipped with sufficient know-how and experience in the application field; moreover BFEP prohibits black-box use by inexperienced users, unaware of its limitations, as indeed any program should.
On the other hand the user-modelling facility guarantees maximal flexibility and use in almost unlimited application areas.

INTENDED USE OF BFEP

Standard BFEP-use comprises two stages:

stage 1: preperation-stage, requiring system modelling and preparation of the input-file.
This stage can be thought of as being rather dependent upon the available computer environment (i.e. interactive file preparation, whenever possible). BFEP merely supplies so-called generation subroutines for generating the element data for the input-model of standard components (i.e. walls, rooms, etc.).
The use of finite elements allows a flexible space-discretization on component-level. Components such as solar collectors, packed beds, storage tanks, etc. are all treated uniformly, requiring only different elements.

stage 2: Computation-stage, requiring a user-written main program and user-subroutines (Batch processing only).
In this stage the main program acts as a master-routine for all user-selected actions, every action requiring the call of a BFEP-subroutine. Different standard files, containing climate data can be connected during this stage, along with the specification of loads, control-actions, etc. in user-subroutines.

LITERATURE

Background:

1. Augenbroe, G.L.M.; Finite elements in building physics.
Building Physics Group, Delft University of Technology (1978).
2. Augenbroe, G.L.M.; A finite element-based computer program for the simulation of the thermal behaviour of complex systems. 8th CIB-Congres, Oslo (1980).

3. Augenbroe, G.L.M.; Temperature calculations in buildings using a finite element-based computer program.
Third Int. Symp. on Energy Conservation in the Built Environment, Dublin (1982).

BFEP-Manuals: (in Dutch):

4. Augenbroe, G.L.M.; Temperature calculations in buildings using BFEP. Part 1-4.
Building Physics Group, Delft University of Technology (1982).

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:
EMPA
Ueberlandstrasse 129
att. Mr. R. Hastings
8600 Dübendorf

GENERAL:

TOOL NAME: PASSIM

DEVELOPED BY: Nicolas MOREL
Laboratory for Solar Energy
and Building Physics (LSB)

DATE DEVELOPED: 1981

DATE OF LAST REVISION: Dec. 1981

AVAILABLE THROUGH: Nicolas MOREL
LSB - EPFL
LESO - Building
1015 LAUSANNE

PHONE NO.: 021/47'45'47

SUPPORTED BY: IEA Solar Task 1
and EPFL

PHONE NO.:

BRIEF DESCRIPTION: Nodal decomposition of system (max. 30 to 50 nodes); the nodes may be connected by therma' conductance,natural convection on radiation coupling.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☐ TIME SHARING
- ☒ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

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SURVEY FORM FOR
ENERGY DESIGN TOOLS
& ANALYSIS MODELS

1 SECTION

COMMENTS:

- Mainly used for research work, PASSIM is actually used by an Ingeneer Office at design level.
- The documentation of PASSIM is in project.

PASSIM

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

- [ ] ARCHITECT
- [x] ENGINEER
- [ ] TECHNICIAN
- [x] RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

- [ ] PRE-DESIGN
- [ ] SITE ANALYSIS
- [ ] SCHEMATICS
- [ ] DESIGN DEVEL.
- [ ] POST-DESIGN SERV.
- [x] RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

- [ ] PRE-DESIGN
- [ ] SITE ANALYSIS
- [ ] SCHEMATICS
- [x] DESIGN DEVEL.
- [x] POST-DESIGN SERV.
- [x] RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

- [x] HEATING
  - [ ] LOADS
  - [ ] SPACE TEMPS.
  - [ ] HVAC SYSTEMS
  - [x] PASSIVE SOLAR
  - [ ] ACTIVE SOLAR
  - [x] SHADING
  - [x] SYSTEM DESIGN
  - [ ] ECONOMICS
  - [ ] UNDERGROUND LOADS
  - [x] MASS
- [ ] COOLING
  - [ ] LOADS
  - [ ] SPACE TEMPS.
  - [ ] HVAC SYSTEMS
  - [ ] PASSIVE CLNG.
  - [ ] SHADING
  - [ ] SYSTEM DESIGN
  - [ ] ECONOMICS
  - [ ] UNDERGROUND LOADS
  - [ ] SLOPED GLAZING
  - [ ] MASS
- [ ] LIGHTING
  - [ ] LOADS
  - [ ] FC (LUX) LEVELS
  - [ ] SYSTEM DESIGN
  - [ ] ECONOMICS
  - [ ] DAYLIGHTING FC (LUX) LEVELS
  - [ ] ARTIFICIAL LTNG. REDUCTION
- [ ] DHW
  - [ ] LOADS
  - [ ] SOLAR ACTIVE
  - [ ] SOLAR PASSIVE
  - [ ] ECONOMICS
- [ ] MISCELLANEOUS
  - [ ] FANS
  - [ ] PUMPS
  - [ ] MISC. ELECTRICAL
  - [ ] ELEV. & ESCALATOR

INPUT DATA REQUIRED:

See comments next page !

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	[ ]	[ ]	[ ]	[ ]
BUILDING TYPE AND SCHEDULE	[ ]	[ ]	[ ]	[ ]
OCCUPANCY RATES	[ ]	[ ]	[ ]	[ ]
BUILDING AREA	[ ]	[ ]	[ ]	[ ]
SPACE TEMPERATURES	[ ]	[ ]	[ ]	[ ]
LOCAL ENERGY COSTS	[ ]	[ ]	[ ]	[ ]
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	[ ]	[ ]	[ ]	[ ]
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	[ ]	[ ]	[ ]	[ ]
LIGHTING REQUIREMENTS	[ ]	[ ]	[ ]	[ ]
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	[ ]	[ ]	[ ]	[ ]
GLAZING AREAS & ORIENTATIONS	[ ]	[ ]	[ ]	[ ]
ZONING	[ ]	[ ]	[ ]	[ ]
ROOM SHAPES	[ ]	[ ]	[ ]	[ ]
OPERATING SCHEDULES & PROFILES	[ ]	[ ]	[ ]	[ ]
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	[ ]	[ ]	[ ]	[ ]
BUILDING MASS DATA	[ ]	[ ]	[ ]	[ ]
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	[ ]	[ ]	[ ]	[ ]
INTERIOR SURFACE DATA	[ ]	[ ]	[ ]	[ ]
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
MECHANICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]
LIGHTING SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
LIGHTING SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

COMMENTS:

The input data required is :

(1) a description file for the system, which describes :

- the chosen nodes (type, ie, floating, assigned temperature, or thermostat-controlled; initial temperature or assignation on lower / upper limit)
- the thermal capacity of each node
- the coupling constants between nodes (which may be pure conductance, natural convection, or radiation).
- the external heat sources on certain nodes
- the definition at solar irradiation measurements tabulation and solar constants
- the times (simulation and display timesteps, beginning end of simulation)
- an optimal title
- multiplying expressions for coupling constants

(2) a tabulated data file, which tabulates :

- the temperature of assigned nodes
- the horizontal and diffuse solar irradiation if one uses the "solar generator"
- the external heat sources if necessary

The tabulation interval may be anything, typically one may use half hour or one hour. The format has to be "GRES - format"; it is described in an internal report, which may be obtained by the GRES/EPFL ("Format-GRES 81", N. MOREL)

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SECTION 2

WEATHER DATA:

TEMPERATURE DATA: [x] HOURLY TAPE [ ] TYPICAL DAY [ ] MONTHLY DATA [ ] ANNUAL DATA [ ] MONTHLY DEGREE DAYS [ ] ANNUAL DEGREE DAYS [ ] AVE. MONTHLY MIN. AND MAX. [ ] AVE. MONTHLY TEMP. [ ] DAILY

SOLAR DATA: [x] HOURLY TAPE [ ] TYPICAL DAY PROFILE [ ] MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: [x] ANY ORIEN. INCL. SLOPED [ ] ANY VERT. & HORIZ. [ ] HORIZ. & 4 CARDINAL DIREC. [ ] SLOPED FACING SOUTH [ ] SURFACE REFLECTANCE

..../LIGHT CALC: [ ] HOUR-BY-HOUR [ ] TYPICAL CLEAR & CLOUDY DAY/MONTH [ ] TYPICAL DAY/MONTH [ ] ANNUAL AVERAGE [ ] OTHER ________

CALCULATION PROCEDURES:

LANGUAGE: [x] FORTRAN [ ] BASIC [ ] MACHINE LANGUAGE [ ] OTHER ________ [ ] GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: [x] INTERACTIVE [x] INTERACTIVE GRAPHIC [x] PREPARE FILE [ ] HAND CALCULATION

UNITS OF CALCULATION: [x] SI UNITS [ ] ENGLISH [ ] BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	[x] FINITE DIFFERENCE	[ ] RESPONSE FACTOR	[ ] STEADY STATE
SOLAR COMP. CALCULATED:	[ ] DIFFUSE/DIRECT/RE-RADIATED	[x] DIFFUSE/DIRECT	[ ] TOTAL
INTEGRATION:	[ ] SIMPLE EULER	[x] IMPLICIT	[ ] OTHER
SHADING:	[x] ANY SOLAR OBSTRUCTION	[ ] OVERHANG ONLY	[ ] NO SHADING
MOVABLE SHADING:	[x] DAILY & SEASONAL SWITCHING	[ ] SEASONAL SWITCHING	[ ] NOT CALCULATED
MASS EFFECT IS CALCULATED:	[x] TRANSIENT HEAT FLOW	[ ] TIME CONSTANT FACTORS	[ ] ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	[ ] SURFACE & AIR	[x] AIR ONLY	[ ] NOT CALCULATED
INSIDE TEMPERATURE:	[x] INPUT SCHEDULE BY USER	[ ] FIXED BY TOOL	[ ] VARIED BY TOOL
U-VALUES:	[ ] CHANGE W/WIND SPEED	[ ] REMAIN CONSTANT	[x] MOVABLE INSULATION
INFILTRATION:	[x] AIR CHANGE PER HOUR	[ ] CRACK METHOD	[ ] VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	[x] SENSIBLE & LATENT SEPARATE	[ ] SENS. & LAT. TOTAL	[ ] SENSIBLE ONLY
VENTILATION:	[ ] SENSIBLE	[ ] LATENT	[ ] VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	[ ] SKY, REFL. & DIRECT	[ ] SKY & REFL.	[ ] SKY ONLY
ZONES PER RUN:	[ ] > 25	[ ] 10 - 25 · [ ] 2 - 10	[ ] 1 ONLY
SYSTEM MODELING:	[ ] SYSTEM EFFIC. INPUT	[ ] SYSTEM OPTIMIZING	[ ] COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	[ ] ANNUAL COST	[ ] SIMPLE PAYBACK	[ ] LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: [x] COMPONENT [x] ZONE [x] BUILDING

LOADS OUTPUT BY: [x] HOUR [x] DAY [x] MONTH [x] SEASON [x] YEAR

TEMPERATURES: [x] AIR [x] SURFACE [x] GRAPHIC PLOT

FUEL USE BY: [ ] MONTHLY CONSUMPTION [ ] MONTHLY PEAK DEMAND [ ] OTHER daily consumption [ ] ANNUAL CONSUMPTION [ ] ANNUAL PEAK DEMAND [ ] OTHER ________ [ ] SYSTEM COMPONENTS [ ] ENERGY SYSTEMS [ ] TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☐ UNIVAC ☒ OTHER VAX 11/780

CORE REQUIRED: ☒ > 500K ☐ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ☐ USER'S GUIDE ☐ DATA MANUAL ☒ OTHER Paper joined

EQUIPMENT: ☒ CRT ☐ PRINTER ☒ TEXTRONIX 4012/4051 ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: 2 MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME: ☒ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☒ 100 - 1000 SEC. ☐ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII – PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING
SUBTASK B – MODELLING & SIMULATION
SUBTASK C – DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: MODPAS

DEVELOPED BY: J.C. Hadorn – D. Chuard
Sorane S.A.
Route du Chatelard 52
1018 Lausanne

DATE DEVELOPED: May 1982

DATE OF LAST REVISION: June 1982

AVAILABLE THROUGH: Not available at present

PHONE NO.: (021) 37 11 75

SUPPORTED BY: Sorane S.A.

PHONE NO.:

BRIEF DESCRIPTION: MODPAS = Model for Passive Systems solves a nodal network describing the thermal interactions between nodes representing parts of the system, by means of equivalent conductances and capacities

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☐ TAPE
- ☐ TIME SHARING
- ☐ LISTING – HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☒ TAPE
- ☒ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

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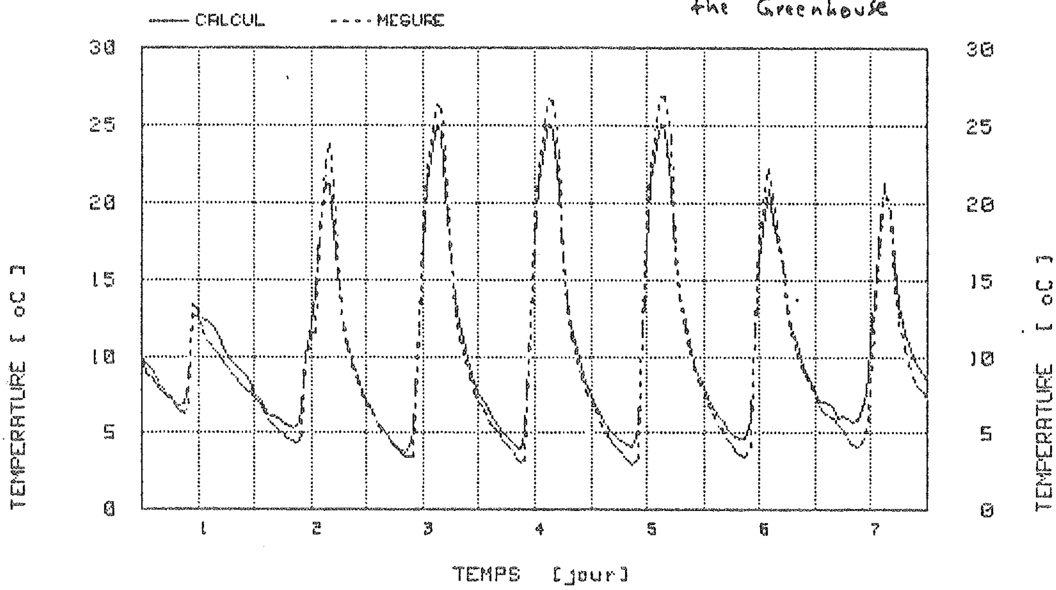
SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

COMMENTS: Example of a validation test : winter week

Temperature of the air inside the Greenhouse



Simulation of a greenhouse linked to an hospital (CH)
Time step: 1 hour - 6 nodes network -
Conductances (conduction, convection, radiation) constant during the whole period

MODPAS SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☐ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☒ PRE-DESIGN ☒ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☒ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☒ SHADING
- ☒ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☒ MASS

☒ COOLING
- ☐ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☒ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

PRE-DESIGN AND SITE ANALYSIS DATA	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	☒	☒
BUILDING TYPE AND SCHEDULE	☐	☐	☒	☒
OCCUPANCY RATES	☐	☐	☒	☒
BUILDING AREA	☐	☐	☒	☒
SPACE TEMPERATURES → is an output	☐	☐	☐	☐
LOCAL ENERGY COSTS	☒	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☒	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☒	☐	☐	☐
LIGHTING REQUIREMENTS	☒	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☒	☒
GLAZING AREAS & ORIENTATIONS	☐	☐	☒	☒
ZONING	☐	☒	☐	☒
ROOM SHAPES	☐	☒	☐	☒
OPERATING SCHEDULES & PROFILES	☐	☐	☒	☒
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.) } input through conductances and capacities	☐	☒	☐	☒
BUILDING MASS DATA	☐	☒	☐	☒
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☒	☒
INTERIOR SURFACE DATA	☐	☒	☐	☒
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☒	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☒	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☒	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☒	☐	☐	☐
LIGHTING SYSTEM DESIGN	☒	☐	☐	☐
LIGHTING SYSTEM CONTROL	☒	☐	☐	☐

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

COMMENTS:

- in general conductances and capacities are treated as constant, i.e. independant of the nodes temperatures (except for a free convection path), so that the indoor geometry is not an input: this is given through the conductances and capacities input.

- The glazing geometry is a real input and the transmitted radiation is computed for any inclination and orientation

- The repartition of the transmitted solar radiation between all nodes is also an input. It is considered as a constant for one month.

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA:	☒ HOURLY TAPE	OR ☒ TYPICAL DAYS	☐ MONTHLY DATA	☐ ANNUAL DATA	☐ MONTHLY DEGREE DAYS
	☐ ANNUAL DEGREE DAYS	☐ AVE. MONTHLY MIN. AND MAX.		☐ AVE. MONTHLY TEMP.	☐ DAILY
SOLAR DATA:	☐ HOURLY TAPE	☒ TYPICAL DAY PROFILE	OR	☒ ~~MONTHLY~~ AVE. DAILY & TOTAL	
SOLAR ORIENS. CALC:	☒ ANY ORIEN. INCL. SLOPED	☐ ANY VERT. & HORIZ.		☐ HORIZ. & 4 CARDINAL DIREC.	
	☐ SLOPED FACING SOUTH	☒ SURFACE REFLECTANCE			
DAYLIGHT CALC:	☐ HOUR-BY-HOUR	☐ TYPICAL CLEAR & CLOUDY DAY/MONTH		☐ TYPICAL DAY/MONTH	
	☐ ANNUAL AVERAGE	☐ OTHER ______			

CALCULATION PROCEDURES:

LANGUAGE:	☐ FORTRAN	☒ BASIC	☐ MACHINE LANGUAGE	☐ OTHER ______	☐ GRAPHS, CHARTS & SIMPLE CALC.
USER TYPE:	☐ INTERACTIVE	☒ INTERACTIVE GRAPHIC	☒ PREPARE FILE	☐ HAND CALCULATION	
UNITS OF CALCULATION:	☒ SI UNITS	☐ ENGLISH	☐ BOTH		

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☒ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☐ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☒ IMPLICIT	☐ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☒ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☒ SURFACE & AIR	☐ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL OR	☒ VARIED BY TOOL
U-VALUES:	☐ CHANGE W/WIND SPEED	☒ REMAIN CONSTANT	☐ MOVABLE INSULATION
INFILTRATION:	☒ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☒ SENSIBLE ONLY
VENTILATION:	☐ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☒ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS:	☐ COMPONENT	☒ ZONE	☐ BUILDING		
LOADS OUTPUT BY:	☒ HOUR	☐ DAY	☐ MONTH	☐ SEASON	☐ YEAR
TEMPERATURES:	☒ AIR	☒ SURFACE	☒ GRAPHIC PLOT		
FUEL USE BY:	☐ MONTHLY CONSUMPTION	☐ ANNUAL CONSUMPTION	☐ SYSTEM COMPONENTS		
	☐ MONTHLY PEAK DEMAND	☐ ANNUAL PEAK DEMAND	☐ ENERGY SYSTEMS		
	☒ OTHER consumption over the period	☐ OTHER ______	☐ TOTAL BUILDING ONLY		

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

COMMENTS:

The main uses of this tool are:

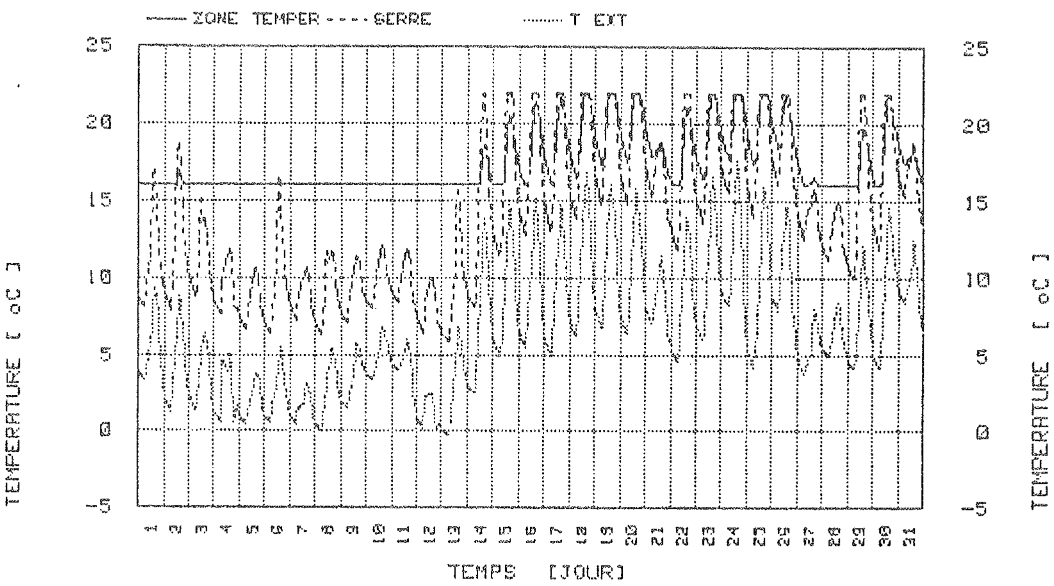
- Check of the maximum/minimum temperature of rooms air in greenhouse passive systems.
- Optimisation of thermal mass
- Interest and need for shading devices
- general thermal haviour of a passive house or greehouse during typical weeks or days

Example of output: follows

MODPAS SWITZERLAND

SORANE SA / MAI 1982

SERRE / DOUBLE ESPACE 1



MOIS DE CALCUL 3

NOEUD	APPOINT CHAUFFAGE	APPOINT FROID	POTENTIEL RECUPERABLE
1	0	57608	57608
3	1160741	31183	31183
20	3286630	865654	865654

Simulation, hour by hour during March, of a

Large Greenhouse (~ 250 m²) in Switzerland,

using 20 nodes

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 4

FOR DESIGN TOOLS REQUIRING A MICRO-COMPUTER

HARDWARE:

MANUFACTURER AND MODEL NUMBER: HP 9845 B

RANDOM ACCESS MEMORY (RAM) REQUIRED: ~ 100 K bytes

DOES THIS TOOL REQUIRE A PRINTER? ☐ YES ☒ NO and a plotter

SUPPORT: ☐ USER'S GUIDE ☐ DATA MANUAL ☒ OTHER short description

COSTS:

FIRST COST:

MICRO-COMPUTER: unknown

SOFTWARE: ROM IC ______ DISC ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ~ 20 MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

TYPICAL* INPUT SET-UP TIME: ______ MAN-DAYS 1 to 3 MAN-HOURS

TYPICAL* RUN TIME: ~ 5 HRS. ______ MIN.

TYPICAL* PRINT TIME: ~ 0.5 HRS. ______ MIN. with plots

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

+ time step: 1 hour
period of simulation: 1 year (8760 steps)

IGLOU

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: IGLOU

DEVELOPED BY: MOTOR-COLUMBUS ING. AG
Parkstrasse 27, 5400 Baden
and
Höhere Techn. Lehranstalt
Brugg-Windisch

DATE DEVELOPED: 1979

DATE OF LAST REVISION: 11.03.1982

AVAILABLE THROUGH: MOTOR-COLUMBUS, ING. AG
Parkstrasse 27, 5400 Baden

PHONE NO.: 056 20 11 21

SUPPORTED BY: Motor-Columbus, ING.AG.
Parkstrasse 27, 5400 Baden
J. Lanz, A. Schopfer

PHONE NO.: 056 20 11 21

BRIEF DESCRIPTION: Wärmetechnische Analysen im Hochbau
J. Lanz, A. Schopfer
Schwelzer Ingenieur und Architekt, Heft 20/1981

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☒ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

IGLOU SWITZERLAND

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SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☒ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☐ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☒ PRE-DESIGN ☒ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☐ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☒ PRE-DESIGN ☒ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☐ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☒ ACTIVE SOLAR
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☒ MASS

☒ COOLING
- ☐ LOADS
- ☐ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☐ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☒	☐	☒
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☐	☒	☐	☐
BUILDING AREA	☐	☒	☐	☐
SPACE TEMPERATURES	☐	☒	☐	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☐	☒	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☐	☒
GLAZING AREAS & ORIENTATIONS	☐	☐	☐	☒
ZONING	☐	☒	☐	☐
ROOM SHAPES	☐	☐	☐	☒
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☒
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	☐	☒
BUILDING MASS DATA	☐	☐	☐	☒
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☐	☒
INTERIOR SURFACE DATA	☐	☐	☐	☒
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☒	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☒	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☒	☐	☐

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IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☐ HOURLY TAPE ☒ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☐ HOURLY TAPE ☒ TYPICAL DAY PROFILE ☒ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☒ SURFACE REFLECTANCE

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☐ OTHER ________

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☒ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☐ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☒ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☐ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☒ OTHER
SHADING:	☒ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☒ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☒ SURFACE & AIR	☐ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☐ VARIED BY TOOL
U-VALUES:	☒ CHANGE W/WIND SPEED	☐ REMAIN CONSTANT	☐ MOVABLE INSULATION
INFILTRATION:	☒ AIR CHANGE PER HOUR	☐ CRACK METHOD	☒ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☒ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☐ SENSIBLE ONLY
VENTILATION:	☒ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☒ > 25	☐ 10 - 25 ☐ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☒ ZONE ☒ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☒ DAY ☐ MONTH ☐ SEASON ☐ YEAR

TEMPERATURES: ☒ AIR ☒ SURFACE ☐ GRAPHIC PLOT

FUEL USE BY: ☒ MONTHLY CONSUMPTION ☒ MONTHLY PEAK DEMAND ☐ OTHER ________ ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ________ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☐ UNIVAC ☒ OTHER PRIME

CORE REQUIRED: ☒ > 500K ☐ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☒ DATA MANUAL ☐ OTHER ____

EQUIPMENT: ☒ CRT ☒ PRINTER ☒ TEXTRONIX ☐ OTHER ____

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ____ PRINTER ____

SOFTWARE PURCHASE: CARD DECK ____ TAPE ____ LISTING ____

SUPPORT INFORMATION: USER'S GUIDE ____ DATA MANUAL ____ OTHER ____

TIME TO INPUT AND DEBUG: ____ MAN-DAYS ____ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: 1-10 MAN-DAYS ____ MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☒ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☒ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

J. Lanz, A. Schopfer
Motor Columbus Ing. AG
Parkstr. 27, 5400 Baden
tel. 056 20 11 21

BAUDYN

SWITZERLAND

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII – PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B – MODELLING & SIMULATION
SUBTASK C – DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: BAUDYN

DEVELOPED BY: SULZER / Ponomareff

DATE DEVELOPED: 81

DATE OF LAST REVISION:

AVAILABLE THROUGH: SULZER / Winterhein

PHONE NO.:

SUPPORTED BY: PONOMAREFF

PHONE NO.: (052) 814148

BRIEF DESCRIPTION: Calculates dynamic heat flows in a room model. Including air and surface temperatures. Can also be used to calculate the loads of heating and cooling systems.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☐ TAPE
- ☐ TIME SHARING
- ☒ LISTING – HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

BAUDYN SWITZERLAND

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☒ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☒ MASS

☒ COOLING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☒ MASS

☒ LIGHTING
- ☒ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	☒	☐
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☐	☐	☐	☐
BUILDING AREA	☐	☐	☒	☐
SPACE TEMPERATURES	☐	☐	☒	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☒	☐
LIGHTING REQUIREMENTS	☐	☐	☒	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☒	☐
GLAZING AREAS & ORIENTATIONS	☐	☐	☒	☐
ZONING	☐	☐	☐	☐
ROOM SHAPES	☐	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	☒	☐
BUILDING MASS DATA	☐	☐	☒	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☒	☐
INTERIOR SURFACE DATA	☐	☐	☒	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

BAUDYN SWITZERLAND

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☐ HOURLY TAPE ☒ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☐ HOURLY TAPE ☒ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☐ ANY ORIEN. INCL. SLOPED ☐ ANY VERT. & HORIZ. ☐ ~~HORIZ~~. & ~~4~~ 2 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☐ SURFACE REFLECTANCE

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☐ OTHER ____________

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☐ FINITE DIFFERENCE	☒ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☐ DIFFUSE/DIRECT/RE-RADIATED	☒ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☒ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☒ NO SHADING
MOVABLE SHADING:	☐ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☒ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☒ SURFACE & AIR	☐ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☐ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☒ VARIED BY TOOL
U-VALUES:	☐ CHANGE W/WIND SPEED	☐ REMAIN CONSTANT	☐ MOVABLE INSULATION
INFILTRATION:	☐ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☐ SENSIBLE ONLY
VENTILATION:	☐ SENSIBLE	☐ LATENT	☒ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☐ 2 - 10	☒ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☐ ZONE ☐ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☐ DAY ☐ MONTH ☐ SEASON ☐ YEAR

TEMPERATURES: ☒ AIR ☒ SURFACE ☐ GRAPHIC PLOT

FUEL USE BY: ☐ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER ________ ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ________ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE:	☐ IBM	☒ CDC	☐ UNIVAC	☒ OTHER PRIME
CORE REQUIRED:	☐ > 500K	☐ 100 - 500 K	☐ 25 - 100 K	☒ < 25 K
SUPPORT:	☒ USER'S GUIDE	☐ DATA MANUAL		☐ OTHER ______
EQUIPMENT:	☒ CRT	☒ PRINTER	☐ TEXTRONIX	☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ______ MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME:	☐ > 1 HR.	☐ 60 M - 30 M	☐ 30 M - 10 M	☐ < 10 M
TYPICAL* CPU TIME:	☐ > 1000 SEC.	☐ 100 - 1000 SEC.	☐ 5 - 100 SEC.	☒ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

STEMOD / DYWAN SWITZERLAND

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:
EMPA
Ueberlandstrasse 129
att. Mr. R. Hastings
8600 Dübendorf

GENERAL:

TOOL NAME: STEMOD / DYWAN

DEVELOPED BY: Büro 'ur'
Turnerstr. 24
8006 Zürich

DATE DEVELOPED: 1981

DATE OF LAST REVISION:

AVAILABLE THROUGH: U. Roth, Dipl.Arch.ETH
Büro f. Raumplanung
Turnerstr. 24
8006 Zürich

PHONE NO.: 01/361.33.21

SUPPORTED BY:

PHONE NO.:

F DESCRIPTION:

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☐ TAPE
- ☒ TIME SHARING
- ☒ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

STEMOD / DYWAN SWITZERLAND

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

COMMENTS:

Taking into account geographical location and elevation above sea level (maximum theoretical radiation available), shade, cloudiness, haze, orientation (horizontal and vertical) and transmittance of glazed areas STEMOD computes the solar energy available behind translucent surfaces for any period of time by hourly aggregation.

DYWAN is a dynamic procedure to simulate the energy-household of entire buildings and their zones in hourly intervals, taking into account the changes in climate (solar heat gain, temperature, wind, humidity), the building's capacity for heat storage and the user behavior (ventilation when spaces are overheated by solar heat gain).
DYWAN is based on so-called 'Beuken-models' and produces realistic data for heating and cooling loads and energy required for any period of time when sufficient meteorological information is available.
The solar heat gain-input is derived from STEMOD. Thus, DYWAN is always combined with STEMOD.

☒ applies to STEMOD

☒ applies to DYWAN

STEMOD / DYWAN SWITZERLAND

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☒ ARCHITECT ☐ ENGINEER ☐ TECHNICIAN ☐ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

P. E(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☒ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☒ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ MASS

☒ COOLING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☐ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
OCATION - ASSOCIATED WEATHER DATA				
UILDING TYPE AND SCHEDULE				
OCCUPANCY RATES				
BUILDING AREA				
SPACE TEMPERATURES				
LOCAL ENERGY COSTS				
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS				
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)				
LIGHTING REQUIREMENTS				
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS				
GLAZING AREAS & ORIENTATIONS				
ZONING				
ROOM SHAPES				
OPERATING SCHEDULES & PROFILES				
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)				
BUILDING MASS DATA				
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION				
INTERIOR SURFACE DATA				
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN				
MECHANICAL SYSTEM CONTROL				
ELECTRICAL SYSTEM DESIGN				
ELECTRICAL SYSTEM CONTROL				
LIGHTING SYSTEM DESIGN				
LIGHTING SYSTEM CONTROL				

STEMOD / DYWAN SWITZERLAND

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

WEATHER DATA:

TEMPERATURE DATA: ☐ HOURLY TAPE ☐ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☐ HOURLY TAPE ☒ TYPICAL DAY PROFILE ☒ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☐ ANY ORIEN. INCL. SLOPED ☐ SLOPED FACING SOUTH ☒ ANY VERT. & HORIZ. ☒ SURFACE REFLECTANCE ☐ HORIZ. & 4 CARDINAL DIREC.

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ ANNUAL AVERAGE ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ OTHER ______ ☐ TYPICAL DAY/MONTH

CALCULATION PROCEDURES:

LANGUAGE: ☐ FORTRAN ☒ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ______ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☒ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☐ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☐ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☒ DYNAMIC ~~STEADY STATE~~
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☐ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	☒ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☒ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☐ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☐ SURFACE & AIR	☐ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☐ VARIED BY TOOL
U-VALUES:	☐ CHANGE W/WIND SPEED	☐ REMAIN CONSTANT	☐ MOVABLE INSULATION
INFILTRATION:	☒ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☐ SENSIBLE ONLY
VENTILATION:	☐ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☒ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☐ 2 - 10	☒ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☐ COMPONENT ☐ ZONE ☐ BUILDING

LOADS OUTPUT BY: ☐ HOUR ☒ DAY ☒ MONTH ☐ SEASON ☒ YEAR

TEMPERATURES: ☐ AIR ☐ SURFACE ☐ GRAPHIC PLOT

FUEL USE BY: ☐ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER ______ ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ______ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

STEMOD / DYWAN

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☒ IBM ☐ CDC ☐ UNIVAC ☐ OTHER ______

CORE REQUIRED: ☐ > 500K ⊗ ☐ 100 - 500 K ☒ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ______

EQUIPMENT: ☐ CRT ☒ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ______ MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☐ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

______ ______
______ ______
______ ______
______ ______

PROGRAMME MUR-DIODE SWITZERLAND

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SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: Programme Mur-Diode

DEVELOPED BY: O. Rudaz
Ecole de Physique
24 q. E. Ansermet
1211 Geneve 4

DATE DEVELOPED: Juillet 1981

DATE OF LAST REVISION: -

AVAILABLE THROUGH: O. Rudaz
O. Guisan
same address

PHONE NO.: (022) 21 93 55

SUPPORTED BY: Universite de Geneve

PHONE NO.:

BRIEF DESCRIPTION: Etude d'une cellute-test en energie solaire passive avec mur-diode et stockage. Mesures, simulation et validation.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☐ TIME SHARING
- ☒ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

PROGRAMME MUR-DIODE SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

COMMENTS:

Bibliographie: - Etude d'une structure solaire passive
M. Baussiere, O. Guisan, O. Rudaz
3 Sywposium R + D Energie Solaire en Suisse
EPFL, Ecublens 19/10/81 pp. 191-200 ef.annexe

- Travail de diplome M. Baussiere, O. Rudaz
Bibliotheque Ecole de Physique
24 q. E. Ansermet 1211 Geneve 4

Energie Solaire: Bilanthermique d'une cellule test

- Le programme est peu documente, doc peu utilisable par d'autres.
Les resultats sont tres satisfaisants.
Cette etude ponctuelle n'est actuellement pas poursuivie.

PROGRAMME MUR - DIODE SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ☐ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ? ☒ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☐ LOADS
- ☐ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ MASS

☐ COOLING
- ☐ LOADS
- ☐ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☐ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	☒	☐
BUILDING TYPE AND SCHEDULE	☒	☐	☐	☐
OCCUPANCY RATES	☒	☐	☐	☐
BUILDING AREA	☒	☐	☐	☐
SPACE TEMPERATURES	☐	☐	☒	☐
LOCAL ENERGY COSTS	☒	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☒	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☒	☐	☐	☐
LIGHTING REQUIREMENTS	☒	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☒	☐
GLAZING AREAS & ORIENTATIONS	☐	☐	☒	☐
ZONING	☒	☐	☐	☐
ROOM SHAPES	☒	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	☒	☐
BUILDING MASS DATA	☐	☐	☒	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☒	☐
INTERIOR SURFACE DATA	☐	☐	☒	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

PROGRAMME MUR-DIODE SWITZERLAND

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA: ☒ 6 minutes-data

TEMPERATURE DATA: ☐ HOURLY TAPE ☐ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY ☒ 6 min-data on South vertical wall

SOLAR DATA: ☐ HOURLY TAPE ☐ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☐ ANY ORIEN. INCL. SLOPED ☐ ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☐ SURFACE REFLECTANCE ☒ 6 min. basis

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☐ OTHER ____________

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☒ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED: and measured	☒ DIFFUSE/DIRECT/RE-RADIATED	☐ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☒ SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☒ NO SHADING
MOVABLE SHADING:	☐ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☒ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☐ SURFACE & AIR	☒ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☐ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☒ VARIED BY TOOL
U-VALUES:	☐ CHANGE W/WIND SPEED	☒ REMAIN CONSTANT	☐ MOVABLE INSULATION
INFILTRATION: negligeable	☒ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☒ SENSIBLE ONLY
VENTILATION:	☒ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☐ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☒ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☐ ZONE ☐ BUILDING

LOADS OUTPUT BY: ☐ HOUR ☒ 6 min ☐ DAY ☐ MONTH ☐ SEASON ☐ YEAR

TEMPERATURES: ☒ AIR ☐ SURFACE ☒ GRAPHIC PLOT

FUEL USE BY: ☐ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER ________ ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ________ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

PROGRAMME MUR-DIODE SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☒ UNIVAC ☐ OTHER ____

CORE REQUIRED: ☐ > 500K ☐ 100 - 500 K ☐ 25 - 100 K ☒ < 25 K

SUPPORT: ☒ USER'S GUIDE ☒ DATA MANUAL ☐ OTHER ____

EQUIPMENT: ☐ CRT ☒ PRINTER ☒ TEXTRONIX ☐ OTHER ____

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ____ PRINTER ____

SOFTWARE PURCHASE: CARD DECK ____ TAPE ____ LISTING ____

SUPPORT INFORMATION: USER'S GUIDE ____ DATA MANUAL ____ OTHER ____

TIME TO INPUT AND DEBUG: ____ MAN-DAYS ____ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ____ MAN-DAYS ____ MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☐ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

SOLAR TRAP SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII – PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B – MODELLING & SIMULATION
SUBTASK C – DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: SOLAR TRAP

DEVELOPED BY: Dr. C. Filleux / P. Jemelka
Basler & Hofmann
Consulting Engineers
Forchstrasse 395
8029 Zürich

DATE DEVELOPED: 1981

DATE OF LAST REVISION: 1981

AVAILABLE THROUGH: Basler & Hofmann
Consult. Engineers

PHONE NO.: 01/55 11 22

SUPPORTED BY:
Nationaler Energie-Forschungs-
Fonds

PHONE NO.:

BRIEF DESCRIPTION: Dynamic simulation of energy flows in a active/passive system.
Nodal decomposition of system . First difference solutine method.
Black box for active parts of system.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

Validation over 1 year period in a active/passive test-cell.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ ~~TAPE~~ DISC
- ☒ TIME SHARING
- ☒ LISTING – HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☒ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

SOLAR TRAP SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

COMMENTS:

Mainly used for research work, i.e. for optimisation of the Solar Trap system (see e.g. Proceedings Solar World Forum, Brighton 1981, section B). Easy to use input.

SOLAR TRAP SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☒ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☒ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☒ MASS

☐ COOLING
- ☐ LOADS
- ☐ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☐ SLOPED GLAZING
- ☐ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	☐	☐
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☐	☐	☐	☐
BUILDING AREA	☐	☐	☐	☐
SPACE TEMPERATURES	☐	☐	☐	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☐	☐
GLAZING AREAS & ORIENTATIONS	☐	☐	☐	☐
ZONING	☐	☐	☐	☐
ROOM SHAPES	☐	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	☐	☐
BUILDING MASS DATA	☐	☐	☐	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☐	☐
INTERIOR SURFACE DATA	☐	☐	☐	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

See next page.

SOLAR TRAP SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

COMMENTS:

- Programs has been developped for 1 zone only
- Input file describing building geometry as well as material constants must be set up.
- Coupling constants (conductance, convective or by radiation) are defined.
- Input required is solar irradiation, horizontal or vertical south and air temperature

SOLAR TRAP SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☐ ANY ORIEN. INCL. SLOPED ☒ ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☐ SURFACE REFLECTANCE

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☐ OTHER ________

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☒ INTERACTIVE ☒ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☒ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☐ DIFFUSE/DIRECT or	☒ TOTAL
INTEGRATION:	☒ SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☐ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☒ SURFACE & AIR	☐ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☐ VARIED BY TOOL
U-VALUES:	☐ CHANGE W/WIND SPEED	☒ REMAIN CONSTANT	(☒)MOVABLE INSULATION
INFILTRATION:	☒ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☒ SENSIBLE ONLY
VENTILATION:	☐ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☐ 2 - 10	☒ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☒ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☒ ZONE ☐ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☒ DAY ☒ MONTH ☒ SEASON ☒ YEAR

TEMPERATURES: ☒ AIR ☒ SURFACE ☒ GRAPHIC PLOT

FUEL USE BY: ☐ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☒ OTHER DAILY, HOURLY ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ________ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

SOLAR TRAP SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☐ UNIVAC ☐ OTHER PRIME 450

CORE REQUIRED: ☐ > 500K ☐ 100 - 500 K ☒ 25 - 100 K ☐ < 25 K

SUPPORT: ☐ USER'S GUIDE ☐ DATA MANUAL ☒ OTHER Final report to NEFF

EQUIPMENT: ☐ CRT ☒ PRINTER ☐ TEXTRONIX ☒ OTHER calcomb plotter

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ______ MAN-DAYS 2-3 MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☒ 100 - 1000 SEC. for 1 season ☐ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

COMMENTS:

Additional information of interest for passive solar task VIII:

SOL TRAP is able to simulate three of the four commonly used design types, namely

- direct gain
- isolated gain (air collector + rockbed storage, where the air collector may be part of the south window)
- trombe wall (with vents)

HELIOS 1 SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: HELIOS 1

DEVELOPED BY: EMPA Abt. 151 (Th. Frank)

DATE DEVELOPED: 1980/82

DATE OF LAST REVISION: JUNI 1982

AVAILABLE THROUGH: EMPA Abt.151

PHONE NO.: 01/823 55 11

SUPPORTED BY: NF

PHONE NO.:

BRIEF DESCRIPTION: Single zone model for simulating the thermal behavion of a building taking into account the radiation processes (short-wave and longwave) at the building envelope.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☒ CARD DECK
- ☒ TAPE
- ☐ TIME SHARING
- ☒ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

HELIOS 1

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

COMMENTS:

The simulation model has been developed to investigate the influence of radiation processes at the building envelope to the energy consumption

- influence of solar radiation on elements heat loss and
- influence of infra red - radiation exchange (study of selective surfaces) to the net heat loss
- influence of glazed walls (absorber walls) to the solar gain

The simulation model is based on the detailed thermal balance method. The model has been validated against two test cells.

HELIOS 1 SWITZERLAND

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☐ ARCHITECT ☒ ENGINEER ☒ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☒ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☐ PRE-DESIGN ☒ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☒ MASS

☒ COOLING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☐ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☒ SLOPED GLAZING
- ☒ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☒ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☒	☐	☐
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☐	☒	☐	☐
BUILDING AREA	☐	☒	☐	☐
SPACE TEMPERATURES	☐	☒	☐	☐
LOCAL ENERGY COSTS	☐	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☒	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☐
LIGHTING REQUIREMENTS	☐	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☒	☐	☐
GLAZING AREAS & ORIENTATIONS	☐	☒	☐	☐
ZONING	☐	☒	☐	☐
ROOM SHAPES	☐	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☒	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☒	☐	☐
BUILDING MASS DATA	☐	☒	☐	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☒	☐	☐
INTERIOR SURFACE DATA	☐	☒	☐	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☒	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☒	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☐
LIGHTING SYSTEM DESIGN	☐	☐	☐	☐
LIGHTING SYSTEM CONTROL	☐	☐	☐	☐

HELIOS 1 SWITZERLAND

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☐ SURFACE REFLECTANCE

DAYLIGHT CALC: ☒ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☐ OTHER ____________

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☐ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☐ FINITE DIFFERENCE		☒ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED		☐ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	☐ SIMPLE EULER		☐ IMPLICIT	☐ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION		☐ OVERHANG ONLY	☒ NO SHADING
MOVABLE SHADING:	☐ DAILY & SEASONAL SWITCHING		☐ SEASONAL SWITCHING	☒ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW		☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☒ SURFACE & AIR		☐ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☐ INPUT SCHEDULE BY USER		☐ FIXED BY TOOL	☒ VARIED BY TOOL
U-VALUES:	☒ CHANGE W/WIND SPEED		☐ REMAIN CONSTANT	☒ MOVABLE INSULATION
INFILTRATION:	☐ AIR CHANGE PER HOUR		☐ CRACK METHOD	☒ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE		☐ SENS. & LAT. TOTAL	☒ SENSIBLE ONLY
VENTILATION:	☐ SENSIBLE		☐ LATENT	☒ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT		☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25	☐ 10 - 25	☐ 2 - 10	☒ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT		☐ SYSTEM OPTIMIZING	☒ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST		☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☐ ZONE ☒ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☐ DAY ☒ MONTH ☐ SEASON ☐ YEAR

TEMPERATURES: ☒ AIR ☒ SURFACE ☒ GRAPHIC PLOT

FUEL USE BY: ☒ MONTHLY CONSUMPTION ☒ MONTHLY PEAK DEMAND ☐ OTHER ________ ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER ________ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE:	☐ IBM	☒ CDC	☐ UNIVAC	☐ OTHER
CORE REQUIRED:	☐ > 500K	☒ 1~~0~~0 - ~~500 K~~	☐ 25 - 100 K	☐ < 25 K
SUPPORT:	☒ USER'S GUIDE	☐ DATA MANUAL		☐ OTHER
EQUIPMENT:	☒ CRT	☒ PRINTER	☐ TEXTRONIX	☐ OTHER

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT:	CRT -	PRINTER -	
SOFTWARE PURCHASE:	CARD DECK $ 30,-	TAPE $ 100,-	LISTING $ 10,-
SUPPORT INFORMATION:	USER'S GUIDE $ 20,-	DATA MANUAL	OTHER
TIME TO INPUT AND DEBUG:	____ MAN-DAYS	____ MAN-HOURS	

RUN COST/TIME: 1 month -

INPUT SET-UP TIME:	1 MAN-DAYS	____ MAN-HOURS		
TYPICAL* RUN TIME:	☐ > 1 HR.	☐ 60 M - 30 M	☐ 30 M - 10 M	☐ < 10 M
TYPICAL* CPU TIME:	☐ > 1000 SEC.	☒ 100 - 1000 SEC.	☐ 5 - 100 SEC.	☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

EMPA Abt. 151
CH - 8600 Dübendorf

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING
SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: BLAST 3.0

DEVELOPED BY: U.S. Army Construction Engineering Research Laboratory
P.O. Box 4005
Champaign, Illinois 61820

DATE DEVELOPED: March, 1981

DATE OF LAST REVISION: March, 1981

AVAILABLE THROUGH: U.S. Army Construction Engineering Research Laboratory
P.O. Box 4005
Champaign, Illinois 61820

PHONE NO.:

SUPPORTED BY: U.S. Army Construction Engineering Research Laboratory
P.O. Box 4005
Champaign, Illinois 61820

PHONE NO.:

BRIEF DESCRIPTION: BLAST 3.0 is a computer program which predicts energy consumption and energy systems performance and cost in buildings.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☒ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

COMMENTS:

BLAST - 3.0 NOTES

1). Daylighting: In experimental version.

2). Interior surface data: Only by specifying a paint type in materials library.

3). Surface reflectance: Assume this means ground reflectivity, based on TMY indication of snow.

4). Solution technique: conduction through envelope based on response factors, zonal effects based on simultaneous equations.

BLAST

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

INTENDED USE:

INTENDED FOR USE BY:

[X] ARCHITECT [X] ENGINEER [ ] TECHNICIAN [X] RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

[ ] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [X] DESIGN DEVEL. [ ] POST-DESIGN SERV. [ ] RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

[X] PRE-DESIGN [X] SITE ANALYSIS [X] SCHEMATICS [X] DESIGN DEVEL. [X] POST-DESIGN SERV. [X] RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

[X] HEATING
- [X] LOADS
- [X] SPACE TEMPS.
- [X] HVAC SYSTEMS
- [X] PASSIVE SOLAR
- [X] ACTIVE SOLAR
- [X] SHADING
- [X] SYSTEM DESIGN
- [X] ECONOMICS
- [X] UNDERGROUND LOADS
- [X] MASS

[X] COOLING
- [X] LOADS
- [X] SPACE TEMPS.
- [X] HVAC SYSTEMS
- [X] PASSIVE CLNG.
- [X] SHADING
- [X] SYSTEM DESIGN
- [X] ECONOMICS
- [X] UNDERGROUND LOADS
- [X] SLOPED GLAZING
- [X] MASS

[X] LIGHTING
- [X] LOADS
- [ ] FC (LUX) LEVELS
- [X] SYSTEM DESIGN
- [X] ECONOMICS
- [ ] DAYLIGHTING FC (LUX) LEVELS
- [X] ARTIFICIAL LTNG. REDUCTION

[X] DHW
- [X] LOADS
- [X] SOLAR ACTIVE
- [X] SOLAR PASSIVE
- [X] ECONOMICS

[X] MISCELLANEOUS
- [X] FANS
- [X] PUMPS
- [X] MISC. ELECTRICAL
- [ ] ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	[ ]	[ ]	[ ]	[X]
BUILDING TYPE AND SCHEDULE	[ ]	[ ]	[ ]	[X]
OCCUPANCY RATES	[ ]	[ ]	[ ]	[X]
BUILDING AREA	[ ]	[ ]	[ ]	[X]
SPACE TEMPERATURES	[ ]	[ ]	[ ]	[X]
LOCAL ENERGY COSTS	[ ]	[ ]	[ ]	[X]
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	[ ]	[ ]	[ ]	[X]
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	[ ]	[ ]	[ ]	[X]
LIGHTING REQUIREMENTS	[ ]	[ ]	[ ]	[X]
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	[ ]	[ ]	[ ]	[X]
GLAZING AREAS & ORIENTATIONS	[ ]	[ ]	[ ]	[X]
ZONING	[ ]	[ ]	[ ]	[X]
ROOM SHAPES	[ ]	[ ]	[ ]	[X]
OPERATING SCHEDULES & PROFILES	[ ]	[ ]	[ ]	[X]
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	[ ]	[ ]	[ ]	[X]
BUILDING MASS DATA	[ ]	[ ]	[ ]	[X]
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	[ ]	[ ]	[ ]	[X]
INTERIOR SURFACE DATA	[ ]	[ ]	[ ]	[X]
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[X]
MECHANICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[X]
ELECTRICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[X]
ELECTRICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[X]
LIGHTING SYSTEM DESIGN	[ ]	[ ]	[ ]	[X]
LIGHTING SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

WEATHER DATA:

TEMPERATURE DATA: ☒ HOURLY TAPE ☒ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☒ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☒ SURFACE REFLECTANCE

DAYLIGHT CALC: ☒ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☐ OTHER ____________

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ____________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☒ ENGLISH ☒ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☐ FINITE DIFFERENCE	☒ RESPONSE FACTOR	☐ STEADY STATE	
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☒ DIFFUSE/DIRECT	☒ TOTAL	
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☒ OTHER	
SHADING:	☒ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☐ NO SHADING	
MOVABLE SHADING:	☒ DAILY & SEASONAL SWITCHING	☒ SEASONAL SWITCHING	☐ NOT CALCULATED	
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT	
ROOM TEMP. BASED ON:	☒ SURFACE & AIR	☐ AIR ONLY	☐ NOT CALCULATED	
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☒ VARIED BY TOOL	
U-VALUES:	☒ CHANGE W/WIND SPEED	☒ REMAIN CONSTANT	☒ MOVABLE INSULATION	
INFILTRATION:	☒ AIR CHANGE PER HOUR	☐ CRACK METHOD	☒ VARIES W/WIND SPEED	
INTERNAL LOADS INCLUDE:	☒ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☐ SENSIBLE ONLY	
VENTILATION:	☒ SENSIBLE	☐ LATENT	☒ VARIES BY SCHEDULE OR COMMAND	
DAYLIGHT COEFFICIENTS:	☒ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY	
ZONES PER RUN:	☒ > 25	☐ 10 - 25	☐ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☒ SYSTEM EFFIC. INPUT	☒ SYSTEM OPTIMIZING	☒ COMPONENT SENSITIVITY	
ECONOMIC ANALYSIS:	☒ ANNUAL COST	☒ SIMPLE PAYBACK	☒ LIFE CYCLE COSTING	

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☒ ZONE ☒ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☒ DAY ☒ MONTH ☒ SEASON ☒ YEAR

TEMPERATURES: ☒ AIR ☐ SURFACE ☐ GRAPHIC PLOT

FUEL USE BY: ☒ MONTHLY CONSUMPTION ☒ MONTHLY PEAK DEMAND ☐ OTHER ____________ ☒ ANNUAL CONSUMPTION ☒ ANNUAL PEAK DEMAND ☐ OTHER ____________ ☒ SYSTEM COMPONENTS ☒ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE:	☐ IBM	☒ CDC	☐ UNIVAC	☐ OTHER ______
CORE REQUIRED:	☐ > 500K	☒ 100 - 500 K	☐ 25 - 100 K	☐ < 25 K
SUPPORT:	☒ USER'S GUIDE	☒ DATA MANUAL		☐ OTHER ______
EQUIPMENT:	☒ CRT	☒ PRINTER	☐ TEXTRONIX	☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT:	CRT X	PRINTER X	
SOFTWARE PURCHASE:	CARD DECK ______	TAPE X	LISTING ______
SUPPORT INFORMATION:	USER'S GUIDE X	DATA MANUAL X	OTHER ______
TIME TO INPUT AND DEBUG:	4 MAN-DAYS	______ MAN-HOURS	

RUN COST/TIME:

INPUT SET-UP TIME:	2 MAN-DAYS	______ MAN-HOURS		
TYPICAL* RUN TIME:	☒ > 1 HR.	☐ 60 M - 30 M	☐ 30 M - 10 M	☐ < 10 M
TYPICAL* CPU TIME:	☐ > 1000 SEC.	☐ 100 - 1000 SEC.	☒ 5 - 100 SEC.	☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

Boeing Time Share Service

Cybernet User Service

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING
SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: DEROB IV

DEVELOPED BY: Francisco Arumi - Noe
University of Texas at Austin
School of Architecture
Austin, TX 78712

DATE DEVELOPED: 1979

DATE OF LAST REVISION: 1981

AVAILABLE THROUGH: SOLENCO
P.O. Box 7907
Austin, TX 78712

PHONE NO.: 471-7729

SUPPORTED BY: SOLENCO
P.O. Box 7907
Austin, TX 78712

PHONE NO.: 471-7729

BRIEF DESCRIPTION: DEROB IV is a computer program which models in detail the various heat transfer mechanisms of a building and calculates the energy consumption of that building.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☐ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

COMMENTS:

DEROB IV

Movable shading: Possible by using movable insulation option.

Daylighting subroutines available on request from code author.

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☒ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☒ PRE-DESIGN ☒ SITE ANALYSIS ☒ SCHEMATICS ☒ DESIGN DEVEL. ☒ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☒ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☒ UNDERGROUND LOADS
- ☒ MASS

☒ COOLING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☒ HVAC SYSTEMS
- ☒ PASSIVE CLNG.
- ☒ SHADING
- ☒ SYSTEM DESIGN
- ☐ ECONOMICS
- ☒ UNDERGROUND LOADS
- ☒ SLOPED GLAZING
- ☒ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☒ MISCELLANEOUS
- ☒ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	☐	☒
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☒	☐	☐	☐
BUILDING AREA	☐	☐	☐	☒
SPACE TEMPERATURES	☐	☐	☐	☒
LOCAL ENERGY COSTS	☒	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☒
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☒
LIGHTING REQUIREMENTS	☒	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☐	☒
GLAZING AREAS & ORIENTATIONS	☐	☐	☐	☒
ZONING	☐	☐	☐	☒
ROOM SHAPES	☐	☐	☐	☒
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☐
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	☐	☒
BUILDING MASS DATA	☐	☐	☐	☒
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☐	☐
INTERIOR SURFACE DATA	☐	☐	☐	☒
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☐	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☒	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☒	☐	☐	☐
LIGHTING SYSTEM DESIGN	☒	☐	☐	☐
LIGHTING SYSTEM CONTROL	☒	☐	☐	☐

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☒ SURFACE REFLECTANCE

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☐ OTHER ____________

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER __________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☐ SI UNITS ☒ ENGLISH ☐ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☒ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☒ DIFFUSE/DIRECT	☒ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☒ IMPLICIT	☐ OTHER
SHADING:	☒ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☒ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☒ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☐ SURFACE & AIR	☒ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☒ VARIED BY TOOL
U-VALUES:	☒ CHANGE W/WIND SPEED	☐ REMAIN CONSTANT	☒ MOVABLE INSULATION
INFILTRATION:	☒ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☐ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☒ SENSIBLE ONLY
VENTILATION:	☒ SENSIBLE	☐ LATENT	☐ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☒ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☒ ZONE ☒ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☐ DAY ☒ MONTH ☐ SEASON ☒ YEAR

TEMPERATURES: ☒ AIR ☒ SURFACE ☐ GRAPHIC PLOT

FUEL USE BY: ☐ MONTHLY CONSUMPTION ☐ MONTHLY PEAK DEMAND ☐ OTHER __________ ☐ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☐ OTHER __________ ☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: [ ] IBM [x] CDC [ ] UNIVAC [ ] OTHER ________

CORE REQUIRED: [ ] > 500K [ ] 100 - 500 K [x] 25 - 100 K [ ] < 25 K

SUPPORT: [x] USER'S GUIDE [ ] DATA MANUAL [ ] OTHER ________

EQUIPMENT: [x] CRT [x] PRINTER [ ] TEXTRONIX [ ] OTHER ________

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT X PRINTER X

SOFTWARE PURCHASE: CARD DECK ____ TAPE X LISTING ____

SUPPORT INFORMATION: USER'S GUIDE X DATA MANUAL ____ OTHER ____

TIME TO INPUT AND DEBUG: 5 MAN-DAYS ____ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: 2 MAN-DAYS ____ MAN-HOURS

TYPICAL* RUN TIME: [x] > 1 HR. [ ] 60 M - 30 M [ ] 30 M - 10 M [ ] < 10 M

TYPICAL* CPU TIME: [ ] > 1000 SEC. [x] 100 - 1000 SEC. [ ] 5 - 100 SEC. [ ] < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

DOE 2.1 U.S.A.

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: DOE-2.1

DEVELOPED BY: Building Energy Analysis Group
Energy and Environment Division
Lawrence Berkeley Laboratory
Berkeley, California

DATE DEVELOPED: May 1980

DATE OF LAST REVISION:

AVAILABLE THROUGH: National Technical Information Service - U.S. Department of Commerce - 5285 Port Royal Road
Springfield, Virginia 22161

PHONE NO.: (703) 557-4650

SUPPORTED BY: Building Energy Analysis Group
Energy and Environment Division
Lawrence Berkeley Laboratory
Berkeley, California

PHONE NO.:

BRIEF DESCRIPTION: DOE-2 is a public domain computer program which can be used to explore the energy behavior of proposed and existing buildings and their associated heating, ventilation and air conditioning systems.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

- [x] MAIN FRAME COMPUTER
  - [ ] CARD DECK
  - [x] TAPE
  - [x] TIME SHARING
  - [ ] LISTING - HARD COPY

  (COMPLETE SECTIONS 1, 2, 3)
- [ ] MICRO-COMPUTER
  - [ ] DISC
  - [ ] TAPE
  - [ ] LISTING
  - [ ] RECALL ONLY MEMORY-INTEGRATED CIRCUIT

  (COMPLETE SECTIONS 1, 2, 4)
- [ ] HAND CALCULATOR
  - [ ] MAGNETIC CARD
  - [ ] LISTING
  - [ ] RECALL ONLY MEMORY INTEGRATED CIRCUIT

  (COMPLETE SECTIONS 1, 2, 5)
- [ ] GRAPHIC OR MANUAL
  - [ ] TEMPLATES, CHARTS, TABLES
  - [ ] BOOK
  - [ ] DEVICE

  (COMPLETE SECTIONS 1, 2, 6)

DOE 2.1 USA

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SURVEY FORM FOR
ENERGY DESIGN TOOLS
& ANALYSIS MODELS

1 SECTION

COMMENTS:

DOE 2.1

Solution Technique:

Conduction through envelope based on response factors
Zonal effects based on weighting factors

Daylighting: In experimental version

DOE 2.1 USA

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

[X] ARCHITECT [X] ENGINEER [ ] TECHNICIAN [X] RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

[ ] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [X] DESIGN DEVEL. [ ] POST-DESIGN SERV. [ ] RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

[X] PRE-DESIGN [X] SITE ANALYSIS [X] SCHEMATICS [X] DESIGN DEVEL. [X] POST-DESIGN SERV. [X] RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

[X] HEATING
- [X] LOADS
- [X] SPACE TEMPS.
- [X] HVAC SYSTEMS
- [X] PASSIVE SOLAR
- [X] ACTIVE SOLAR
- [X] SHADING
- [X] SYSTEM DESIGN
- [X] ECONOMICS
- [X] UNDERGROUND LOADS
- [X] MASS

[X] COOLING
- [X] LOADS
- [X] SPACE TEMPS.
- [X] HVAC SYSTEMS
- [X] PASSIVE CLNG.
- [X] SHADING
- [X] SYSTEM DESIGN
- [X] ECONOMICS
- [X] UNDERGROUND LOADS
- [X] SLOPED GLAZING
- [X] MASS

[X] LIGHTING
- [X] LOADS
- [ ] FC (LUX) LEVELS
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [ ] DAYLIGHTING FC (LUX) LEVELS
- [ ] ARTIFICIAL LTNG. REDUCTION

[X] DHW
- [X] LOADS
- [X] SOLAR ACTIVE
- [X] SOLAR PASSIVE
- [X] ECONOMICS

[X] MISCELLANEOUS
- [X] FANS
- [X] PUMPS
- [X] MISC. ELECTRICAL
- [ ] ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	[ ]	[ ]	[ ]	[X]
BUILDING TYPE AND SCHEDULE	[ ]	[ ]	[ ]	[X]
OCCUPANCY RATES	[ ]	[ ]	[ ]	[X]
BUILDING AREA	[ ]	[ ]	[ ]	[X]
SPACE TEMPERATURES	[ ]	[ ]	[ ]	[X]
LOCAL ENERGY COSTS	[ ]	[ ]	[ ]	[X]
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	[ ]	[ ]	[ ]	[X]
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	[ ]	[ ]	[ ]	[X]
LIGHTING REQUIREMENTS	[ ]	[ ]	[ ]	[X]
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	[ ]	[ ]	[ ]	[X]
GLAZING AREAS & ORIENTATIONS	[ ]	[ ]	[ ]	[X]
ZONING	[ ]	[ ]	[ ]	[X]
ROOM SHAPES	[ ]	[ ]	[ ]	[X]
OPERATING SCHEDULES & PROFILES	[ ]	[ ]	[ ]	[X]
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	[ ]	[ ]	[ ]	[X]
BUILDING MASS DATA	[ ]	[ ]	[ ]	[X]
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	[ ]	[ ]	[ ]	[X]
INTERIOR SURFACE DATA	[X]	[ ]	[ ]	[ ]
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[X]
MECHANICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[X]
ELECTRICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[X]
ELECTRICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[X]
LIGHTING SYSTEM DESIGN	[X]	[ ]	[ ]	[ ]
LIGHTING SYSTEM CONTROL	[ ]	[X]	[ ]	[ ]

DOE 2.1 USA

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☒ HOURLY TAPE ☒ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☒ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ SLOPED FACING SOUTH ☐ ANY VERT. & HORIZ. ☒ SURFACE REFLECTANCE ☐ HORIZ. & 4 CARDINAL DIREC.

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ ANNUAL AVERAGE ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ OTHER ____ ☐ TYPICAL DAY/MONTH

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ____ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☒ SI UNITS ☒ ENGLISH ☒ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☐ FINITE DIFFERENCE	☒ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☒ DIFFUSE/DIRECT	☒ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☐ IMPLICIT	☒ OTHER
SHADING:	☒ ANY SOLAR OBSTRUCTION	☐ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☒ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☐ SURFACE & AIR	☒ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☒ VARIED BY TOOL
U-VALUES:	☒ CHANGE W/WIND SPEED	☒ REMAIN CONSTANT	☒ MOVABLE INSULATION
INFILTRATION:	☒ AIR CHANGE PER HOUR	☒ CRACK METHOD	☒ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☒ SENSIBLE & LATENT SEPARATE	☒ SENS. & LAT. TOTAL	☒ SENSIBLE ONLY
VENTILATION:	☒ SENSIBLE	☐ LATENT	☒ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☒ > 25 ☐ 10 - 25	☐ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☒ SYSTEM EFFIC. INPUT	☒ SYSTEM OPTIMIZING	☒ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☒ ANNUAL COST	☒ SIMPLE PAYBACK	☒ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: ☒ COMPONENT ☒ ZONE ☒ BUILDING

LOADS OUTPUT BY: ☒ HOUR ☒ DAY ☒ MONTH ☒ SEASON ☒ YEAR

TEMPERATURES: ☒ AIR ☒ SURFACE ☒ GRAPHIC PLOT

FUEL USE BY: ☒ MONTHLY CONSUMPTION ☒ MONTHLY PEAK DEMAND ☐ OTHER ____ ☒ ANNUAL CONSUMPTION ☒ ANNUAL PEAK DEMAND ☐ OTHER ____ ☒ SYSTEM COMPONENTS ☒ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

DOE 2.1

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☒ IBM ☒ CDC ☐ UNIVAC ☐ OTHER ______

CORE REQUIRED: ☐ > 500K ☒ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☒ DATA MANUAL ☐ OTHER ______

EQUIPMENT: ☒ CRT ☒ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT X PRINTER X

SOFTWARE PURCHASE: CARD DECK ______ TAPE X LISTING ______

SUPPORT INFORMATION: USER'S GUIDE X DATA MANUAL X OTHER ______

TIME TO INPUT AND DEBUG: 3 MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: 2 MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME: ☒ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☒ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

Airflow Science Corporation/BACS Inc.
Arga Associates
Babcock and Wilcox
Boeing Computer Services
University of Massachusetts Computing Center
McDonnell Douglas Automation Company

Cybernet User Service
Centre Technique Industriel de la Construction Metallique
Intermountain Technologies, Inc.
Minnesota Energy Agency
United Computing Systems, Inc.

EMPS 2.0 U.S.A.

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: EMPS 2.0

DEVELOPED BY: D. R. Merriam
Arthur D. Little, Inc.
for Electric Power Research Inst.

DATE DEVELOPED: Feb. 1982

DATE OF LAST REVISION: Feb. 1982

AVAILABLE THROUGH: Electric Power Research Institute, 3412 Hillview Ave.
Palo Alto, Calif. 94303
Attn: Gary G. Purcell

PHONE NO.: (415) 855-2168

SUPPORTED BY: Arthur D. Little, Inc.

PHONE NO.: (617) 864-5770 x-5887

BRIEF DESCRIPTION: EMPS 2.0 models more common passive solar designs and conventional design residential buildings. Multiple conditioned or unconditioned spaces, which communicate by conductive and convective transport, can be modeled. Heat or cooling energy requirements to maintain comfort conditions are calculated for unitary, central or combination systems. System part load performance

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☒ TIME SHARING
- ☒ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

EMPS 2.0 USA

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

COMMENTS:

and duct losses (or gains) are simulated. Through the house or individual room ventilations can be modeled. Slab and/or basement heat transfers with the soil are included. The thermal balance method for establishing space thermal loads (including internal radiative couplings) is used. The user has the choice of a simplified solar gain analysis or of a detailed analysis of solar heat inputs to individual walls/floors, etc., using solar radiation scattering matrices. Daylighting analysis is carried out. Shading by building structural elements or by detached elements is included. Backup heating/cooling equipment can be controlled by schedule and/or time of day thermostats. Room moisture balances (including the potential for moisture condensation on cold surfaces) can be simulated. The most common passive solar designs simulated are detailed solar gain, attached sunspaces, trombe wall, water wall, controlled and natural ventilation, off peak electrical heat input to massive elements, moveable insulation. A new version of the program, scheduled for completion by Dec. 1982, will include active solar water heating, dedicated heat pump, water heating, and ground coupled heat pump.

EMPS 2.0 USA

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

[ ] ARCHITECT [x] ENGINEER [ ] TECHNICIAN [x] RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

[ ] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [ ] DESIGN DEVEL. [ ] POST-DESIGN SERV. [x] RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

[x] PRE-DESIGN [ ] SITE ANALYSIS [ ] SCHEMATICS [x] DESIGN DEVEL. [ ] POST-DESIGN SERV. [x] RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

[x] HEATING
- [x] LOADS
- [x] SPACE TEMPS.
- [x] HVAC SYSTEMS
- [x] PASSIVE SOLAR
- [x] ACTIVE SOLAR (next-ver.)
- [x] SHADING
- [x] SYSTEM DESIGN
- [x] ECONOMICS (next ver)
- [x] UNDERGROUND LOADS
- [x] MASS

[x] COOLING
- [x] LOADS
- [x] SPACE TEMPS.
- [x] HVAC SYSTEMS
- [x] PASSIVE CLNG.
- [x] SHADING
- [x] SYSTEM DESIGN
- [x] ECONOMICS (next)
- [x] UNDERGROUND LOADS
- [x] SLOPED GLAZING
- [x] MASS

[x] LIGHTING
- [x] LOADS
- [x] FC (LUX) LEVELS
- [ ] SYSTEM DESIGN
- [ ] ECONOMICS
- [x] DAYLIGHTING FC (LUX) LEVELS
- [x] ARTIFICIAL LTNG. REDUCTION

[ ] DHW
- [ ] LOADS
- [ ] SOLAR ACTIVE
- [ ] SOLAR PASSIVE
- [ ] ECONOMICS

next version

[x] MISCELLANEOUS
- [x] FANS
- [x] PUMPS
- [x] MISC. ELECTRICAL
- [ ] ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	[ ]	[ ]	[ ]	[x]
BUILDING TYPE AND SCHEDULE	[ ]	[ ]	[ ]	[x]
OCCUPANCY RATES	[ ]	[ ]	[ ]	[x]
BUILDING AREA	[ ]	[ ]	[ ]	[x]
SPACE TEMPERATURES - schedule for thermostat	[ ]	[ ]	[ ]	[x]
LOCAL ENERGY COSTS	[ ]	[ ]	[ ]	[ ]
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	[ ]	[ ]	[ ]	[ ]
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	[ ]	[ ]	[ ]	[ ]
LIGHTING REQUIREMENTS	[ ]	[ ]	[ ]	[ ]
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	[ ]	[ ]	[ ]	[x]
GLAZING AREAS & ORIENTATIONS	[ ]	[ ]	[ ]	[x]
ZONING	[ ]	[ ]	[ ]	[ ]
ROOM SHAPES	[ ]	[ ]	[ ]	[x]
OPERATING SCHEDULES & PROFILES	[ ]	[ ]	[ ]	[x]
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	[ ]	[ ]	[ ]	[x]
BUILDING MASS DATA	[ ]	[ ]	[ ]	[x]
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	[ ]	[ ]	[ ]	[x]
INTERIOR SURFACE DATA	[ ]	[ ]	[ ]	[x]
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
MECHANICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]
LIGHTING SYSTEM DESIGN	[ ]	[ ]	[ ]	[ ]
LIGHTING SYSTEM CONTROL	[ ]	[ ]	[ ]	[ ]

EMPS 2.0 USA

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

2 SECTION

COMMENTS:

The program is primarily a research tool. It can be used with various levels of detail in building/system description. For example, building shading may or may not be evaluated. The building can consist of only one space or as many as ten mutually coupled spaces. Walls may be "UA" type or have as many as 10 nodes.

EMPS 2.0 USA

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: [X] HOURLY TAPE [ ] TYPICAL DAY [ ] MONTHLY DATA [ ] ANNUAL DATA [ ] MONTHLY DEGREE DAYS [ ] ANNUAL DEGREE DAYS [ ] AVE. MONTHLY MIN. AND MAX. [ ] AVE. MONTHLY TEMP. [ ] DAILY

SOLAR DATA: [X] HOURLY TAPE [ ] TYPICAL DAY PROFILE [ ] MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: [X] ANY ORIEN. INCL. SLOPED [ ] SLOPED FACING SOUTH [ ] ANY VERT. & HORIZ. [ ] SURFACE REFLECTANCE [ ] HORIZ. & 4 CARDINAL DIREC.

DAYLIGHT CALC: [X] HOUR-BY-HOUR [ ] ANNUAL AVERAGE [ ] TYPICAL CLEAR & CLOUDY DAY/MONTH [ ] OTHER ________ [ ] TYPICAL DAY/MONTH

CALCULATION PROCEDURES:

LANGUAGE: [X] FORTRAN [ ] BASIC [ ] MACHINE LANGUAGE [ ] OTHER ________ [ ] GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: [ ] INTERACTIVE [ ] INTERACTIVE GRAPHIC [X] PREPARE FILE [ ] HAND CALCULATION

UNITS OF CALCULATION: [ ] SI UNITS [X] ENGLISH [ ] BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	[X] FINITE DIFFERENCE	[ ] RESPONSE FACTOR	[ ] STEADY STATE
SOLAR COMP. CALCULATED:	[X] DIFFUSE/DIRECT/RE-RADIATED	[ ] DIFFUSE/DIRECT	[ ] TOTAL
INTEGRATION:	[ ] SIMPLE EULER	[ ] IMPLICIT	[X] OTHER
SHADING:	[X] ANY SOLAR OBSTRUCTION	[ ] OVERHANG ONLY	[ ] NO SHADING
MOVABLE SHADING:	[X] DAILY & SEASONAL SWITCHING	[ ] SEASONAL SWITCHING	[ ] NOT CALCULATED
MASS EFFECT IS CALCULATED:	[X] TRANSIENT HEAT FLOW	[ ] TIME CONSTANT FACTORS	[ ] ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	[X] SURFACE & AIR	[ ] AIR ONLY	[ ] NOT CALCULATED
INSIDE TEMPERATURE:	[X] INPUT SCHEDULE BY USER	[ ] FIXED BY TOOL	[ ] VARIED BY TOOL
U-VALUES:	[X] CHANGE W/WIND SPEED	[ ] REMAIN CONSTANT	[X] MOVABLE INSULATION
INFILTRATION: (wind &	[ ] AIR CHANGE PER HOUR	[X] CRACK METHOD	[ ] VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	[X] SENSIBLE & LATENT SEPARATE	[ ] SENS. & LAT. TOTAL	[ ] SENSIBLE ONLY
VENTILATION:	[X] SENSIBLE	[X] LATENT	[ ] VARIES BY SCHEDULE OR COMMAND
		X natural and/or forced	
DAYLIGHT COEFFICIENTS:	[X] SKY, REFL. & DIRECT	[ ] SKY & REFL.	[ ] SKY ONLY
ZONES PER RUN:	[ ] > 25	[ ] 10 - 25 / [ ] 2 - 10	[ ] 1 ONLY
SYSTEM MODELING:	[X] SYSTEM EFFIC. INPUT	[ ] SYSTEM OPTIMIZING	[ ] COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	[ ] ANNUAL COST new version	[ ] SIMPLE PAYBACK new version	[ ] LIFE CYCLE COSTING new version

OUTPUT:

LOAD DETERMINANTS: [ ] COMPONENT [X] ZONE [X] BUILDING

LOADS OUTPUT BY: [X] HOUR [X] DAY [X] MONTH [ ] SEASON [X] YEAR

TEMPERATURES: [X] AIR [ ] SURFACE [ ] GRAPHIC PLOT X comf. temp.

FUEL USE BY: [X] MONTHLY CONSUMPTION new version [ ] MONTHLY PEAK DEMAND [ ] OTHER hourly [X] ANNUAL CONSUMPTION new version [ ] ANNUAL PEAK DEMAND [ ] OTHER ________ [ ] SYSTEM COMPONENTS [X] ENERGY SYSTEMS [ ] TOTAL BUILDING ONLY

EMPS 2.0 U.S.A

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☒ IBM ☐ CDC ☒ UNIVAC ☐ OTHER ______

CORE REQUIRED: ☒ > 500K ☐ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ______

EQUIPMENT: ☐ CRT ☐ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

CONTACT EPRI

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE ______ LISTING ______

SUPPORT INFORMATION: USER'S GUIDE ______ DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: 1 MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ______ MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☒ 100 - 1000 SEC. ☐ 5 - 100 SEC. ☐ < 5 SEC.

for annual analysis

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

SERIRES U.S.A.

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

TASK VIII – PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B – MODELLING & SIMULATION
SUBTASK C – DESIGN METHODS

RETURN TO:

GENERAL:

TOOL NAME: SERI - RES

DEVELOPED BY: SERI and Larry Palmiter
Terry Wheeling
Ecotope Group
2238 East Madison
Seattle, WA 98112

DATE DEVELOPED: August, 1981

DATE OF LAST REVISION: August, 1981

AVAILABLE THROUGH: National Energy Software Center
Argonne National Laboratory
Argonne, IL 60439

PHONE NO.:

SUPPORTED BY: Ecotope Group
2238 East Madison
Seattle, WA 98112

PHONE NO.:

BRIEF DESCRIPTION: SERI-RES is a general purpose thermal analysis computer program for residential buildings.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☐ TIME SHARING
- ☐ LISTING – HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

SERIRES

USA

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☒ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☒ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☐ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☒ PRE-DESIGN ☒ SITE ANALYSIS ☒ SCHEMATICS ☒ DESIGN DEVEL. ☒ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☒ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☒ UNDERGROUND LOADS
- ☒ MASS

☒ COOLING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☒ HVAC SYSTEMS
- ☒ PASSIVE CLNG.
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☒ UNDERGROUND LOADS
- ☒ SLOPED GLAZING
- ☒ MASS

☐ LIGHTING
- ☐ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☐ DHW
- ☐ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☒ MISCELLANEOUS
- ☒ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	☐	☒
BUILDING TYPE AND SCHEDULE	☐	☐	☐	☐
OCCUPANCY RATES	☒	☐	☐	☐
BUILDING AREA	☐	☐	☐	☒
SPACE TEMPERATURES	☐	☐	☐	☒
LOCAL ENERGY COSTS	☒	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☐	☐	☐	☒
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☐	☐	☐	☒
LIGHTING REQUIREMENTS	☒	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☐	☒
GLAZING AREAS & ORIENTATIONS	☐	☐	☐	☒
ZONING	☐	☐	☐	☒
ROOM SHAPES	☐	☐	☐	☐
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☒
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	☐	☒
BUILDING MASS DATA	☐	☐	☐	☒
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☐	☒
INTERIOR SURFACE DATA	☐	☐	☐	☐
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☐	☐	☐	☒
MECHANICAL SYSTEM CONTROL	☐	☐	☐	☒
ELECTRICAL SYSTEM DESIGN	☒	☐	☐	☐
ELECTRICAL SYSTEM CONTROL	☒	☐	☐	☐
LIGHTING SYSTEM DESIGN	☒	☐	☐	☐
LIGHTING SYSTEM CONTROL	☒	☐	☐	☐

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA:	☒ HOURLY TAPE	☐ TYPICAL DAY	☐ MONTHLY DATA	☐ ANNUAL DATA	☐ MONTHLY DEGREE DAYS
	☐ ANNUAL DEGREE DAYS	☐ AVE. MONTHLY MIN. AND MAX.		☐ AVE. MONTHLY TEMP.	☐ DAILY
SOLAR DATA:	☒ HOURLY TAPE	☐ TYPICAL DAY PROFILE		☐ MONTHLY AVE. DAILY & TOTAL	
SOLAR ORIENS. CALC:	☒ ANY ORIEN. INCL. SLOPED	☐ ANY VERT. & HORIZ.		☐ HORIZ. & 4 CARDINAL DIREC.	
	☐ SLOPED FACING SOUTH	☒ SURFACE REFLECTANCE			
DAYLIGHT CALC:	☐ HOUR-BY-HOUR	☐ TYPICAL CLEAR & CLOUDY DAY/MONTH		☐ TYPICAL DAY/MONTH	
	☐ ANNUAL AVERAGE	☐ OTHER ____________			

CALCULATION PROCEDURES:

LANGUAGE:	☒ FORTRAN	☐ BASIC	☐ MACHINE LANGUAGE	☐ OTHER ________	☐ GRAPHS, CHARTS & SIMPLE CALC.
USER TYPE:	☒ INTERACTIVE	☐ INTERACTIVE GRAPHIC	☐ PREPARE FILE	☐ HAND CALCULATION	
UNITS OF CALCULATION:	☒ SI UNITS	☒ ENGLISH	☒ BOTH		

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☒ FINITE DIFFERENCE	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	☐ DIFFUSE/DIRECT/RE-RADIATED	☒ DIFFUSE/DIRECT	☒ TOTAL
INTEGRATION:	☒ SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION	☒ OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	☒ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☐ SURFACE & AIR	☒ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☒ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☒ VARIED BY TOOL
U-VALUES:	☐ CHANGE W/WIND SPEED	☒ REMAIN CONSTANT	☒ MOVABLE INSULATION
INFILTRATION:	☒ AIR CHANGE PER HOUR	☐ CRACK METHOD	☒ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☒ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☐ SENSIBLE ONLY
VENTILATION:	☒ SENSIBLE	☒ LATENT	☒ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☐ > 25 ☐ 10 - 25	☒ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☐ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☐ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS:	☒ COMPONENT	☒ ZONE	☒ BUILDING		
LOADS OUTPUT BY:	☒ HOUR	☒ DAY	☒ MONTH	☒ SEASON	☒ YEAR
TEMPERATURES:	☒ AIR	☒ SURFACE	☐ GRAPHIC PLOT		
FUEL USE BY:	☐ MONTHLY CONSUMPTION	☐ ANNUAL CONSUMPTION	☐ SYSTEM COMPONENTS		
	☐ MONTHLY PEAK DEMAND	☐ ANNUAL PEAK DEMAND	☐ ENERGY SYSTEMS		
	☐ OTHER ________	☐ OTHER ________	☐ TOTAL BUILDING ONLY		

SERIRES USA

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 3

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☒ IBM ☒ CDC ☒ UNIVAC ☒ OTHER Generally ANSI standard code

CORE REQUIRED: ☐ > 500K ☐ 100 - 500 K ☒ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ______

EQUIPMENT: ☒ CRT ☒ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT X PRINTER X

SOFTWARE PURCHASE: CARD DECK ______ TAPE X LISTING ______

SUPPORT INFORMATION: USER'S GUIDE X DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: 5 MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: 2 MAN-DAYS ______ MAN-HOURS

TYPICAL* RUN TIME: ☒ > 1 HR. ☐ 60 M - 30 M ☐ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☐ 100 - 1000 SEC. ☒ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

______ ______
______ ______
______ ______
______ ______

TRNSYS 11.1 U.S.A

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

RETURN TO:

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

GENERAL:

TOOL NAME: TRNSYS 11.1

DEVELOPED BY: University of Wisconsin
Solar Energy Laboratory
1500 Johnson Drive
Madison, Wisconsin 53706

DATE DEVELOPED: 3/75

DATE OF LAST REVISION: 4/81

AVAILABLE THROUGH: Solar Energy Laboratory

PHONE NO.: (608) 263-1586

SUPPORTED BY: Solar Energy Laboratory
J.E. Braun

PHONE NO.: (608) 263-1599

BRIEF DESCRIPTION: TRNSYS is a modular system simulation program. It recognizes a system description language in which the user specifies which components constitute the system and the manner in which they are connected. The TRNSYS library includes many of the active and passive components commonly found in solar energy systems.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER -
- ☐ CARD DECK
- ☐ TAPE
- ☒ TIME SHARING
- ☒ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

TRNSYS 11.1 USA

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 1

COMMENTS:

The present version of TRNSYS is supplied with the following standard component models:

Data Reader	Heat Pump
Solar Radiation Data Processor	Absorption Air Conditioner
Shading Algorithm	Auxiliary Heater
Flat Plate Collector	Liquid Collector - Storage Subsystem
CPC Collector	Air Collector - Storage Subsystem
Mass Wall	Domestic Hot Water Subsystem
Direct Gain Window	Energy/(degree-Hour) Space Heating or Cooling Load
Pipe And Duct	Wall (Transfer Function Model)
Pump/Fan	Roof and Attic (Transfer Function Model)
Flow Divertor/Mixing Valve/Tee Piece	Room and Basement (Transfer Function Model)
Controller With Hysteresis	Cyclic Time-Dependent Function Generator
Three-Stage Thermostat	Algebraic Operations Unit
Microprocessor Controller	Quantity Intergrator
Relief Valve	Printer (Using Line Plott)
Heat Exchanger	Plotter (Using Line Plott)
Storage Tank	Time and Frequency Distribution Plotter (Using Line Plott)
Rock Bed	Simulation Summarizer
	Lifecycle Ecomonmic Analysis

In addition to the standard components listed above, TRNSYS 11.1 also contains a library of user-contributed components. These components are supported by the contributors rather than the Solar Lab. Prsesntly, this library contains models for photovoltaic and combined photovoltaic/thermal systems. They are:

PV/Thermal Collector
Storage Battery
Regulator Inverter
Electrical Subsystem

These subroutines were developed by Professor Don Evans of Arizona State University ((602) 965-3291).

The TRNSYS Manual is a 650 page document explaining the construction of the TRNSYS program and its use. The manual presents the concepts central to the TRNSYS approach to system simulation, as well as general and mathematical descriptions of each component model. Methods for formulating component models and preparing input data for system simulation are given. There are also a variety of example problems covering water heating, active or passive space heating, space cooling and building load generating simulations.

TRNSYS 11.1 USA

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

- [ ] ARCHITECT
- [x] ENGINEER
- [ ] TECHNICIAN
- [x] RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

- [ ] PRE-DESIGN
- [ ] SITE ANALYSIS
- [ ] SCHEMATICS
- [ ] DESIGN DEVEL.
- [ ] POST-DESIGN SERV.
- [x] RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

- [x] PRE-DESIGN
- [x] SITE ANALYSIS
- [ ] SCHEMATICS
- [x] DESIGN DEVEL.
- [x] POST-DESIGN SERV.
- [x] RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

- [x] HEATING
  - [x] LOADS
  - [x] SPACE TEMPS.
  - [x] HVAC SYSTEMS
  - [x] PASSIVE SOLAR
  - [x] ACTIVE SOLAR
  - [x] SHADING
  - [x] SYSTEM DESIGN
  - [x] ECONOMICS
  - [ ] UNDERGROUND LOADS
  - [x] MASS
- [x] COOLING
  - [x] LOADS
  - [x] SPACE TEMPS.
  - [x] HVAC SYSTEMS
  - [x] PASSIVE CLNG.
  - [x] SHADING
  - [x] SYSTEM DESIGN
  - [x] ECONOMICS
  - [ ] UNDERGROUND LOADS
  - [x] SLOPED GLAZING
  - [x] MASS
- [ ] LIGHTING
  - [ ] LOADS
  - [ ] FC (LUX) LEVELS
  - [ ] SYSTEM DESIGN
  - [ ] ECONOMICS
  - [ ] DAYLIGHTING FC (LUX) LEVELS
  - [ ] ARTIFICIAL LTNG. REDUCTION
- [x] DHW
  - [x] LOADS
  - [x] SOLAR ACTIVE
  - [ ] SOLAR PASSIVE
  - [x] ECONOMICS
- [x] MISCELLANEOUS
  - [x] FANS
  - [x] PUMPS
  - [ ] MISC. ELECTRICAL
  - [ ] ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	[ ]	[ ]	[ ]	[x]
BUILDING TYPE AND SCHEDULE	[ ]	[ ]	[ ]	[x]
OCCUPANCY RATES	[ ]	[ ]	[ ]	[x]
BUILDING AREA	[ ]	[ ]	[ ]	[x]
SPACE TEMPERATURES	[ ]	[ ]	[ ]	[x]
LOCAL ENERGY COSTS	[ ]	[ ]	[ ]	[x]
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	[ ]	[ ]	[ ]	[x]
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	[ ]	[ ]	[ ]	[x]
LIGHTING REQUIREMENTS	[x]	[ ]	[ ]	[ ]
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	[x]	[ ]	[ ]	[ ]
GLAZING AREAS & ORIENTATIONS	[x]	[ ]	[ ]	[ ]
ZONING	[x]	[ ]	[ ]	[ ]
ROOM SHAPES	[x]	[ ]	[ ]	[ ]
OPERATING SCHEDULES & PROFILES	[x]	[ ]	[ ]	[ ]
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, c, ETC.)	[ ]	[ ]	[ ]	[x]
BUILDING MASS DATA	[ ]	[ ]	[ ]	[x]
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	[ ]	[ ]	[ ]	[x]
INTERIOR SURFACE DATA	[ ]	[ ]	[ ]	[x]
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	[ ]	[ ]	[ ]	[x]
MECHANICAL SYSTEM CONTROL	[ ]	[ ]	[ ]	[x]
ELECTRICAL SYSTEM DESIGN	[x]	[ ]	[ ]	[ ]
ELECTRICAL SYSTEM CONTROL	[x]	[ ]	[ ]	[ ]
LIGHTING SYSTEM DESIGN	[x]	[ ]	[ ]	[ ]
LIGHTING SYSTEM CONTROL	[x]	[ ]	[ ]	[ ]

TRNSYS 11.1

USA

IEA
SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

WEATHER DATA:

TEMPERATURE DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY ☐ MONTHLY DATA ☐ ANNUAL DATA ☐ MONTHLY DEGREE DAYS ☐ ANNUAL DEGREE DAYS ☐ AVE. MONTHLY MIN. AND MAX. ☐ AVE. MONTHLY TEMP. ☐ DAILY

SOLAR DATA: ☒ HOURLY TAPE ☐ TYPICAL DAY PROFILE ☐ MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: ☒ ANY ORIEN. INCL. SLOPED ☐ ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. ☐ SLOPED FACING SOUTH ☐ SURFACE REFLECTANCE

DAYLIGHT CALC: ☐ HOUR-BY-HOUR ☐ TYPICAL CLEAR & CLOUDY DAY/MONTH ☐ TYPICAL DAY/MONTH ☐ ANNUAL AVERAGE ☐ OTHER ____________

CALCULATION PROCEDURES:

LANGUAGE: ☒ FORTRAN ☐ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ________ ☐ GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: ☐ INTERACTIVE ☐ INTERACTIVE GRAPHIC ☒ PREPARE FILE ☐ HAND CALCULATION

UNITS OF CALCULATION: ☐ SI UNITS ☐ ENGLISH ☒ BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	☒ FINITE DIFFERENCE	☒ RESPONSE FACTOR	☒ STEADY STATE
SOLAR COMP. CALCULATED:	☒ DIFFUSE/DIRECT/RE-RADIATED	☒ DIFFUSE/DIRECT	☒ TOTAL
INTEGRATION:	☐ SIMPLE EULER	☒ IMPLICIT	☒ OTHER
SHADING:	☐ ANY SOLAR OBSTRUCTION	☒ OVERHANG ONLY plus wingwalls	☐ NO SHADING
MOVABLE SHADING:	☒ DAILY & SEASONAL SWITCHING	☐ SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	☒ TRANSIENT HEAT FLOW	☐ TIME CONSTANT FACTORS	☐ ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	☐ SURFACE & AIR	☒ AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	☐ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☒ VARIED BY TOOL
U-VALUES:	☒ CHANGE W/WIND SPEED	☐ REMAIN CONSTANT	☒ MOVABLE INSULATION
INFILTRATION:	☒ AIR CHANGE PER HOUR	☐ CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	☒ SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	☐ SENSIBLE ONLY
VENTILATION:	☒ SENSIBLE	☒ LATENT	☒ VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	☐ SKY, REFL. & DIRECT	☐ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	☒ > 25 ☐ 10 - 25	☐ 2 - 10	☐ 1 ONLY
SYSTEM MODELING:	☐ SYSTEM EFFIC. INPUT	☐ SYSTEM OPTIMIZING	☒ COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	☐ SIMPLE PAYBACK	☒ LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS:	☒ COMPONENT	☒ ZONE	☒ BUILDING	
LOADS OUTPUT BY:	☒ HOUR	☒ DAY	☒ MONTH	☒ SEASON ☒ YEAR
TEMPERATURES:	☒ AIR	☐ SURFACE	☒ GRAPHIC PLOT	
FUEL USE BY:	☒ MONTHLY CONSUMPTION ☒ MONTHLY PEAK DEMAND ☒ OTHER	☒ ANNUAL CONSUMPTION ☐ ANNUAL PEAK DEMAND ☒ OTHER ________	☒ SYSTEM COMPONENTS ☒ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY	

TRNSYS 11.1 USA

IEA
SOLAR R&D

SURVEY FORM FOR
ENERGY DESIGN TOOLS
& ANALYSIS MODELS

2 SECTION

COMMENTS:

TRNSYS is highly flexible in terms of the systems it models, the level of detail of the analysis and the outputs of the simulation. Many components may operate in any of several modes, offering several degree of model complexity. Also, the capabilities of several component routines may overlap. Building loads, for example, may be calculated using the simple "degree-day" (or in this case "degree-hour") load model. When more exact determination of the dynamics of a particular building is desired, the transfer function "walls", "roof", and "rooms" can be assembled to model virtually any structure. Alternatively, TRNSYS can accept hourly loads generated by even more sophisticated load programs.

Although TRNSYS can handle several zones, it does not conveniently model natural convection between zones.

TRNSYS 11.1

USA

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE:	☒ IBM	☒ CDC	☒ UNIVAC	☒ OTHER ______
CORE REQUIRED:	☐ > 500K	☐ 100 - 500 K	☒ 25 - 100 K	☐ < 25 K
SUPPORT:	☒ USER'S GUIDE	☐ DATA MANUAL	☐ OTHER ______	
EQUIPMENT:	☒ CRT	☒ PRINTER	☐ TEXTRONIX	☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT ______ PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE $800.00 LISTING Inc.

SUPPORT INFORMATION: USER'S GUIDE Inc. w/tape DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: 1 MAN-DAYS ______ MAN-HOURS

RUN COST/TIME:

INPUT SET-UP TIME: ______ MAN-DAYS 2-4 MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☒ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☒ 100 - 1000 SEC. ☐ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

Control Data Corp.	Jay Fang (Minnesota)
Boeing Computer Services	George Van Fuchs (Washinoton)
McAuto	Mr. Dwidark (Missouri)
Computer Sharing Service	Thomas Rallens (Colorado)

TRNSYS 11.1

USA

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SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

COMMENTS:

TRNSYS is written in standard ANSI FORTRAN. The program has been run on a wide variety of machines with very little or no modification. No serious problem should be anticipated in setting up the program, provided core space requirements are met.

ESP

UNITED KINGDOM

IEA SOLAR R&D

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

1 SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION
SUBTASK C - DESIGN METHODS

RETURN TO:
Richard Rittelmann
Burt Hill Kosar Rittelmann Assoc.
400 Morgan Center
Butler PA 16001
USA

GENERAL:

TOOL NAME: Environmental Systems Performance (ESP)

DEVELOPED BY: Joe Clarke
ABACUS
University of Strathclyde
Dept. of Architecture, 131
Rotten Row - Glasgow G40NG

DATE DEVELOPED: 1977

DATE OF LAST REVISION: September 1983

AVAILABLE THROUGH: Joe Clarke

PHONE NO.: 041-552-4400 Ext. 3021

SUPPORTED BY: ABACUS

PHONE NO.: 041 552 4400 Ext. 3021

BRIEF DESCRIPTION: ESP is a large finite-difference based program running on a mainframe or mini computer providing a detailed simulation of hourly heat flows in a multizone construction.

PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.

TOOL HARDWARE & AVAILABLE FORMS:

☒ MAIN FRAME COMPUTER
- ☐ CARD DECK
- ☒ TAPE
- ☐ TIME SHARING
- ☐ LISTING - HARD COPY

(COMPLETE SECTIONS 1, 2, 3)

☐ MICRO-COMPUTER
- ☐ DISC
- ☐ TAPE
- ☐ LISTING
- ☐ RECALL ONLY MEMORY-INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 4)

☐ HAND CALCULATOR
- ☐ MAGNETIC CARD
- ☐ LISTING
- ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

☐ GRAPHIC OR MANUAL
- ☐ TEMPLATES, CHARTS, TABLES
- ☐ BOOK
- ☐ DEVICE

(COMPLETE SECTIONS 1, 2, 6)

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SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION 2

INTENDED USE:

INTENDED FOR USE BY:

☒ ARCHITECT ☒ ENGINEER ☐ TECHNICIAN ☒ RESEARCH ANALYST

PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):

☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. ☒ RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):

☒ PRE-DESIGN ☒ SITE ANALYSIS ☒ SCHEMATICS ☒ DESIGN DEVEL. ☒ POST-DESIGN SERV. ☒ RESEARCH

MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

☒ HEATING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☒ PASSIVE SOLAR
- ☐ ACTIVE SOLAR
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☒ MASS

☒ COOLING
- ☒ LOADS
- ☒ SPACE TEMPS.
- ☐ HVAC SYSTEMS
- ☐ PASSIVE CLNG.
- ☒ SHADING
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ UNDERGROUND LOADS
- ☒ SLOPED GLAZING
- ☒ MASS

☒ LIGHTING
- ☒ LOADS
- ☐ FC (LUX) LEVELS
- ☐ SYSTEM DESIGN
- ☐ ECONOMICS
- ☐ DAYLIGHTING FC (LUX) LEVELS
- ☐ ARTIFICIAL LTNG. REDUCTION

☒ DHW
- ☒ LOADS
- ☐ SOLAR ACTIVE
- ☐ SOLAR PASSIVE
- ☐ ECONOMICS

☐ MISCELLANEOUS
- ☐ FANS
- ☐ PUMPS
- ☐ MISC. ELECTRICAL
- ☐ ELEV. & ESCALATOR

INPUT DATA REQUIRED:

	DOES NOT ACCOMMODATE	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA				
LOCATION - ASSOCIATED WEATHER DATA	☐	☐	☐	☒
BUILDING TYPE AND SCHEDULE	☒	☐	☐	☐
OCCUPANCY RATES	☐	☐	☐	☒
BUILDING AREA	☒	☐	☐	☐
SPACE TEMPERATURES	☐	☐	☐	☒
LOCAL ENERGY COSTS	☒	☐	☐	☐
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS	☒	☐	☐	☐
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)	☒	☐	☐	☐
LIGHTING REQUIREMENTS	☒	☐	☐	☐
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS	☐	☐	☐	☒
GLAZING AREAS & ORIENTATIONS	☐	☐	☐	☒
ZONING	☐	☐	☐	☒
ROOM SHAPES	☐	☐	☐	☒
OPERATING SCHEDULES & PROFILES	☐	☐	☐	☒
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, α, ε, ETC.)	☐	☐	☐	☒
BUILDING MASS DATA	☒	☐	☐	☐
SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION	☐	☐	☐	☒
INTERIOR SURFACE DATA	☐	☐	☐	☒
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN	☒	☐	☐	☐
MECHANICAL SYSTEM CONTROL	☒	☐	☐	☐
ELECTRICAL SYSTEM DESIGN	☐	☐	☐	☒
ELECTRICAL SYSTEM CONTROL	☐	☐	☐	☒
LIGHTING SYSTEM DESIGN	☒	☐	☐	☐
LIGHTING SYSTEM CONTROL	☒	☐	☐	☐

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WEATHER DATA:

TEMPERATURE DATA: [x] HOURLY TAPE [ ] TYPICAL DAY [ ] MONTHLY DATA [ ] ANNUAL DATA [ ] MONTHLY DEGREE DAYS [ ] ANNUAL DEGREE DAYS [ ] AVE. MONTHLY MIN. AND MAX. [ ] AVE. MONTHLY TEMP. [ ] DAILY

SOLAR DATA: [x] HOURLY TAPE [ ] TYPICAL DAY PROFILE [ ] MONTHLY AVE. DAILY & TOTAL

SOLAR ORIENS. CALC: [x] ANY ORIEN. INCL. SLOPED [ ] ANY VERT. & HORIZ. [ ] HORIZ. & 4 CARDINAL DIREC. [ ] SLOPED FACING SOUTH [x] SURFACE REFLECTANCE

DAYLIGHT CALC: [ ] HOUR-BY-HOUR [ ] TYPICAL CLEAR & CLOUDY DAY/MONTH [ ] TYPICAL DAY/MONTH [ ] ANNUAL AVERAGE [ ] OTHER ______

CALCULATION PROCEDURES:

LANGUAGE: [x] FORTRAN [ ] BASIC [ ] MACHINE LANGUAGE [x] OTHER RATFOR [ ] GRAPHS, CHARTS & SIMPLE CALC.

USER TYPE: [x] INTERACTIVE [x] INTERACTIVE GRAPHIC [ ] PREPARE FILE [ ] HAND CALCULATION

UNITS OF CALCULATION: [x] SI UNITS [ ] ENGLISH [ ] BOTH

CHECK ALL APPROPRIATE BOXES:

HEAT TRANSFER:	[x] FINITE DIFFERENCE	[ ] RESPONSE FACTOR	[ ] STEADY STATE
SOLAR COMP. CALCULATED:	[x] DIFFUSE/DIRECT/RE-RADIATED	[ ] DIFFUSE/DIRECT	[ ] TOTAL
INTEGRATION:	[ ] SIMPLE EULER	[ ] IMPLICIT	[x] OTHER
SHADING:	[x] ANY SOLAR OBSTRUCTION	[ ] OVERHANG ONLY	[ ] NO SHADING
MOVABLE SHADING:	[x] DAILY & SEASONAL SWITCHING	[ ] SEASONAL SWITCHING	[ ] NOT CALCULATED
MASS EFFECT IS CALCULATED:	[x] TRANSIENT HEAT FLOW	[ ] TIME CONSTANT FACTORS	[ ] ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	[x] SURFACE & AIR	[ ] AIR ONLY	[ ] NOT CALCULATED
INSIDE TEMPERATURE:	[x] INPUT SCHEDULE BY USER	[ ] FIXED BY TOOL	[ ] VARIED BY TOOL
U-VALUES:	[x] CHANGE W/WIND SPEED	[ ] REMAIN CONSTANT	[x] MOVABLE INSULATION
INFILTRATION:	[ ] AIR CHANGE PER HOUR	[x] CRACK METHOD	[x] VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	[ ] SENSIBLE & LATENT SEPARATE	[ ] SENS. & LAT. TOTAL	[x] SENSIBLE ONLY
VENTILATION:	[x] SENSIBLE	[ ] LATENT	[ ] VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	[ ] SKY, REFL. & DIRECT	[ ] SKY & REFL.	[ ] SKY ONLY
ZONES PER RUN:	[ ] > 25 [ ] 10 - 25	[x] 2 - 10	[ ] 1 ONLY
SYSTEM MODELING:	[x] SYSTEM EFFIC. INPUT	[ ] SYSTEM OPTIMIZING	[ ] COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	[ ] ANNUAL COST	[ ] SIMPLE PAYBACK	[ ] LIFE CYCLE COSTING

OUTPUT:

LOAD DETERMINANTS: [ ] COMPONENT [x] ZONE [ ] BUILDING

LOADS OUTPUT BY: [x] HOUR [x] DAY [x] MONTH [x] SEASON [x] YEAR

TEMPERATURES: [x] AIR [x] SURFACE [x] GRAPHIC PLOT

FUEL USE BY: [ ] MONTHLY CONSUMPTION [ ] MONTHLY PEAK DEMAND [ ] OTHER ______ [ ] ANNUAL CONSUMPTION [ ] ANNUAL PEAK DEMAND [ ] OTHER ______ [ ] SYSTEM COMPONENTS [ ] ENERGY SYSTEMS [ ] TOTAL BUILDING ONLY

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SECTION 2

COMMENTS:

Finite difference integration method: Crank-Nicolson.

The choice of output period is under control of the user.

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3 SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:

COMPUTER TYPE: ☐ IBM ☐ CDC ☒ UNIVAC ☒ OTHER DEC 10, DEC 20, HP3000, Honeywell 6060, SEL, Burroughs VAX780, PRIME550, UNIVAC1108

CORE REQUIRED: ☐ > 500K ☒ 100 - 500 K ☐ 25 - 100 K ☐ < 25 K

SUPPORT: ☒ USER'S GUIDE ☐ DATA MANUAL ☐ OTHER ______

EQUIPMENT: ☒ CRT ☐ PRINTER ☐ TEXTRONIX ☐ OTHER ______

COSTS:

ASSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:

FIRST COST:

IN-OFFICE EQUIPMENT: CRT £ 3000 PRINTER ______

SOFTWARE PURCHASE: CARD DECK ______ TAPE £ 1000 LISTING ______

SUPPORT INFORMATION: USER'S GUIDE Free DATA MANUAL ______ OTHER ______

TIME TO INPUT AND DEBUG: ______ MAN-DAYS ______ MAN-HOURS See comments

RUN COST/TIME:

INPUT SET-UP TIME: ______ MAN-DAYS 2 MAN-HOURS

TYPICAL* RUN TIME: ☐ > 1 HR. ☐ 60 M - 30 M ☒ 30 M - 10 M ☐ < 10 M

TYPICAL* CPU TIME: ☐ > 1000 SEC. ☒ 100 - 1000 SEC. ☐ 5 - 100 SEC. ☐ < 5 SEC.

*FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (✓) IN SECTION 2.

ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING NETWORKS:

NAMES AND CONTACTS OF TIME-SHARING SERVICES WHICH HAVE THIS PROGRAM AVAILABLE (EXACT COSTS CAN BE OBTAINED THROUGH THEM).

______ ______
______ ______
______ ______
______ ______

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3 SECTION

COMMENTS:

Cost of source code: £ 1000 for Educationel or Research Application
£ 10000 for commercial Application

Time to input and debug:

For machine identical to one on which code already implemented 10 days.

For machine similar to one on which code already implemented 30 days.

For new machine with no existing graphics facilities 120 days.

Run costtime:

Single-user machine 7 month heating season assumed.

APPENDIX 2.

IEA Solar Heating and Cooling Programme, Task VIII

Subtask B Reprensentatives

BELGIUM	Prof. A. De Herde Unite' d'Architecture - Fac. Sciences Appl. Place du Levant B - 1348 Louvain - la - Nueve
CANADA	Mr. S. Barakat Division of Building Research Thermal Performance Section National Research Council Ottawa, Ontario KlA OR6
DENMARK	Mr. O. Jørgensen Thermal Insulation Lab. Technical University of Denmark Building 118 DK - 2800 Lyngby
GERMANY	Prof. Dr. Karl Gertis University of Essen P.O. Box 6843 D - 4300 Essen 1
ITALY	Mr. F. Butera Instituto Di Fisica Tecnica Facolta Di Ingegneria Universita De Palermo Viale Delle Scienze Palermo
NETHERLANDS	Mr. B. Poel & P. Herulltomo BOUWCENTRUM Weena 700 Rotterdam
NEW ZEALAND	Mr. M. Donn Lecturer in Environmental Science School of Architecture Private Bag Wellington

NORWAY	Mr. Terje Wolleng Norweigian Building Research Institute P.O. Box 322, Blindern N - Oslo 3
SPAIN	Mr. E. Mezquida INTA Torrejon de Ardoz Madrid
SWEDEN	Mr. S. Salö Dept. of Building Science P.O. Box 725 S - 220 07 Lund
SWITZERLAND	Mr. C. Filleux Basler and Hofmann Forchstr. 395 CH - 8029 Zurich
UNITED KINGDOM	Mr. D. Bloomfield Building Research Established Department of the Environment Garston, Hertfordshire
USA	Mr. R. Judkoff Solar Energy Research Institute 1617 Cole Boulevard Golden, CO 80401