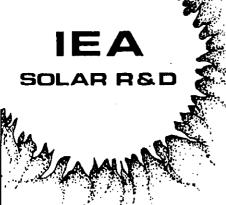


solar heating and cooling programme



task VIII
passive and hybrid
solar low energy buildings

## ANALYSIS MODEL SURVEY

december 1983

# INTERNATIONAL ENERGY AGENCY solar heating and cooling programme

task VIII passive and hybrid solar low energy buildings

### 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
Austria
Belgium
Canada
Denmark
Commission of the
European Communities
Federal Republic of
Germany
Greece

Italy
Japan
Netherlands
New Zealand
Norway
Spain
Sweden
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 nonerenewable energy over that of conventional buildings while maintaning acceptable levels of year-round comfort. 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

		Page No.
	Preface .	vii
1.	Executive Summary	1
2.	Introduction	3
3.	Survey Summary Tables	5
4.	Status of Validation of Models used in the Participating Countries	21
5.	Bibliography	23
App	endices	
1.	Completed Survey Forms	
2.	List of Subtask B Representatives	



#### 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 Survey	,
Belgium	2	
Canada	4	1
Denmark	1	
Germany	1	
Italy	3	
Netherlands	2	
Norway	2	
Switzerland	8	
United Kingdom	1	
USA	7	
Total	31	<del></del> /

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.

	PASSIVE SYSTEMS				NUMBER OF ZONES			HEATING							COOLING										Τ	Τ	
APPLICATION, CAPABILITY														S							8					1	
PROGRAM NAME	DIRECT GAIN	1	ATTACHED SUNSPACE	1	> 25	10 - 25	2 - 10		LOADS	SPACE TEMPS,	ACTIVE SOLAR	SHADING	ECONOMICS	UNDERGROUND LOADS	MASS	HVAC SYSTEM	LOADS	SPACE TEMPS,		ECONIMICS	UNDERGROUND LOADS	SLOPED GLAZING		HVAC SYSTEMS	PASSIVE COOLING	DAY LIGHTING	
PASSIVE HOUSE DESIGN	•	•	_			<del>                                     </del>		•	-	•	_	,			<u>}</u>		-	0)	S	ш	<u> </u>	S	Σ	1 =	<u> </u>	H	12
ENCORE - CANADA	•		Γ.	_		•		Ť	•	•				•	-	•	+				_		⊢	-	⊢	<del> </del>	┼
PASSIVE	•	•	•	<u> </u>		1	•		-			•				-	•	•	•		•	•	•		├	├	<del> </del>
SIMNET	•	•	•	•			•								-			•	-		•	•		$\vdash$	-	⊢	├
BA4	•	_	T		1	1	_	•	•			•		•		┪	ᅴ		•		•	•	•		-		₩
HAUSER	•				$\vdash$	1		Ť				-				$\dashv$	-	-	-	$\dashv$	-	•				-	Ŀ
MORE	•	_	T			•						•			•	•		•	•			_	_	_		•	Р
SMP	•			-	H	Ť	•			•	•	•			<del> </del>	-	-		•	$\dashv$		•	•	•	•	<u> </u>	L
AZIZ	•	_					_	•	•		-	-	-		-	•	<del>-</del>					-	•		-	•	
ВУУОК		_				<del>                                     </del>		ŏ		•	-				-	▝▍	哥	-	•			•	•		L.	•	
ENCORE	•					•		-	•	•	-	-				┧	•	•	-		-					•	
BFEP		•	•	•	•		_	-	•	-		-	-	-	_	•	_	ᅱ								•	Ρ
KLI	•	_	-	_	-	-	_			-		1)	$\dashv$		-	흿	$\overline{}$		•			•	•	•	•	•	
PASSIM	-	•	•	_	_		•			-	-		-		•	-	•	•	1)	$\dashv$	_	•	•			Щ	
MODPAS	<del> </del>	•					-		-	<del></del>		•		-	•	4	4	_	_	_		_				_	Ш
1GLOU	-	•			•		•	-	•	•	_	•		-+	•			•	•	_	_		•				
BAUDYN		•		-				_	•	-+	•	•	_		•	4		_	_		4						
STEMOD/DYWAN	-	•				-		•	•	•		-		-4	•	4		•	_	_	_	$\Box$	•				
	-	-	•	$\dashv$	•			_	•	•	_					4	•	•			_						
MUR-DIODE SOLTRAP	•	•		_				•	•	•	4	4		_			$\perp$	_									
	•		-1	•			_	•	•	•	4	_	].	_	•				$\Box$								
HELIOS	•	_		$\dashv$	_		_	•	•	•	$\rightarrow$	_	_		•	$\perp$	•	•				•	•			П	Р
BLAST 3.0		•		_	•		_		•	•	•	<u>•  </u>	•	•	•	<u>• l</u>	•	•	•	•	•	•	•	•	•	•	A/β
	-	•	•	-			•		•	•		•		•	•	ਗ	•	•	•		•	•	•	•	•		
DOE - 2.1 A	•		_		•				•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	A√F
EMPS 2.0		_	•	_1			•		•	•	$\Box$	•				•	•	•	•		•	•	•	•	-	•	**
SERI-RES 1.0	<del>-</del> +-		•				•	[		•		•		•	•		• (		•	$\neg$	•	•	•	_	•	7	一
TRNSYS 11.1	_	•		_	•		$\perp$	[	•	•	•	•	•		• (	•	• (		•	•	$\dashv$	•	•	•	•	一	Α
·	_	•	•	•		•			•	•		•			•	_			•	_	•	_				7	~
	•	$\perp$			•			]	•	•		•		•	•	_		-	•	_		•	_	$\neg$	•	十	一
	•		_					•	•	$\Box T$		•	$\neg \uparrow$	$\top$	7	十	丁	_		$\top$	$\top$	7	1	十	<del>-</del>	十	一
ESP	•	•	•				•		•	•	Ţ,	•	$\neg$		•	1	• (		•	$\dashv$	1	•	•	+	_	•	$\dashv$
		$\Box$						7		_	┪	1	_	-	-	+	+	-	+	+	+	-	┪	$\dashv$	+	+	-1

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 present systems. It should, however, be noted that at 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 airconditioning 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.

This page is intentionally left blank.

																									та <b>р</b> 1е 3.2		ייסטעמיי שייינט		use and availability		or surveyed models		
E.	۶>	Π	Π															•											Γ				٦
TIME SEC	00T - S	•	Γ		•	•			•	•	•	•	•				•			$\neg$			•		•				Г				
	100 - 1000	Γ	•	•				•					•	•	•						•	•		•		Г	•	•	•			•	1
R CPU G	0001<		Π													•				$\exists$									Г				1
	отнев	•							•	•					•	•					•											П	П
SUP- Port	JAUNAM ATAG										•	•					•			•		•	•		•							П	1
03 11.	NZEKZ GNIDE		•			•		•			•	•	•	•			•	•		•		•	•	•	•		•	•	•		•	•	J
COMPUTER VERSION		AMDHAI	1BM	WANG	IBM	IBM	SIEMENS	VAX/UNIVAC	IBM	IBM	UNIVAC	UNIVAC/ND	SEVERAL	BURROUGHS	VAX	нР 9845 в	PRIME	CDC/PRIME	IBM	UNIVAC	PRIME	CDC	CDC	CDC	IBM/CDC	IBM/UNIVAC	CDC/PRIME	ANY	ANY	IBM	НР	SEVERAL	
COMPUTER TYPE	MICRO			•												•				$\exists$													٦
OMPU. TYPE	INIW							•				•	•		•		•	•			•	_										•	7
(L (0)	MAIN FRAME	•	•		•	•	•	•	•	•	•	•	•	•				•	•	•		•	•	•	•		•	•	-	•	•	•	٦
	(, TINU	В	ш	S	S	S		Ŋ	S	S	S	S	S	S	S	S	S	S	S	S	S	S	щ	П	В	ш	8	В	В	S	S	S	╗
	3J8AJIAVA	•	•	•	•	•	٦	•	•	•	•	•			•		•	•	•	╗	•	•	•	•	•	•	•	•	•	•	•	•	٦
	ВЕЗЕРВСН	•	•	•	•	•	•	•	•		•	•	•		•	•		•	•	•	•	•	•	•	•	•	•	•	•			•	٦
nF NF	POST DESIGN SER,	Ī	•		•	•		•	•			•		•	•	•		•	•	$\neg$	•		•	•	•		•	•				•	٦
SEF	DESIGN DEAEL,	•		•	•	•			•		•	•		•	•	•	$\neg$	•			•	•	•	•	•	•	•	•	•			•	٦
ALSO USEFUL FOR	SCHEMATICS			•	•			$\neg$												$\exists$			•	•	•		•					•	٦
1LS -0R	SITE ANALYSIS			_	•				╛				$\Box$		$\neg$	•	•				•	•	•	•	•		٠	•				•	٦
	PRE-DESIGN	•								•		•				•	•		•		$\exists$		•	•	•	•	•					•	٦
:	ВЕЗЕРВСН	•	•	•	•	•	•	•	•			•	•	•	•			•	•	•	•	•		•		•		•	•			•	٦
	POST DESIGN SER,						$\neg$						•																				ヿ
Ü	DESIGN DENEL'	T					$\neg$	┪			•	7	•			•		$\neg$		1	•	T	•		•		•			•	•	$\neg$	┨
DEVELOPED FOR	SCHEMATICS		П		П	$\exists$		1	7	7	7		1	1			7	7	7	$\forall$	$\dashv$					П		П		•	•	T	7
DEVE For	SITE ANALYSIS			_			$\dashv$	$\dashv$	7		$\dashv$				_		7		7	十	寸	7	_		_							$\neg$	┪
	PRE-DESIGN		П				┪	_	7	•							•		1	十	_	7								•	•		┨
Œ	RESEARCH ANAL.	•	•	•	•	•	•	•	7	┪	•	ヿ	•	•	•	•	$\neg$	•	寸	•	•	•	•	•	•	•	•	•	•			•	┨
INTENDED USERS	TECHNICIAN		$\Box$			$\neg$	$\dashv$	$\dashv$	$\dashv$	7	+	1	$\neg$	•	$\dashv$	$\dashv$	$\dashv$		$\dashv$	$\dashv$	$\dashv$	•	$\dashv$	$\dashv$	_	Н			$\neg$	•		$\Box$	7
INTENI USERS	ENGINEER	•		_		•	7	•	•	•	•	•	-+	•	•	•	•	•	+	$\dashv$	•	•	•	•	•	•	•	•	$\exists$		•	•	$\dashv$
ļ ≖ ší	ARCHITECT	•	Н	П	$\Box$	$\dashv$	$\dashv$	•		•	$\dashv$	$\dashv$	$\dashv$	7	7	7	•	寸	•	$\dashv$	_	7	•	•	•	$\vdash$	•		$\exists$	•	•	•	7
INTENDED USE	AVAILABILITY PROGRAM NAME	PASSIVE HOUSE DESIGN	ENCORE - CANADA	PASSIVE	SIMNET	BA4	HAUSER	MORE	SMP	AZ1Z	BYVOK	ENCORE	ВЕЕР	KLI	PASSIM	MODPAS	IGLOU	BAUDYN	STEMOD/DYWAN	MUR-D10DE	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	

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

#### 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 predesign, 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. 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.

This page is intentionally left blank.

	10	AD		Г				-	Т		-		~			511		
	DΕ	TER			DAD UTP		BY		T R	EMP ATU	E- RES	Н	EUE	г		BY.	Ι	_
	NA	NTS T		H	T	Γ.	Γ.	Т	H	1	T	MON	<u>тн</u> Т	YΕ	ar I	ĺ		
RESULTS,	}											l				٫ ا		ONLY
OUTPUT	Ì		ļ	l	]		ļ									SYSTEM COMPONENTS		
				1	ļ	İ			l							볼	Σ	S
	ŀ		İ	l				l			P.C07	중	₽	증	皇	AP.	ENERGY SYSTEM	BUILDING
	Z	l	ច		ļ				ļ	١		Ĕ	Ϋ́	Ě	¥	္ပ	%	Ω
PROGRAM NAME	COMPONENT		BUILDING	Ì		ᇁ	8			SURFACE	GRAPHIC	CONSUMPTION	PEAK DEMAND	CONSUMPTION	PEAK DEMAND	핊	լչ	
	Į Š	ZONE	11	HOUR	DAY	MONTH	SEASON	YEAR	AIR	H.	₽	SNS	¥	SS	¥	ST	띪	TOTAL
	ၓ	×	M	Ι¥	à	Įξ	22	>	₹	20	5	ၓ	<u> </u>	ၓ	ā	Ś	ធ៌	ĭ
PASSIVE HOUSE DESIGN			•			•		•	•									
ENCORE - CANADA	_	•	•	•	•	•	•		•		oxdot	•	•	•	•			
PASSIVE	•	•	•	•	_	•		_	•	•	_	•	•		_	•		
SIMNET	<b> </b>	•	•	•	•	•		•		•		L				L		
BA4	-	⊢	•	•	•	•	•	•	•	•	<u> </u>							
HAUSER	•	ļ	•	•	•		<u> </u>	•	•	•				•	<u></u>			•
MORE SMP	•	•		•	•	•		H	•	•		1)	1)		_			<u> </u>
AZ1Z				-		-	•	<del> </del>	-	-	H	-	_					
BYVOK	_		_	•		_	_	<del> </del>	•	•		_				_		
ENCORE	•	•	•	•	•	•		•	÷	•								
BFEP	•	•	•	•	•	•	•	•	•	0	•	•	•	ŏ	•	•	•	•
KLI		•	•	•	•	•	•	-	•	•	•	Ť				Ť		
PASSIM	•	•	•	•	•	•	•	•	•	•	•	2)						
MODPAS		•		•					•	•	•	•				П		
IGLOU	•	•	•	•	•	•	•	•	•	•		•	•					
BAUDYN	•			•					•	•								
STEMOD/DYWAN			_		•	•		•										
MUR-DIODE .	•								•		•							
SOLTRAP	•	•		•	•	•	•	•	•	•	•	4)						
HELIOS	•	_	•	•		•	_	_	•	•	•	•	•				_	
BLAST 3.0 DEROB IV	-	-	의	•	•	•	•	•	•	_		•	•	•	•	•	•	
DOE - 2.1 A	-	-	:	•		•		•	•	•	╗	<u> </u>	ᅱ		_		_	_
EMPS 2.0	-	-	-	•		•	•	•	•	•	•	•	:	•	•	•	•	
SERI-RES 1.0	•	ä	핆	-	-	-	•	-	•	•		-	-		_	-	•	_
TRNSYS 11.1	•	•	•	•	-	•	<del> </del>	•			•	•	•	•	=		•	_
PASOLE	•	i	•	•	•	•	•	-	•	•	-	-		Ť		-	-	$\dashv$
LPB1	•	•	•	•		Ť		一	•	$\neg$	_	•	•	•	•		_	_
SOLPA	•			•					•	•	寸			$\neg$	寸	$\neg$		
ESP		•		•	•	•	•	•	•	•	•			ヿ	$\Box$	$\neg$	寸	
	$\Box$											$\Box$					$\neg$	

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 components separately.

GENERAL NETWORK PROGRAM
GENERAL NETWORK PROGRAM
GENERAL, NETWORK PROGRAM
GENERAL NETWORK PROGRAM  GENERAL NETWORK PROGRAM  GENERAL NETWORK PROGRAM  GENERAL NETWORK PROGRAM

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.

	AARIES BY SCHEDULE, COMM,	•	Ţ		_	_	· ·	_	_				_					_	_				_		_		T _	_	1			1	_
VENTI- LATION	VARIES BY SCHEDILE COMM	-	⊢	-	-	-	┝	•	•	•	-		•	-	Н		_	•				•	•		•		•	•	<u> </u>	$\vdash$	-	$\dashv$	-{
	PATENT	⊬	├	_	-	Ļ	┝			-	_	_	_	_			_	_			_		_	_	_	•	•	•	-				4
>_1	SENSIBLE ONLY	┝-	<u> </u>	•	•	•		<u> </u>	_	_	•	•	•	•	_	_	•	L	_	•	_		•	•	•	•	•	•	┝		·	•	4
TEK-		├-	•	•	•	•	-	H	•	•	•	•	-	•		•		H		•	•	•		•	•	H	├	-	-			•	4
NAL NAL LOADS	SENSIBLE & LATENT SEPER,	Ļ	ļ	-		_	-	_		ļ	_												_		•		<u> </u>	H	-	Ļ		$\vdash$	4
-22		•	Ļ		-	L	<u> </u>	•	_	L			•		•		•	Щ	_			_	<u>•</u>		•	•	•	•	_	•		4	4
┧╻┙	VARIED WITH WIND SPEED CRACK METHOD	├	•	•	_		_	•	•	•		•	•			-	•					•	•		•	_	•		•	<u> </u>		•	4
TRA- TION		<u> </u>	L		_	<u> </u>	_		L			•		<u> </u>												•	<del> -</del> -	-	L	<u> </u>	_	•	4
	AIR CHANGE/HOUR	•	•	L	•	•	_	•	_	<u> </u>	_		•	•	•	•	•	L	•	•	•		•	•	•		•	•	•	•		4	_
u- Values	MOVEABLE INSULATION	•	•	_	•	<u> </u>	•				Ш	Щ	•	<u> </u>	•						•	•	•	•	•	•	•	•	•		•	$\sqcup$	4
.¥.	REMAIN CONSTANT	L	L	_	•	•	_	<u> </u>	_	<u> </u>	•	•	•	L_		•		Щ		•	•		•		•	ļ	•	Ŀ	•	•			4
>>	CHANGED MITH MIND SPEED	L	•	•	•		_	•	•	•	_		•	•			•		į			•	•	•	•	•	<u> </u>	•	•			•	4
ļ	VARIED BY TOOL	_	_	•		L	_	L_	•	•		Ш		L		•		•		•		•	•	•	•	<u> </u>	•	•	•				4
	FIXED BY TOOL				•	L			Ĺ		•											Ш		Ш		<u> </u>	L						_
SERA S	INPUT SCHEDULES BY USER	•	•			•	•					•	•	•	•	•	•		•		•		•	•	•	•	•		•	•	•	•	_]
KOUI/I TEMPERA- TURES	YIR ONLY	Ĺ	•		•		•	•				•		•	•					•				•	•		•	•					
₹## <b>=</b>	SURFACES & AIR	•		•		•			•	•	•		•			•	•	•			•	•	•			•	}		•	•		•	7
	SEASONAL SWITCHING			•					•	•																							7
9	DAXLY & SEASONAL SW,	•				•		•					•	•	•		•		•				•	•	•	•	•	•	•	•	•	T	7
SHADING	OVERHANG ONLY		$\vdash$	•			-		Г		•			•		П											•	•	•		•		
장	ANY SOLAR OBSTRUCT,	•	T			•	•	•	•	•		•	•	_	•		•		•			П	•	•	•	•	T	•		•		•	7
	JATOT	_	┪		_				Г	Г		_					_										•					$\sqcap$	7
1 2	DIFFUSE, DIRECT	•	•	-	•		<del>                                     </del>	-	Н	-		•			•			•									•	Г					
	D1FFUSE,D1RECT,RE-RAD		t	•		•	•	•	•	•	•		•	•		•	•		•	•	•	•	•	•	•	-	Г	•	•			$\forall$	- 1
TATTON-	ANY, INCL, SLOPED	•	•	•	•	•	•	•	•	•			•	•	•	•	•						•	•	•	•	•	•	•	•	•	•	- ;
	ОТНЕВ	-	-		-	_	┝	_	Ě	_			•	Ě	_		•		-			H	Ť	Ë	_	•	۲		-	_	_	•	┨
<u>-</u>	IMPLICIT	•	$\vdash$		•		┝	-	$\vdash$	-			-	•	•	•	_		_			-		•		-	-	•	•	•		$\dashv$	7
GRAE TON	SIMPLE EULER	•	<del> </del> -	•	Ť	•	•		-						-				_	•	•	Н		Ĕ		-	•	F	-	_			1
	<u> </u>	F	┢	Ī		_	<u> </u>		-	-	-			-		Н			_	_	_		_		-	_	F	╘					┨
EANS- FR	RESPONSE FACTOR	├	•				-	•	$\vdash$	H		•				Н		•				•	•	Н	•		├	•		•		-	┨
	FINITE DIEFERENCE	•	-	•	•	•	•	ľ	•	•	-		)	•	•	•			•	•	•	4	_	•	_	_	-	<del> </del> -		•	-		4
5_	AL60L	-	-		Ĭ	_	_	H	ř	Ĕ	•	-	3)	┝╾	_	-		H	-	-	_	Н		۳		•	•	•	•		H		4
꽃' 뛰	BASIC	_	┝		-		-		-	H	_		H	•				-				Н				$\vdash$	-	├-	├	$\vdash$	_	$\vdash$	$\dashv$
PROGRAM LAN- GUAGE	ИАЯТЯОН	•	•	•			•	•	•	_	_				_		_	_	•				_		•	•	•	┝	•	•			-{
		ľ	-	$\vdash$	-			-	ľ	•	_	•	•	<u> </u>	•	H	•	•		•	•	•	_	•	_	-	┞	•	-	-	Ľ		4
CALCULATION	PROCEDURES	PASSIVE HOUSE DESIGN	ENCORE - CANADA		SIMNET		HAUSER	₹E	c	21	BYVOK	ENCORE	d	1	PASSIM	MODPAS	IGLOU	BAUDYN	STEMOD/DYWAN	MUR-DIODE	SOLTRAP	HEI 10S	BLAST 3.0	DEROB IV	DOE - 2,1 A	C	SERI-RES 1.0	TRNSYS 11.1	PASO1 F	3.1	LPA.	ESP	
	PRC	PAS	ENC	PAS	₹IS	ΒAϤ	HAL	MORE	SMP	AZIZ	BYV	ENC	BFEP	KLI	PAS	MOI	161	BAL	STE	MUF	S01	HEI	BL/	   	DO	FM	1 5	1 2	PA	LPB	80	ES	

Summary of calculation procedures for surveyed models

Table 3.5

#### 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

		P	ASSIVE	SYSTE	м		VA	LIDATI	ON EXP	ERIENC	E		
MODEL	COUNTRY	ANA	LYSIS	CAPABII	LITY		TEST	CELLS			HOU	SES	
		DG	TW	ss	TS	DG	TW	ss	TS	DG	TW	ss	TS
TRNSYS	Austria	х	х	х		0	o	0					
ENCORE	Canada	х		?									
BA4	Denmark	<b>x</b>								•			
HAUSER	Germany	х	x	x	x					. •			
MORE (Fiat)	Italy	х											
NBSLD	Italy	х											
KLI	Nether- lands	х	x	x						0			
BFEP	Nether- lands	х	х	х									
ENCORE	Norway	х		?				,		0		0	
VARUM	Norway	х		?		•							
ESP	United Kingdom	х	x	х	x					•			
BRIS	Sweden	х	3	x									
STANWAD	Sweden	x			-								
DEROB	Switzer- land	х	x	x	?	•		•		•		•	
SERI-RES	Switzer- land	х	х	x	?	•	•			•	•	•	
SERI-RES	U.S.A.	х	x	х	?	•	•	•		•			
BLAST	U.S.A.	х	x	x	х	•	•			•		•	
DOE-2.1	U.S.A.	х		,		•				• •			

<sup>?</sup> 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**

- 1. Källblad, K. (1983). International Energy Agency. Energy Conservation in Buildings and Community Systems Programme, Annex III, Residential Buildings Energy Analysis. Calculation Methods to predict Energy Savings in Residential Buildings. ISBN 91-540-3885-5.
- 2. Littler, J.G.F. (1982). Overview of some available models for passive solar design. Computer-Aided Design, vol. 14, page 15-18.
- 3. SERI. (1980). Analysis Methods for Solar Heating and Cooling Applications, Passive and Active Systems.

  3rd edition. SERI/SP-35-232R.
- 4. Burt, Hill, Kosar, Rittelman Assoc. (1983).

  International Energy Agency, Solar Heating and Cooling
  Programme, Task VIII, Subtask C. Design Tool Survey.
- 5. Judkoff, R. et al. (1983). A Methodology for Validating Building Energy Analysis Simulations. SERI/TR-254-1508.

#### APPENDIX 1

COMPLETED SURVEY FORMS



IEA BOLAR RED BELGIUM

## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

TASK VIII - PASSIVE AND	HYBRID SOLAR	RETURN TO:
I OW ENERGY	DWELLING	

SUBTASK B ~ MODELLING & SIMULATION SUBTASK C ~ DESIGN METHODS

GENERAL:	
TOOL NAME: LPB1	AVAILABLE THROUGH: Laboratoire de Physiqu
DEVELOPED BY: Laboratoire de Physique d	
Batiment: Universite' de Liege	Faculte des Sciences, Applique es
Faculte des Sciences Applique es	
15, Avenue des Tilleuls - Bat Dl	4000 Liege Belgique PHONE NO.: <u>041/590180</u> ext 367
4000 Liege Belgique	SUPPORTED BY: The SPPS
DATE DEVELOPED: 81	Rue de la Sciences no. 8
DATE OF LAST REVISION: 83	1040 Bruxelles - Belgique
	PHONE NO.: 02/2304400
BRIEF DESCRIPTION: LPB1 is a programme de	signed to compute thermal loads and
temperatures in a building. This	is done taking all capacity effects
into account, thus in a dynamic v	ay.
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	
TOOL HARDWARE & AVAILABLE F	ORMS:
☐ MAIN FRAME COMPUTER ☐ MICRO-COMPUTER	☐ HAND CALCULATOR ☐ GRAPHIC OR MANUAL
CARD DECK DISC TAPE TAPE TIME SHARING LISTING LISTING - HARD COPY RECALL ONLY MEMORY-	☐ HAGNETIC CARD ☐ TEMPLATES, CHARTS, TABLES ☐ LISTING ☐ BOOK ☐ RECALL ONLY MEMORY ☐ DEVICE ☐ INTEGRATED CIRCUIT
(COMPLETE SECTIONS 1, 2, 3)	(COMPLETE SECTIONS 1, 2, 5)

LPB1

BELGIUM



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

Section

								•	
INTENDED	USE:								
INTENDED FOR USE	BY:	•	-						
ARCHITECT	M ENGINEER	M TECHNICIA	N 🗆	RESEARC	H ANALY	ST			
PHASE FOR WHICH DE	ESIGN TOOL WAS DEVELO	OPED (1 ONLY):							-
PRE-DESIGN	SITE ANALYSIS	SCHEMATIC:	s B	DESIGN	DEVEL.	D POST-D	ESIGN SEF	IV. D RESI	EARCH
PHASE(S) FOR WHICH	design tool may be	USEFUL (ANY NO	o.):						
PRE-DESIGN	SITE ANALYSIS	☐ SCHEMATICS	s 📮	DESIGN	DEVEL.	POST-D	ESIGN SER	V. DRESE	EARCH
MAJOR & N	INOR ENER	GY COM	PONE	NTS	ADD	RESSE	D BY	TOOL:	
M HEATING	☑ COOLING	LIC			DHW			MISCELLANEOU	ıs
LOADS SPACE TEMPS DHVAC SYSTEM PASSIVE SOL ACTIVE SOLA SYSTEM DESI DECOMPLES UNDERGROUND LOADS HASS	HS HVAC SYST LAR ME PASSIVE ( AR ME SHADING SYSTEM DI LGN CONOMICS WINDERGROU	MPS. D. TEMS D. CLING. D. CESIGN S. D. CLING. D. CESIGN S. D. CLING D. CLING D. C.	LOADS FC (LUX) I SYSTEM I ECONOMIC DAYLIGHT FC (LL ARTIFIC) REDUC	DESIGN CS TING JX) LEVEL LAL LTNG	s 📙	LOADS SOLAR ACTIV SOLAR PASSI ECONOMICS	E VE	D FANS D PUMPS D MISC. ELE D ELEV. & E	CTRICAL SCALATOR
INPUT DATA	A REQUIRED:	<u>:</u>			A	DOES NOT	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
BUILDING TYPE A OCCUPANCY RATES BUILDING AREA SPACE TEMPERATU LOCAL ENERGY CO GENERIC BUILDIN	URES USTS US SHAPE DUE TO SITE UREMENTS (VENTIL., I	RESTRICTIONS				000000000			00000000
SCHEMATIC DESIGN D	ATA .					•	•		
BUILDING SURFAC GLAZING AREAS & ZONING ROOH SHAPES OPERATING SCHED	ORIENTATIONS			,		00000	0000		00000
ARCHITECTURAL DESI	GN DEVELOPMENT DATA-			,					
BUILDING MASS D	IENTS & DAYLIGHT TRA		c.)		٠	0000	0000		0000
ENGINEERING DESIGN	DEVELOPMENT DATA	,							
MECHANICAL SYST MECHANICAL SYST ELECTRICAL SYST ELECTRICAL SYST LIGHTING SYSTEM LIGHTING SYSTEM	EH CONTROL EH DESIGN EM CONTROL DESIGN						000000		

LPB1

BELGIUM



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



	·				ノし	<u> </u>
WEATHER D	ATA:					
TEMPERATURE DATA:	HOURLY T		l day 🔲 monthi ave. monthly min.	Y DATA		MONTHLY DEGREE DAYS
SOLAR DATA:	MOURLY 7	APE TY	ICAL DAY PROFILE	☐ HONTHI	LY AVE. DAILY	E TOTAL
SOLAR ORIENS. CALC:		N. INCL. SLOPED ACING SOUTH	☐ ANY VERT	REFLECTANCE	HORIZ. & 4	CARDINAL DIREC.
DAYLIGHT CALC:	HOUR-BY-		ICAL CLEAR & CLOU	DY DAY/MONTH	TYPICAL DAY,	MONTH
CALCULATIO	N PRO	CEDURES:			,	
LANGUAGE: D FORT	RAN BAS	IC   HACHINE	LANGUAGE 0	THER	GRAPHS, CI	HARTS & SIMPLE CALC.
USER TYPE:	INTERACTIVE '	☐ INTERACT	IVE GRAPHIC	PREPARE FILE	☐ HAND (	CALCULATION
UNITS OF CALCULATIO	N: 🗷 S	I UNITS	E ENG	.ISH	D BOTH	ı
CHECK ALL APPROPRIA	TE BOXES:			•		
HEAT TRANSFER:		TINITE DIFFE	RENCE	RESPONSE FACTOR	□ str	ADY STATE
SOLAR COMP. CALC	ULATED:	DIFFUSE/DIR	CT/RE-RADIATED	☐ DIFFUSE/DIRECT	□ T01	TAL
INTEGRATION:		SIMPLE EULER		M IMPLICIT	□ OT	IER
SHADING:		ANY SOLAR OF	STRUCTION	OVERHANG ONLY	□ NO	SHADING
MOVABLE SHADING:		🛭 DAILY & SEAS	ONAL SWITCHING	SEASONAL SWITCHI	NG 🗖 NOT	CALCULATED
MASS EFFECT IS C	ALCULATED:	TRANSIENT HE	AT FLOW	TIME CONSTANT FA	CTORS 🗀 ASS	SUME NO HASS AFFECT
ROOM TEMP. BASED	ON:	M SURFACE & A	R	AIR ONLY	□ NO	CALCULATED
.INSIDE TEMPERATU	RE:	M INPUT SCHEDU	LE BY USER	FIXED BY TOOL	"	RIED BY TOOL
U-VALUES:		CHANGE W/WIN	D SPEED .	REMAIN CONSTANT	. 🗀 мол	ABLE INSULATION
INFILTRATION:		MAIR CHANGE I	ER HOUR	CRACK METHOD	□ VAI	RIES W/WIND SPEED
INTERNAL LOADS I	NCLUDE:	E SENSIBLE & I	ATENT SEPARATE	☐ SENS. & LAT. TOT.	AL 🗆 SEI	SIBLE ONLY
. VENTILATION:		☐ SENSIBLE		☐ LATENT		RIES BY SCHEDULE COMMAND
DAYLIGHT COEFFIC	IENTS:	SKY, REFL. &	DIRECT	SKY & REFL.	□ sk	ONLY
ZONES PER RUN:		<b>25</b> > 25	[] 10 <b>-</b> 25	□ 2 +	10	☐ 1 ONLY
SYSTEM MODELING:	•	SYSTEM EFFIC	. INPUT	SYSTEM OPTIMIZIN	c □ co:	PONENT SENSITIVITY
ECONOMIC ANALYSI	S:	ANNUAL COST	-	SIMPLE PAYBACK	□ LI	FE CYCLE COSTING
OUTPUT:						
LOAD DETERMINANTS:	COMPONEN	n ⊠ 20	NE	BUILDING		
LOADS OUTPUT BY:	M HOUR	<b>-</b>	Y .	□ номтн	☐ SEASON	. D YEAR
TEMPERATURES:	B AIR .	<b>23.</b> , st	RFACE	GRAPHIC PLOT		
FUEL USE BY:		CONSUMPTION PEAK DEMAND		CONSUMPTION PEAK DEMAND	ENERGY	COMPONENTS SYSTEMS BUILDING ONLY

LPB1

BELGIUM



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

HARDWARE					
COMPUTER TYPE:	⊠ IBM	CD CDC	UNIVAC	OTHER	·
CORE REQUIRED:	☑ > 500K	D 100 - 50	00 K 🔲 25	– 100 K	] < 25 K
SUPPORT:	USER'S GUIDE	D D/	ATA MANUAL	OTHER	<u> </u>
EQUIPMENT:	CRT .	☐ PRINTER	TEXTRONIX	OTHER	
COSTS:		•			
ASSUMING PURCHASE O	F SOFTWARE FOR USE	ON PRESENT TIME	-SHARING:		:
FIRST COST: ?					
IN-OFFICE EQUIPM	ENT: CRT		PRINTER		
SOFTWARE PURCHAS	E: CARL	DECK	TAPE	LIS	STING
SUPPORT INFORMAT	TION: USE	'S GUIDE	DATA HANUA	LOTI	IER
TIME TO INPUT AN	D DEBUG:	MAN-DAYS	MAN	-HOURS	
RUN COST/TIME: ?				>.	
INPUT SET-UP TIM	iE:	MAN-DAYS	MAN	Hours	•
TYPICAL* RUN TIP	Œ: 🗀 > 1	HR.	60 м - 30 м	□ 30 M - 10 M	□ < 10 M
TYPICAL* CPU TIP	Œ: 🗇 > 10	00 SEC.	100 - 1000 SEC.	□ 5 - 100 SEC.	□ < 5 SEC.
*FOR THIS FORM, ASSU SECTION 2.	ME "TYPICAL" TO BE	A SINGLE-ZONED	100 SQUARE METER RE	SIDENCE WITH ALL OUT	PUTS CHECKED (,') IN
ASSUMING USE OF SOF	TWARE ON PUBLIC T	ME-SHARING NETWO	orks:		
NAMES AND CONTACTOR	TS OF TIME-SHARING	SERVICES WHICH	HAVE THIS PROGRAM A	VAILABLE (EXACT COSTS	CAN BE OBTAINED
Laboratoir	e de Physiq	ue du Bati	ment		
Universite	e' de Liege.	Faculte!	des		
Sciences A	applique'es	15 Avenue	des		
Sciences 1	'illeuls - B	at Dl			
4000 Lieg	re Belgique			•	

**SOLPA** 

BELGIUM



### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS

SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR	RETURN TO:
LOW ENERGY DWELLING	

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS

#### **GENERAL:**

TOOL NAME: SOLPA	AVAILABLE THROUGH: A De Herde
DEVELOPED BY: A De Herde - E Gratia	Unite' d'architecture, Bat. Vinci
Unite' d'architecture	Place du Levant l
Batiment Vinci	1348 Louvain-la-Neuve BELGIQUE
Place du Levant 1	PHONE NO.: 010/418181 ect 2139
1348 Louvain-la-Neuve BELGIQUE	SUPPORTED BY: A. De Herde
DATE DEVELOPED: 1981	Unite' d'architecture, Bat.Vinci
DATE OF LAST REVISION: 1981	Place du Levant l
	1348 Louvain-la-Neuve - Belgique
	PHONE NO.: 010/418181 ext 2139
BRIEF DESCRIPTION: This design tool calcul	ates the performances of a window
with a "porch roof". It calculate	s, hour by hour, the shaded surface
and the balance sheet.	
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	
· ·	

#### **TOOL HARDWARE & AVAILABLE FORMS:**

M HAIN FRAME COMPUTER	☐ MICRO-COMPUTER	
CARD DECK TAPE	D DISC	

TIME SHARING
LISTING - HARD COPY | LISTING RECALL ONLY HEMORY-INTEGRATED CIRCUIT

HAND CALCULATOR ☐ MAGNETIC CARD

LISTING
RECALL ONLY MEMORY
INTEGRATED CIRCUIT

GRAPHIC OR MANUAL ☐ TEMPLATES, CHARTS, TABLES ☐ BOOK

DEVICE

(COMPLETE SECTIONS 1, 2, 5)

(COMPLETE SECTIONS 1, 2, 6)

(COMPLETE SECTIONS 1, 2, 3)

(COMPLETE SECTIONS 1, 2, 4)

**SOLPA** 

BELGIUM



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

INTENDED USE:				
INTENDED FOR USE BY:				
🛮 ARCHITECT 🖸 ENGINEER 🔲 TECHNICIAN 🔲 RESEARC	CH ANALYST 🔀 BI	ıilder		
PRASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):		~		
🔁 PRE-DESIGN 🔲 SITE ANALYSIS 🔯 SCHEMATICS 🔯 DESIGN	DEVEL.   POST-	DESIGN SER	RV. 🔘 RESE	EARCH
PHASE(S) FOR WHICH DESIGN TOOL MAY HE USEFUL (ANY NO.):				
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN	DEVEL. D POST-1	DESIGN SER	RV. □ RESE	EARCH
MAJOR & MINOR ENERGY COMPONENTS	ADDRESSE	ED BY	TOOL	
☑ HEATING ☐ COOLING ☐ LIGHTING	DHW		HISCELLANEOU	is
LOADS  D SPACE TEMPS. D SPACE TEMPS. D HVAC SYSTEMS PASSIVE SOLAR D PASSIVE CINC. D SHADING D SYSTEM DESIGN D SYSTEM DESIGN D SYSTEM DESIGN D SYSTEM DESIGN D ECONOMICS D UNDERGROUND LOADS D UNDERGROUND LOADS LOADS D MASS D MASS	D LOADS D SOLAR ACTIV SOLAR PASSI ECONOMICS S.S.	PE	D FANS O PUNPS O MISC. ELE	CTRICAL
INPUT DATA REQUIRED:	DOES NOT	MINIMUM	RECOMMENDED	TOTAL POSSIBLE
PRE-DESIGN AND SITE ANALYSIS DATA	ACCOMMODATE	INPUT	INPUT	INPUT
LOCATION - ASSOCIATED WEATHER DATA BUILDING TYPE AND SCHEDULE OCCUPANCY RATES BUILDING AREA SPACE TEMPERATURES LOCAL EMERGY COSTS GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.) LIGHTING REQUIREMENTS	مومومومه			80000000
SCHEMATIC DESIGN DATA .	•			•
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES	<b>9</b>		0000	
ARCHITECTURAL DESIGN DEVELOPMENT DATA	_ <del>_</del>		u	u
BUILDING MATERIALS & ASSOCIATED DATA (R, D, E, ETC.) BUILDING MASS DATA SHADING C'EFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA	Q Q Q Q	0000		0000
ENGINEERING DESIGN DEVELOPMENT DATA				•
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL		ومممم	200000	000000



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



一种不	`				<del></del>				
WEATHER DA	<u>\TA:</u>								
	ANNUAL DE	GREE DAYS	AVE. HO	NTELY MIN.	AND HAX.	AVE. HON	THLY	☐ MONTHLY TEMP. ☐ D	AILY
	-							DAILY & TOTAL	
SOLAR ORIENS. CALC:									DIREC.
DAYLIGHT CALC:	☐ HOUR-BY-H	OUR C	TYPICAL CL	EAR & CLOU	DY DAY/MON	TH 🗆 TY	PICAL	DAY/MONTH	
CALCULATIO	N PROC	EDUR	ES:			,e		*	
LANGUAGE: Torte	N BAS	C 🗀 MA	CHINE LANGUA	GE 🖸 01	HER		GRAPH	S, CHARTS & S	IMPLE CALC.
USER TYPE: 🐯 II	TERACTIVE	☐ INT	ERACTIVE GRA	PHIC	PREPAR	£ FILE	В	AND CALCULATI	ON
UNITS OF CALCULATION		UNITS		ENG!	.ISH			BOTH	
CHECK ALL APPROPRIATE	BOXES:								
HEAT TRANSFER:		D FINITE	DIFFERENCE		RESPONS	E FACTOR	2	STEADY STAT	Œ
SOLAR COMP. CALCUI	LATED:	DIFFUSE	/DIRECT/RE-R	ADIATED	DIFFUSE	/DIRECT	C	TOTAL	
INTEGRATION:		SIMPLE	EULER		☐ IMPLICE	T	t	OTHER	
SHADING:		ANY SOL	AR OBSTRUCTI	ON.	OVERHAN	G ONLY	9	☐ NO SHADING	
MOVABLE SHADING:		M DAILY	SEASONAL SH	ITCHING	☐ SEASONA	AL SWITCHING	ı	NOT CALCULA	TED
HASS EFFECT IS CAL	LCULATED:	TRANSIE	NT HEAT FLOW		TIME CO	NSTANT FACTO	DRS 1	ASSUME NO 1	ASS AFFECT
ROOM TEMP. BASED	ON:	SURFACE	& AIR		AIR ON	.Y	ı	NOT CALCUL	ATED
INSIDE TEMPERATUR	E:	INPUT S	CHEDULE BY U	SER	FIXED I	BY TOOL	1	VARIED BY	rool
U-VALUES:		CHANGE	W/WIND SPEED	<b>)</b>	☐ REMAIN	CONSTANT	1	MOVABLE IN	SULATION
INFILTRATION:		AIR CHA	ANGE PER HOUT	ť,	CRACK 1	METHOD	1	□ VARIES W/W	IND SPEED
INTERNAL LOADS IN	CLUDE:		E & LATENT S		SENS.	LAT. TOTAL		SENSIBLE O	NLY
VENTILATION:		SENSIB	Œ		☐ LATENT			OR COHMAND	
DAYLIGHT COEFFICE	ENTS:	SKY, RI	efl. & Direct	ŗ	SKY &	REFL.		SKY ONLY	
ZONES PER RUN:		25		<u> 10 - 25</u>		2 - 10		1 ON	LY
SYSTEM HODELING:		SYSTEM	EFFIC. INPUT	r	SYSTEM	OPTIMIZING		COMPONENT	SENSITIVITY
ECONOMIC ANALYSIS	:	☐ ANNUAL	cost		SIMPLE	PAYBACK		LIFE CYCLE	COSTING
OUTPUT:									
LOAD DETERMINANTS:	COMPONEN	T	☐ ZONE		☐ BUILDIN	G			
LOADS OUTPUT BY:	Mour		□ DAY		☐ MONTH		□ s	EASON	☐ YEAR
TEMPERATURES:	□ AIR		SURFACE		☐ GRAPHIC	•			
FUEL USE BY:	MONTHLY MONTHLY OTHER		N D	ANNUAL OTHER	CONSUMPTI PEAK DEMA	no Lu	O E	YSTEM COMPONE NERGY SYSTEMS OTAL BUILDING	

SOLPA

BELGIUM



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

<u>HARDWARE</u>	-				
COMPUTER TYPE:	□ IBM	□ coc	☐ UNIVAC	M OTHER Hewlet	t Packard
CORE REQUIRED:	□ > 500K	□ 100 - S	500 K 💹 25	5 − 100 K 🖂 <	25 K
SUPPORT:	🖾 USER'S GUI	DE 🔯 I	DATA MANUAL	OTHER	
EQUIPMENT:	⊠ CRT '	M PRINTER	☐ TEXTRONIX	OTHER	
COSTS:		. •		•	
<del></del>				0' 1	
ASSUMING PURCHASE	OF SOFTWARE FOR	USE ON PRESENT TIM	E-SHARING:		
FIRST COST: ?					-
IN-OFFICE EQUIP	MENT: C	RT	PRINTER		
SOFTWARE PURCHA	5E: C	ARD DECK	TAPE	LISTI	NG
SUPPORT INFORMA	TION: U	SER'S GUIDE	DATA HANU	AL OTHER	<del></del>
TIME TO INPUT A	ND DEBUG:	MAN-DAYS	MA)	-Hours	
RUN COST/TIME: ?	•			•	
INPUT SET-UP TI	ME:	MAN-DAY	HA	-Hours	
TYPICAL* RUN TI	ME: 🗆 >	1 RR. [	🗖 60 м - 30 м	□ 30 M - 10 M	□ < 10 H
TYPICAL* CPU TI	ME: 🗆 >	1000 SEC.	□ 100 - 1000 SEC.	□ 5 - 100 SEC.	□ < 5 SEC.
FOR THIS FORM, ASS SECTION 2.	UME "TYPICAL" TO	BE A SINGLE-ZONET	) 100 SQUARE METER RE	ESIDENCE WITH ALL OUTPUT	S CHECKED (√) IN
ASSUMING USE OF SO	FTWARE ON PUBLIC	TIME-SHARING NET	ORKS:		
NAMES AND CONTA THROUGH THEM).	CTS OF TIME-SHAR	ING SERVICES WHICH	HAVE THIS PROGRAM	AVAILABLE (EXACT COSTS C	AN BE OBTAINED
Laboratoii	e de Coin	ie Ciul			
<u> </u>			_		
<del></del>	/inci Plac	ce du Levant	<u> </u>		

PASSIVE HOUSE DESIGN EA SOLAR R&D

SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS

SECTION

CANADA

**RETURN TO:** 

Michael Glover

Bldg. R-92

Solar Energy Program

Ottawa, Ontario ,

National Research Council

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS

G	E	Ν	E	R	Α	L	:
---	---	---	---	---	---	---	---

	KIA OR6
TOOL NAME: Passive House Design	AVAILABLE THROUGH: M. Zaheeruddin
DEVELOPED BY:M. Zaheeruddin and R.R. Gilpin	Department of Mechanical Engineering
Dept. of Mechanical Engineering	The University of Alberta
The University of Alberta	EDMONTON, Canada.
EDMONTON, Alberta T6G 2G8	PHONE NO.: (403) 432-3251
	SUPPORTED BY:
DATE OF LAST REVISION: July 1981	
m	PHONE NO.:
	simulates the dynamic response of the house
to variations in radiation fluxes and a	mbient 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.	

#### T RMS:

OOL HARDWAR	E & AVAILABLI	E FO
MAIN FRAME COMPUTER	☐ HICRO-COHPUTER	
CARD DECK TAPE TIME SHARING LISTING - HARD COPY	DISC TAPE LISTING RECALL ONLY MENO	

(COMPLETE SECTIONS 1, 2, 5)

LISTING
RECALL ONLY MEMORY
INTEGRATED CIRCUIT

HAND CALCULATOR

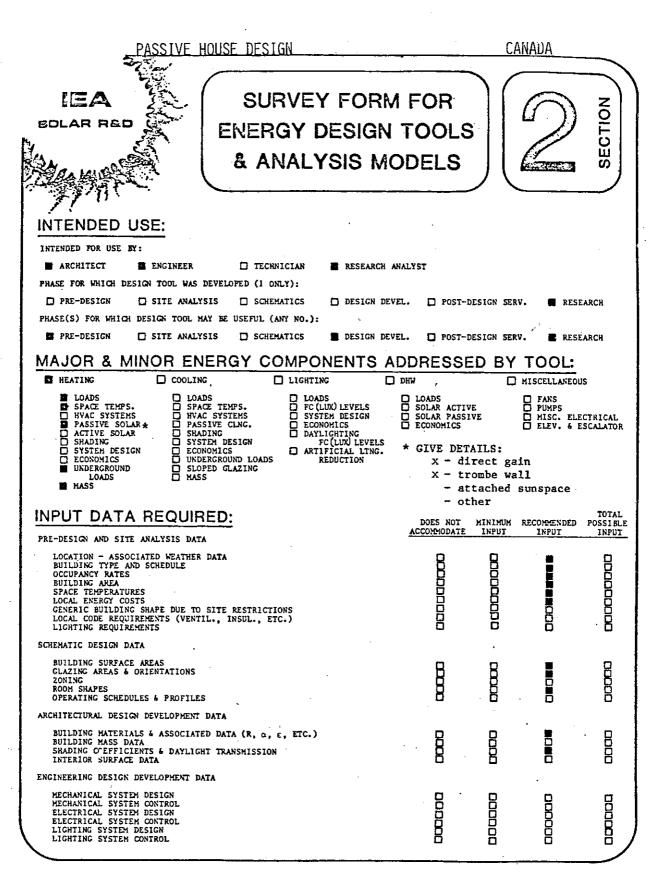
☐ MAGNETIC CARD

☐ TEMPLATES, CHARTS, TABLES □ BOCK DEVICE

O GRAPHIC OR MANUAL

(COMPLETE SECTIONS 1, 2, 6)

(COMPLETE SECTIONS 1, 2, 3) (COMPLETE SECTIONS 1, 2, 4)





# SURVEY FORM FOR



···		ENERGY	DESI	GN TOOLS	5   // E
		& ANA	LYSIS	MODELS	SEC
72449年第		(	- 1 010	MODELO	
WEATHER D	 1ΔΤΔ•		<del></del>		
·-·	_	_			
TEMPERATURE DATA:	·	ECKEE DATS   AVE.	. MONTHLY MIN	AND MAX. 🗆 AVE. M	L DATA
SOLAR DATA:	HOURLY T	APE TYPICAL	L DAY PROFILE	☐ MONTHL	Y AVE. DAILY & TOTAL
SOLAR ORIENS. CALC:	ANY ORIE	N. INCL. SLOPED ACING SOUTH	☐ ANY VER ☐ SURFACE	T. & HORIZ.  REFLECTANCE	HORIZ. & 4 CARDINAL DIREC.
DAYLIGHT CALC:	MOUR-BY-	HOUR TYPICAL VERAGE OTHER_	CLEAR & CLO	UDY DAY/HONTE	TYPICAL DAY/MONTH
CALCULATIO	N PPAC	PEDLIDEO:			<b>,</b>
LANGUAGE: FORT					GRAPHS, CHARTS & SIMPLE CALC
				•	☐ HAND CALCULATION
UNITS OF CALCULATIO	_ :	I UNITS	ENG:	LISH	□ BOTH
CHECK ALL APPROPRIA				<u>.</u>	
HEAT TRANSFER:				☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALC	ULATED:		E-RADIATED .	■ DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	_	SIMPLE EULER		IMPLICIT	☐ OTHER
SHADING:	•	ANY SOLAR OBSTRU	CTION	OVERHANG ONLY	NO SHADING
MOVABLE SHADING:		■ DAILY & SEASONAL	. SWITCHING	SEASONAL SWITCHING	G
MASS EFFECT IS C	ALCULATED:	TRANSIENT HEAT F	LOW	TIME CONSTANT FACT	TORS - ASSUME NO MASS AFFECT
ROOM TEMP. BASED	ON:	SURFACE & AIR		AIR ONLY (	☐ NOT CALCULATED
INSIDE TEMPERATUI	RE:	INPUT SCHEDULE B		FIXED BY TOOL	□ VARIED BY TOOL
U-VALUES:		☐ CHANGE W/WIND SP	EED	REMAIN CONSTANT	MOVABLE INSULATION
INFILTRATION:		AIR CHANGE PER H	OUR	CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS IN	iCLUDE:	SENSIBLE & LATEN	T SEPARATE	SENS. 6 LAT. TOTAL	
VENTILATION:		☐ SENSIBLE		☐ LATENT	VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICE	ENTS:	SKY, REFL. & DIR	ECT	SKY & REFL.	SKY ONLY
ZONES PER RUN:		□ > 25	10 - 25	□ 2 - 10	0 <b>1</b> ONLY
SYSTEM MODELING:		SYSTEM EFFIC. IN		SYSTEM OPTIMIZING	<del>-</del> -
ECONOMIC ANALYSIS		ANNUAL COST		SIMPLE PAYBACK	_
OUTPUT:					
LOAD DETERMINANTS:	COMPONENT	Flane	_		
LOADS OUTPUT BY:	☐ HOUR			BUILDING	•
	_	D DAY		MONTH .	☐ SEASON ☐ YEAR
TEMPERATURES: FUEL USE BY:	■ AIR □ HONTHLY CO □ HONTHLY P		☐ ANNUAL □	GRAPHIC PLOT CONSUMPTION	SYSTEM COMPONENTS
	O OTHER	Enn PERUID	OTHER_	PEAK DEHAND	☐ ENERGY SYSTEMS ☐ TOTAL BUILDING ONLY

PASSIVE HOUSE DESIGN

CANADA



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



HARDWARE:					,	
COMPUTER TYPE:	□ IBM	☐ CDC	:	□ UNIVAC	OTHER _	AMDHAL V/470
CORE REQUIRED:	□ > 500K		100 - 500 K	■ 25	5 - 100 K	□ < 25 K
SUPPORT:	USER'S	GUIDE	DATA P	ANUAL	OTHER _	<u> </u>
EQUIPMENT:	CRT	■ PRI	NTER	☐ TEXTRONIX	OTHER _	
COSTS:	•			•	•	
		DAD 1142 DI DEGA				
ASSUMING FURCHASE OF		FUR USE ON PRES	ENT TIME-SHA	RING:		
IN-OFFICE EQUIPM						
				PRINTER		
				TAPE		
•				DATA MANUA	<u></u>	OTHER
TIME TO INPUT AND	'DEBUG:	M.	AN-DAYS	MAN	-HOURS	
RUN COST/TIME:				•	, <b>,</b>	
INPUT SET-UP TIME		M	AN-DAYS	MAN	-HOURS	•
TYPICAL* RUN TIME						10 H -
TYPICAL* CPU TIME		> 1000 SEC.	100	- 1000 SEC.	<b>2</b> 5 - 100	SEC.
FOR THIS FORM, ASSUM	E "TYPICAL"	TO ME A SINGLE	E-ZONED 100	SQUARE METER RE	SIDENCE WITH A	ALL OUTPUTS CHECKED (/) IN
ASSUMING USE OF SOFT	WARE ON PUB	LIC TIME-SHARIN	G NETWORKS:			
NAMES AND CONTACT	S OF TIME-S	HARING SERVICES	WHICH RAVE	THIS PROGRAM A	VAILABLE (EXAC	T COSTS CAN BE OBTAINED
THROUGH THEM).	· -	•				
		<u> </u>	<del></del>			•
		<del></del>				<del></del>

ENCORE - CANADA

<u>CANAD</u>A



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



71.0	
TASK VIII - PASSIVE AND HYBRIG	SOLAR RETURN TO:
LOW ENERGY DWELL	ING
SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS	Michael Glover Solar Energy Program National Research Council Bldg. R-92
GENERAL:	Ottawa, Ontario
TOOL NAME: Encore-Canada	K1A OR6  AVAILABLE THROUGH:
DEVELOPED BY: A. Konrad	Thermal Performance Section
Division of Building Research	
National Research Council of Canada	National Research Council of Canada
Ottawa, Ontario. KLA OR6	PHONE NO.: Ottawa, KIA OR6 (613) 993-1421
	SUPPORTED BY:
DATE DEVELOPED: August 1978 .	Thermal Performance Section
DATE OF LAST REVISION: 1980	Division of Building Research
	National Research Council of Canada
•	PHONE NO.: Ottawa, KIA OR6 (613) 993-1421
BRIEF DESCRIPTION: The Encore-Canada program per hourly basis using real weather data. I	erforms a dynamic simulation of energy use on ar internal heat storage is taken into account.
Air infiltration calculations are based	on mass flow balance. Solar effects are
included. Temperature variation from ro	oom to room is permitted provided that electric
heaters controlled by proportioning ther	mostats are used. Oil-fired furnace heated
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	(continued over)
TOOL HARDWARE & AVAILABLE F	ORMS:
☐ MAIN FRAME COMPUTER ☐ MICRO-COMPUTER	☐ HAND CALCULATOR ☐ GRAPHIC OR MANUAL
☐ CARD DECK ☐ DISC ☐ TAPE ☐ TAPE ☐ THE SHARING ☐ LISTING ☐ LISTING ~ HARD COPY ☐ RECALL ONLY MEMORY— INTEGRATED CIRCUIT	☐ MAGNETIC CARD ☐ TEMPLATES, CHARTS, TABLES ☐ LISTING ☐ BO'X ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT  (COMPLETE SECTIONS 1, 2, 6)
(COMPLETE SECTIONS 1, 2, 3)	(COMPLETE SECTIONS 1, 2, 5)

EDLAR FED

CANADA

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### **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

BOLAR RED

E

CANADA

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



& ANALYSIS MO	ODELS			S
			<u> </u>	
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 DEV	VEL. 🗖 POST-D	ESIGN SER	V. 🔳 RESE	ARCH
PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):				
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DEV	PEL. POST-DI	ESIGN SER	V. 🐪 RESE	ARCH
MAJOR & MINOR ENERGY COMPONENTS A	DDRESSE	D BY	TOOL:	;
## HEATING COOLING LIGHTING	DHW .	_	MISCELLANEOU	S
LOADS   LOADS	LOADS SOLAR ACTIVE SOLAR PASSIVE ECONOMICS	E Ve	D FANS D PUMPS MISC. ELE ELEV. & E	
SHADING SYSTEM DESIGN FC (LDX) LEVELS SYSTEM DESIGN FC (LDX) LEVELS CONOMICS CONOMICS ARTIFICIAL LING. UNDERGROUND LOADS REDUCTION LOADS HASS		rect ga		
INPUT DATA REQUIRED:	- otl	ner HINIMUM	RECOMMENDED	TOTAL POSSIBLE
PRE-DESIGN AND SITE ANALYSIS DATA	ACCOMMODATE	INPUT	INPUT	INPUT
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	مممممممم			وووووووو
SCHEMATIC DESIGN DATA	•			
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES	0000	00000	0000	
ARCHITECTURAL DESIGN DEVELOPMENT DATA	_	_	_	_
BUILDING MATERIALS & ASSOCIATED DATA (R, a, e, etc.) BUILDING MASS DATA SHADING C'EFFICIENTS & DAYLIGHT TRANSHISSION INTERIOR SURFACE DATA	9000	0000		
ENGINEERING DESIGN DEVELOPMENT DATA	•			
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL	00000	ممممم	ووووو	

ENCORE - CANADA CANADA SURVEY FORM FOR  $\overline{Q}$ SOLAR RED **ENERGY DESIGN TOOLS** SECTI & ANALYSIS MODELS WEATHER DATA: TYPICAL DAY | MONTHLY DATA ANNUAL DATA MONTHLY DEGREE DAYS TEMPERATURE DATA: HOURLY TAPE ANNUAL DEGREE DAYS | AVE. MONTHLY MIN. AND MAX. | AVE. MONTHLY TEMP. □ DAILY SOLAR DATA: BOURLY TAPE TYPICAL DAY PROFILE MONTRLY AVE. DAILY & TOTAL SOLAR ORIENS. CALC: ANY ORIEN. INCL. SLOPED ANY VERT. & HORIZ. ☐ HORIZ. & 4 CARDINAL DIREC. SLOPED FACING SOUTH ☐ SURFACE REFLECTANCE TYPICAL CLEAR & CLOUDY DAY/MONTH DAYLIGHT CALC: □ HOUR-BY-HOUR TYPICAL DAY/MONTH ANNUAL AVERAGE OTHER \_ **CALCULATION PROCEDURES:** ☐ HACHINE LANGUAGE ☐ OTHER \_ LANGUAGE: FORTRAN □ BASIC ☐ GRAPHS, CHARTS & SIMPLE CALC. ■ 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 DIFFUSE/DIRECT/RE-RADIATED DIFFUSE/DIRECT TOTAL SOLAR COMP. CALCULATED: INTEGRATION: ☐ SIMPLE EULER ☐ IMPLICIT OTHER ANY SOLAR OBSTRUCTION OVERHANG ONLY ■ NO SHADING SHADING: MOVABLE SHADING: m DAILY & SEASONAL SWITCHING SEASONAL SWITCHING ■ NOT CALCULATED HASS EFFECT IS CALCULATED: ■ TRANSIENT HEAT FLOW ☐ TIME CONSTANT FACTORS ☐ ASSUME NO MASS AFFECT ROOM TEMP. BASED ON: I NOT CALCULATED SURFACE & AIR AIR ONLY INSIDE TEMPERATURE: INPUT SCHEDULE BY USER ☐ FIXED BY TOOL VARIED BY TOOL U-VALUES: M CHANGE W/WIND SPEED REMAIN CONSTANT MOVABLE INSULATION INFILTRATION: AIR CHANGE PER HOUR CRACK METHOD W VARIES W/WIND SPEED INTERNAL LOADS INCLUDE: SENSIBLE & LATENT SEPARATE D SENS. & LAT. TOTAL E SENSIBLE ONLY VARIES BY SCHEDULE VENTILATION: SENSIBLE ☐ LATENT OR COMMAND DAYLIGHT COEFFICIENTS: SKY, REFL. & DIRECT SKY & REFL. SKY ONLY

#### **OUTPUT:**

CAO	DETERMINANTS:		OM
401PD	PPIDIGITATION IDI	-	٠

- PONENT EN HOUR
- ZONE

ER SYSTEM EFFIC. INPUT

ANNUAL COST

BUILDING

LOADS OUTPUT BY:

ZONES PER RUN:

SYSTEM MODELING:

ECONOMIC ANALYSIS:

AIR

- SURFACE

GRAPHIC PLOT

MONTH

SYSTEM OPTIMIZING

SIMPLE PAYBACK

**2** - 10

E SEASON

☐ YEAR

TEMPERATURES: FUEL USE BY:

- MONTHLY CONSUMPTION MONTHLY PEAK DEMAND
- ANNUAL CONSUMPTION
  ANNUAL PEAK DEMAND OTHER

**10 - 25** 

SYSTEM COMPONENTS

ENERGY SYSTEMS

OTHER

□ > 25

- TOTAL BUILDING ONLY

□ 1 ONLY

☐ LIFE CYCLE COSTING

COMPONENT SENSITIVITY

ENCORE - CANADA

CANADA



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



HARDWARE:												
COMPUTER TYPE:		I BH			CDC		☐ UNIVAC		п отне	ER		
CORE REQUIRED:	<b>-</b> :	500K			D 100 -	500 K		<b>D</b> 25 -	100 K		□ < 25 K	
SUPPORT:	<b>*</b>	JSER'S	CUIDE		0	DATA :	MANUAL		OTHE	R Conve	ersational	Front-e
EQUIPMENT:	0	RT	•		PRINTER		☐ TEXTRON	IX	OTHE	R		
COSTS:												
ASSUMING PURCHASE OF	SOFT	WARE FO	OR USE	ON P	RESENT TI	ME-SH/	ARING:					
FIRST COST:												
IN-OFFICE EQUIPME	NT:		CRT _				PRINT	ER .				
SOFTWARE PURCHASE						PRINTER LISTING				.isting		
SUPPORT INFORMATI					DATA MANUAL C							
TIME TO INPUT AND	DEBU	G:			MAN-DAY							
RUN COST/TIME:								_	ŧ,			
INPUT SET-UP TIME	<b>:</b>		1/3	2	_ MAN-DAY	S		_ MAN-HO	URS			
TYPICAL* RUN TIME	:		> 1 H	R.		D 60	н - 30 н		□ 30	н - 10 н		< 10 H
TYPICAL* CPU TÎME	:		> 100	O SEC	ç.	100	- 1000 SE	c <b>.</b>	<b>5</b> -	100 SEC.		< 5 SEC.
*FOR THIS FORM, ASSUME SECTION 2.	E "TY	PICAL"	TO BE .	A SI	NGLE-ZONE	100	SQUARE MET	ER RESID	ENCE WI	TH ALL OU	TPUTS CHECKE	D (/) IN
ASSUMING USE OF SOFT	ARE	ON PUBL	IC TIM	E-SRJ	ARING NET	WORKS:						
NAMES AND CONTACTS	OF '	TIME-SH	ARING :	SERVI	ICES WHICE	H RAVE	THIS PROG	RAM AVAI	LABLE (	EXACT COS	TS CAN BE OB	TAINED
THROUGH THEM).				•								TALINED
											-	

KE A SOLAR RED

#### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS

ECTION

CANADA

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS

**GENERAL:** 

	<u> </u>						
TOOL NAME:	Passiv <b>E</b>						
DEVELOPED BY:	Okins, Leipciger, Cuplinskas,						
	Kaminker and Associates Limited For:						
	*						

DATE DEVELOPED: \_1979 DATE OF LAST REVISION: February 1982

RET	JRN	TO:

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

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
- MICRO-COMPUTER ■ DISC
- HAND CALCULATOR

MAGNETIC CARD

C GRAPHIC OR MANUAL

☐ DEVICE

CARD DECK

TIME SHARING

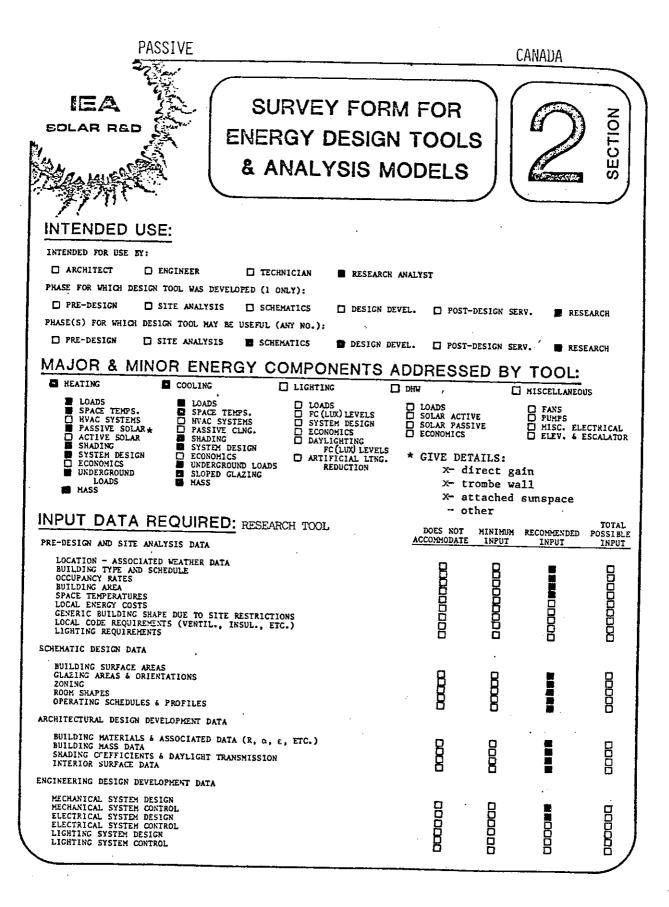
- □ TAPE
- ☐ LISTING
- LISTING RECALL ONLY MEMORY INTEGRATED CIRCUIT
- ☐ TEMPLATES, CHARTS, TABLES □ BOCK

- LISTING HARD COPY
- ☐ RECALL ONLY MEHORY-(COMPLETE SECTIONS 1, 2, 3) INTEGRATED CIRCUIT Cassette

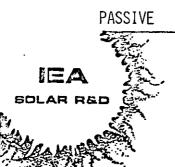
(COMPLETE SECTIONS 1, 2, 4)

(COMPLETE SECTIONS 1, 2, 5)

(COMPLETE SECTIONS 1, 2, 6)



CANADA





IEA 🔆	SURVEY FO	ORM FOR					
SOLAR RED	ENERGY DESIGN TOOLS						
Black Control	& ANALYSIS	MODELS	S III				
		<i></i>					
WEATHER DATA:							
TEMPERATURE DATA: HOURLY-	r Cassette TAPE   TYPICAL DAY   MONT DEGREE DAYS   AVE. HONTHLY HI	N. AND MAX. 🔲 AVE. MONTH	FA   MONTHLY DEGREE DAYS				
SOLAR DATA:	r Cassette D TYPICAL DAY PROFIL	E MONTHLY A	E. DAILY & TOTAL				
SOLAR ORIENS. CALC: ANY ORIE	EN. INCL. SLOPED ANY VE FACING SOUTH SURFACE	RT. & HORIZ.	RIZ. & 4 CARDINAL DIREC.				
DAYLIGHT CALC:   HOUR-BY-	-HOUR TYPICAL CLEAR & CL	OUDY DAY/HONTH   TYPI	CAL DAY/HONTH				
ANNUAL A	AVERAGE OTHER	· · · · · · · · · · · · · · · · · · ·	,				
CALCULATION PROC	CENTIDES:		•				
LANGUAGE: D FORTRAN BAS	,		APHS, CHARTS & SIMPLE CALC.				
USER TYPE:   INTERACTIVE			HAND CALCULATION				
UNITS OF CALCULATION: S  CHECK ALL APPROPRIATE BOXES:	I UNITS ENG	GLISH	□ BOTH				
HEAT TRANSFER:	<b>=</b>	<u>·</u>					
	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		ASSUME NO MASS AFFECT				
ROOM TEMP. BASED ON:	SURFACE & AIR	AIR ONLY	☐ NOT CALCULATED				
INSIDE TEMPERATURE:	☐ INPUT SCHEDULE BY USER	☐ FIXED BY TOOL	W VARIED BY TOOL				
U-VALUES:	CHANGE W/WIND SPEED	REMAIN CONSTANT	MOVABLE INSULATION				
INFILTRATION:	AIR CHANGE PER HOUR	☐ CRACK METHOD	■ VARIES W/WIND SPEED				
	SENSIBLE & LATENT SEPARATE	☐ SENS. & LAT. TOTAL	E SENSIBLE ONLY				
VENTILATION:	■ SENSIBLE	☐ LATENT	U VARIES BY SCHEDULE OR COMMAND				
	SKY, REFL. & DIRECT	☐ SKY & REFL.	SKY ONLY				
	□ > 25 □ 10 - 25	<b>2</b> - 10	☐ 1 ONLY				
	SYSTEM EFFIC. INPUT	SYSTEM OPTIMIZING	COMPONENT SENSITIVITY				
ECONOMIC ANALYSIS:	ANNUAL COST	SIMPLE PAYBACK	☐ LIFE CYCLE COSTING				
OUTPUT:							
LOAD DETERMINANTS: 2 COMPONENT	ZONE 1	BUILDING					
LOADS OUTPUT BY: ## HOUR	D DAY	номтн	SEASON YEAR				
TEMPERATURES: AIR	SURFACE [	GRAPHIC PLOT					
FUEL USE EY: MONTHLY CO	E 1 1	PEAK DEHAND	SYSTEM COMPONENTS ENERGY SYSTEMS				

PASSIVE PASSIVE

CANADA

### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### FOR DESIGN TOOLS REQUIRING A MICRO-COMPUTER

HARDWARE:						
MANUFACTURER AND MODEL NUMBE	. Wang 220	O MVP (Mir	ni)	<del> </del>	,	
RANDOM ACCESS MEMORY (RAM) R	QUIRED: 1	2.5	K			
DOES THIS TOOL REQUIRE A PRI	ITER?	YES D	NO		•	
SUPPORT: USER	'S GUIDE	DATA	MANUAL		THER	·
COSTS:  FIRST COST:  HICRO-COMPUTER:	**************************************					
SOFTWARE: ROM IC	DISC		TAPE		LISTING	
SUPPORT INFORMATION:	USER'S GUI	DE	DA	TA HANUAL _		OTHER
TIME TO INPUT AND DEBUG:		MAN-DAYS		MAN-HOURS		
RUN COST/TIME:				7		
TYPICAL* INPUT SET-UP TIME	<u> 1</u>	HAN-DAYS	<u></u>	MAN-HOURS		
TYPICAL* RUN TIME:		HRS.	2.0	MIN.		
TYPICAL* PRINT TIME:		HRS.	0.1	MIN.		
*FOR THIS FORM, ASSUME "TYPICA SECTION 2.	L" TO BE A SIN	GLE-ZONED 100	) square mete	R RESIDENCE	WITH ALL OUTPUTS	CHECKED (/) IN

IE A SOLAR REI

### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS

RETURN TO:

Michael Glover

Bldg. R-92

Solar Energy Program National Research Council

CANADA

TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS

GEN	VERAL:

GENERAL:	Ottawa, Ontario
TOOL NAME: SIMNET	K1A OR6 AVAILABLE THROUGH: University of Guelph,
DEVELOPED BY: Robin Barker	GJELPH, Ontario.
Margo Mandy ·	- tartiera, ontarto.
Watershed Energy Systems	
97 Six Point Road	PHONE NO.: (519) 824-4120
TORONTO, Ontario. M8Z 2X3	
DATE DEVELOPED: January 1982	SUPPORTED BY:
DATE OF LAST REVISION: June 1982	
	PHONE NO.:
BRIEF DESCRIPTION: The SIMNET program performs	
	rogram is similar to PASOLE program. In
	stems (direct gain, trombe wall and attached
	s hybrid passive systems incorporating isolated
rock storage which is either blower or h	
PLEASE ATTACH ANY VALIDATION OF TECTIVE PURPOSE	

#### TOOL HARDWARE & AVAILABLE FORMS:

			THE W ATTAILED	LE LOUMS
7	MAIN FRA	LME COMPUTER	☐ MICRO-COMPUTER	□ 1141E 0

- C CARD DECK
- HAND CALCULATOR
- GRAPHIC OR HANUAL

- ☐ DISC ☐ TAPE ☐ LISTING
- ☐ MAGNETIC CARD D LISTING RECALL ONLY MEMORY
- ☐ TEMPLATES, CHARTS, TABLES
  ☐ BO'X
  ☐ DEVICE

- TAPE
  TIME SHARING
  LISTING HARD COPY
- RECALL ONLY MEMORY-
- INTEGRATED CIRCUIT

- (COMPLETE SECTIONS 1, 2, 3)
- INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

(COMPLETE SECTIONS 1, 2, 6)

(COMPLETE SECTIONS 1, 2, 4)

SIMNET CANADA EA SURVEY FORM FOR Z O BOLAR RED **ENERGY DESIGN TOOLS** ECTI & ANALYSIS MODELS S 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. D 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: LOADS
SPACE TEMPS.
HVAC SYSTEMS
PASSIVE SOLAR \*
ACTIVE SOLAR
SHADING
SYSTEM # HEATING COOLING □ LIGHTING MISCELLANEOUS LOADS
SPACE TEMPS.
HVAC SYSTEMS
PASSIVE CLNG.
SHADING
SYSTEM DESIGN
ECONOMICS
UNDERGROUND LOADS
SLOPED GLAZING
MASS ☐ LOADS
☐ FC (LUX) LEVELS
☐ SYSTEM DESIGN
☐ ECONOMICS
☐ DAYLIGHTING
☐ FC (LUX) LEVELS
☐ ARTIFICIAL LING.
REDUCTION FANS
D PUMPS
MISC. ELECTRICAL
ELEV. & ESCALATOR LOADS
SOLAR ACTIVE
SOLAR PASSIVE
CONOMICS SHADING SYSTEM DESIGN ECONOMICS \* GIVE DETAILS: ECONOMICS UNDERGROUND X- direct gain LOADS

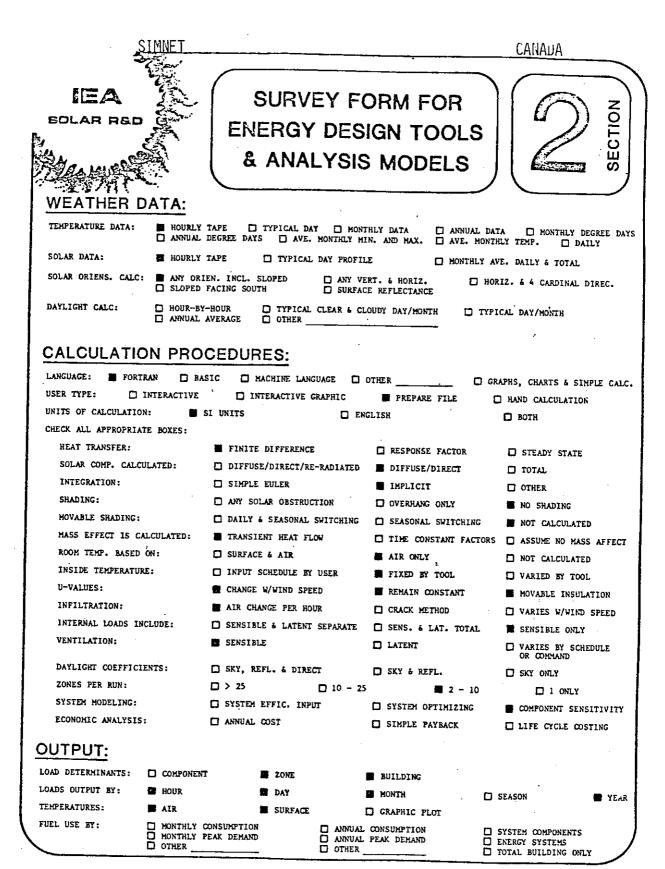
MASS X- trombe wall X- attached sunspace X- other (hybrid) INPUT DATA REQUIRED: TOTAL MINIMUM RECOMMENDED POSSIBLE ACCOMMODATE INPUT INPUT INPUT PRE-DESIGN AND SITE ANALYSIS DATA LOCATION - ASSOCIATED WEATHER DATA BUILDING TYPE AND SCHEDULE OCCUPANCY RATES BUILDING AREA BUILDING AREA
SPACE TEMPERATURES
LOCAL ENERGY COSTS
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)
LIGHTING REQUIREMENTS SCHEHATIC DESIGN DATA BUI! DING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES B ARCHITECTURAL DESIGN DEVELOPMENT DATA BUILDING MATERIALS & ASSOCIATED DATA (R, Q, E, ETC.) BUILDING MASS DATA SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION THEFFELO SUBSECT DAYL 

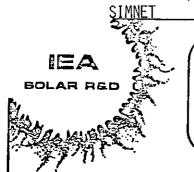
000000

000000

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





CANADA

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



HARDWARE:					
COMPUTER TYPE:	■ IBM	☐ CDC	- UNIVAC	☐ OTHER	
CORE REQUIRED:			K ដ 25 –		·
SUPPORT:	USER'S GUIDE	DATA	HANUAL	OTHER	
EQUIPMENT:	CRT '	PRINTER	☐ TEXTRONIX	•	
COSTS:				•	
ASSUMING PURCHASE OF	SOFTWARE FOR USE	ON PRESENT TIME-SI	HARING:		٠.
FIRST COST:		-			
IN-OFFICE EQUIPME	NT: CRT		PRINTER X		
SOFTWARE PURCHASE		DECK			LISTING X
SUPPORT INFORMATI			DATA MANUAL		OTHER
TIME TO INPUT AND		MAN-DAYS			
RUN COST/TIME:				Š.	
INPUT SET-UP TIME		MAN-DAYS	1/2_ MAN-HO	URS	
TYPICAL* RUN TIME	; D>11	IR. 🗅 60	) M - 30 M	□ 30 M - 10	н □ < 10 н
			00 - 1000 SEC.		<del>-</del>
FOR THIS FORM, ASSUME SECTION 2.	"TYPICAL" TO BE	A SINGLE-ZONED 100	SQUARE METER RESID	ENCE WITH ALL	OUTPUTS CHECKED (/) IN
ASSUMING USE OF SOFT	ARE ON PUBLIC TIM	E-SHARING NETWORKS	4:		
•			<u>-</u> '	LABLE (EXACT (	COSTS CAN BE OBTAINED
Robin Barker					
97 Six Point	Road				
TORONTO, (Ont					
MOT OVO (ALC	) 233-3241				

IEA BOLAR RAD DENMARK

### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS

TASK VIII – PASSIVE AND	HYBRID SOLAR	RETURN TO:
LOW ENERGY	DWELLING	•

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS

GENERAL:  TOOL NAME: BA4  DEVELOPED BY: Hans Lund  Thermal Insulation Laborator  Technical University of Denm  Building 118 - DK-2800 Lyngh	mark
Denmark	
DATE DEVELOPED:	SUPPORTED BY:
DATE OF LAST REVISION:	
	PHONE NO.:
BRIEF DESCRIPTION: The programme calculate	s for a room half-hour values during
a whole year of room tempera	tures, utilizing a simplified method.
Further it can calculate hea	ting and cooling loads, taking into
account sun radiation, fixed	and movable sun shading devices, va-
rying ventilation and infilt	ration, electric lighting and other
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	heat sources in the room, etc.
TOOL HARDWARE & AVAILABLE FO	PRMS:
☐ MICRO-COMPUTER ☐ MICRO-COMPUTER ☐	RAND CALCULATOR GRAPHIC OR MANUAL
CARD DECK  TAPE  TIME SHARING  LISTING - HARD COPY  (COMPLETE SECTIONS 1, 2, 3)  COMPLETE SECTIONS 1, 2, 4)	☐ MAGNETIC CARD ☐ LISTING ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT  (COMPLETE SECTIONS 1, 2, 6)

IEA BOLAR RED

### DENMARK

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



		ノし		
INTENDED USE:				
INTENDED FOR USE BY:				
□ ARCHITECT   Engineer □ Technician   Research	i ANATYST			
PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):				
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN D	DEVEL.   POST-	FSTON SEI	U <del>O</del> loge	E.Deu
PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):		CORON SE	RV. ZD RESI	FAKCH
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☑ DESIGN D	DEVEL. Z POST-D	ESIGN SER	RV. 35 RESI	FARCH
MAJOR & MINOR ENERGY COMPONENTS				JAKCA
EXI HEATING BY COOLING	☐ DHW		MISCELLANEOL	IS.
DADS  DADS  DADS  SPACE TEMPS.  DASSIVE SOLAR  PASSIVE SOLAR  ACTIVE SOLAR  SHADING  SYSTEM DESIGN  SHADING  SYSTEM DESIGN  SYSTEM DESIGN  ACTIVE SOLAR  SHADING  SYSTEM DESIGN  SYSTEM DESIGN  ACTIVE SOLAR  SHADING  SHADING  SHADING  ACTIVE SOLAR  SHADING  SHADING  ARTIFICIAL LING.  REDUCTION  REDUCTION	D LOADS SOLAR ACTIV SOLAR PASSI ECONOMICS	E	D FANS D PUMPS D MISC. ELE	ECTRICAL
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 LOCAL EMERCY COSTS GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.) LIGHTING REQUIREMENTS	ශ්ශිශිතපයය			<u>රෙදරකිකිකිකිකි</u>
SCHEMATIC DESIGN DATA	-	_	-	w
BUILDING SURFACE AREAS SLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES		SECON SECON	<b>SECON</b>	Maca Mark
ARCHITECTURAL DESIGN DEVELOPMENT DATA	_	_	2	به
BUILDING MATERIALS & ASSOCIATED DATA (R, $\alpha$ , $\epsilon$ , ETC.) BUILDING MASS DATA SHADING CYEFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA	0000	්කතන	2 2 2 2	মুত্তমূদ
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL	<b>2022200</b>	190000	. 20000	100000

IEA PLAR RED DENMARK

## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



TO SAMPLE OF THE	& ANALYSIS	MODELS	) RECEIVED
WEATHER DATA:			
TEMPERATURE DATA:   HOURLY TO ANNUAL I	TAPE   TYPICAL DAY   HON DEGREE DAYS   AVE. HONTHLY )	THLY DATA ANNUAL DATE. MONTHLY DATA ANNUAL DATE. MONTHLY	<del>-</del>
SOLAR DATA:   B HOURLY	TAPE TYPICAL DAY PROFI	ILE MONTHLY	AVE. DAILY & TOTAL
SOLAR ORIENS. CALC: ANY ORIE		VERT. & HORIZ.   THE HORIZ.	ORIZ. & 4 CARDINAL DIREC.
	-HOUR TYPICAL CLEAR & C		PICAL DAY/HONTH
CALCULATION PRO	CEDURES:		
LANGUAGE: THE FORTRAN DE BAS	SIC   MACHINE LANGUAGE	OTHER	GRAPHS, CHARTS & SIMPLE CALC.
USER TYPE:   INTERACTIVE	☐ INTERACTIVE GRAPHIC		☐ HAND CALCULATION
_	_	ENGLISH	□ вотн
CHECK ALL APPROPRIATE BOXES:			
HEAT TRANSFER:	A FINITE DIFFERENCE	RESPONSE FACTOR	STEADY STATE
SOLAR COMP. CALCULATED:	☑ DIFFUSE/DIRECT/RE-RADIATED	DIFFUSE/DIRECT	TOTAL
INTEGRATION:	SIMPLE EULER	☐ IMPLICIT	☐ OTHER
SHADING:	$\square$ ANY SOLAR OBSTRUCTION $\overline{\underline{x}}$	SO OVERHANG ONLY	☐ NO SHADING
HOVABLE SHADING: X other	DAILY & SEASONAL SWITCHING	G SEASONAL SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CALCULATED:	TRANSIENT HEAT FLOW	TIME CONSTANT FACTO	DRS D ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	SURFACE & AIR	AIR ONLY	☐ NOT CALCULATED
INSIDE TEMPERATURE:	NPUT SCHEDULE BY USER	☐ FIXED BY TOOL	☐ VARIED BY TOOL
U-VALUES:	CHANGE W/WIND SPEED	REMAIN CONSTANT	MOVABLE INSULATION
INFILTRATION:	Z AIR CHANGE PER HOUR	CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	SENSIBLE & LATENT SEPARATE	E 🗅 SENS. & LAT. TOTAL	SENSIBLE ONLY
VENTILATION:	S SENSIBLE	☐ LATENT	VARIES BY SCHEDULE OR COHMAND
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: COMPONEN	T 🗀 ZONE	☑ BUILDING	
LOADS OUTPUT BY: 12 HOUR	<del></del>	MONTH	SEASON YEAR
TEMPERATURES:  AIR	SURFACE	GRAPHIC PLOT	
FUEL USE BY: MONTHLY	CONSUMPTION ANN	UAL CONSUMPTION UAL PEAK DEMAND	SYSTEM COMPONENTS ENERGY SYSTEMS TOTAL BUILDING ONLY

BA4

DENMARK



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



HADDWADE.								
HARDWARE:							,	
COMPUTER TYPE:	⊠ IBM	□ coc		☐ UNIVAC		OTHER		
CORE REQUIRED:	□ > 500K	<b>2</b> 1	100 - 500 K		<b>二</b> 25 ~	100 K	□ < 25 i	
SUPPORT:	🖾 USER'S GUI	DE	□ DATA M	ANUAL		OTHER		
EQUIPMENT:	E CRT							
COSTS:								
ASSUMING PURCHASE OF	SOFTWARE FOR	USE ON PRESE	NT TIME-SHA	RING:				
FIRST COST:				<del></del>				
IN-OFFICE EQUIPME	NT: C	RT		PRINTE	ER-	•		
SOFTWARE PURCHASE		ARD DECK			100	\$	LISTING	•
SUPPORT INFORMATI	on: u	SER'S GUIDE	10 \$	_ DATA N	IANUAL			
TIME TO INPUT AND		5						
RUN COST/TIME:					-			,
INPUT SET-UP TIME	: <u> </u>	на	N-DAYS	4	HAN-HO	OURS		
TYPICAL* RUN TIME	: 🗆 >	I HR.	□ 60 j	н - 30 н		□ 30 M - 1	0 н	<b>⊠</b> < 10 M
TYPICAL* CPU TIME	: 🗆 >	1000 SEC.	<b>1</b> 00	- 1000 SEC		<b>5</b> - 100 :	SEC.	□ < 5 SEC.
*FOR THIS FORM, ASSUME SECTION 2.	E "TYPICAL" TO	RE A SINGLE	-zoned 100 s	SQUARE METE	r resid	DENCE WITH ALL	L OUTPUTS CHE	CKED (,') IN
ASSUMING USE OF SOFT	WARE ON PUBLIC	TIME-SHARIN	G NETWORKS:					
NAMES AND CONTACTS THROUGH THEM).	OF TIME-SHARI	NG SERVICES	WHICH HAVE	THIS PROGR	IAVA MA	LABLE (EXACT	COSTS CAN BE	OBTAINED
<del></del>								<del></del>
	<del></del> _			-				
· · · · · · · · · · · · · · · · · · ·	<del></del> -							
	<u> </u>						<u> </u>	

HAUSER

IEA

BOLAR RED

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

GERMANY



TASK VIII – PASSIVĖ	AND HYBRID	SOLAR	RETURN TO
I OW END	EDGV DWELL	NO	

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS

				•	
GENERAL:					
TOOL NAME:	HAUSer		AVAILABLE THROUGH	(:	
DEVELOPED BY:	DrIng.	Gerd Hauser			
\tau /o	UNIVER	ISITÄT ESSEN			
		samthochschule -			
		rIng. Karl Gertis	PHONE NO.:		
	Universitätsst	raße 2 - Postfach 6843			
DATE DEVELOPED:	1974-197	300 Essen 1	SUFFORIED BI:		
DATE OF LAST REVI				,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	
	•		PHONE NO.:		
RRIEF DESCRIPTION	: Timo-c+	an mathad for t		Te at a second	
				of the transient th	ermal
			ze and construct		
<u>Testing r</u>	<u>report: H</u>	auser, G.: Verf	ahren zur Berec	nnung des Temperatu	rver-
<u>haltens (</u>	ind Energ	ieverbrauchs vo	on Gebäuden. KI (	5 (1978), H. 2, S.	53-56.
·	· ·				
PLEASE ATTACH ANY	VALIDATION O	R TESTING REPORTS.			
TOOL HAR	DWARE	& AVAILABLE	FORMS:		
MAIN FRAME CO	MPUTER	HI CRO-COMPUTER	☐ HAND CALCULATOR	☐ GRAPHIC OR MANUAL	
CARD DECK TAPE TIME SHAR LISTING -	ING	Disc Tape Listing RECALL ONLY MEMORY	☐ MAGNETIC CARD ☐ LISTING ☐ RECALL ONLY MEH ☐ INTEGRATED CIRC	IIT	
(COMPLETE SECT	IONS 1, 2, 3)	INTEGRATED CIRCUIT (COMPLETE SECTIONS 1. 2	(COMPLETE SECTIONS	(COMPLETE SECTIONS 1, 1, 2, 5)	2,6)

IEA BOLAR RED

### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

**GERMANY** 

SECTION

- ( & ANALYSIS N	MODELS			SS
	<del> </del>	ノヽ		
INTENDED USE:				
INTENDED FOR USE EY:			÷	
E ILLUMITOTAL A RESEARCE	CH ANALYST			
PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (I ONLY):				
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN	DEVEL.   POST-I	DESIGN SE	RV. 💢 RES	EARCH
PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):				
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS · ☐ DESIGN	DEVEL. D POST-I	DESIGN SE	RV. Z RES	EARCH
MAJOR & MINOR ENERGY COMPONENTS	ADDRESSE	ED BY	TOOL:	
HEATING COOLING CIGHTING	□ ини	<del></del>	HISCELLANEO:	บร
LOADS  SPACE TEMPS.  SPACE TEMPS.  HVAC SYSTEMS  HVAC SYSTEMS  PASSIVE SOLAR  ACTIVE SOLAR  SHADING  SYSTEM DESIGN  SYSTEM DESIGN  SYSTEM DESIGN  CONOMICS  UNDERGROUND  LOADS  RESIGN  FC (LUX) LEVELS  D ACTIVELS  ACTIV	D LOADS D SOLAR ACTIVE SOLAR PASSI D ECONOMICS	E Ve	D FANS D PUMPS MISC. ELI	ECTRICAL 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	20000000		00000000	
SCHEMATIC DESIGN DATA	J		u	W
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES	0000	MACAGA	00000	
ARCHITECTURAL DESIGN DEVELOPMENT DATA	_	~	U	J
BUILDING MATERIALS & ASSOCIATED DATA (R, Q, E, ETC.) BUILDING MASS DATA SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA	0000	答	0000	0000
ENGINEERING DESIGN DEVELOPMENT DATA				
HECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL	ם ממממם .	oooo k(k	00000	000000

HAUSER IEA S

GERMANY

## SURVEY FORM FOR ENERGY DESIGN TOOLS

•				DEGI		JULG		O
Many 1	-	8	ANAL	YSIS	MOD	ELS		S S
WEATHER D	ATA:			<del></del>	<del></del>			
TEMPERATURE DATA:	HOURLY ANNUAL	TAPE   DEGREE DAYS	TYPICAL DAY	MONTH LI	LY DATA	ANNUAL DA	TA [] MONTEL HLY TEMP. []	Y DEGREE DAYS DAILY
SOLAR DATA:	MOURLY	TAPE	TYPICAL I	DAY PROFILE		☐ MONTRLY A	VE. DAILY & TOT	AL
SOLAR DRIENS. CALC:			I OPEN	C ANV UED	T. & HORIZ. REFLECTANC	C 110	RIZ. & 4 CARDIN	
DAYLIGHT CALC:	HOUR-BY	-HOUR AVERAGE	TYPICAL C	LEAR & CLO			ICAL DAY/MONTH	æ
		•				-	.•	
CALCULATIO	N PRO	CEDUR	<u>ES:</u>	-		•		•
LANGUAGE: FORTR	AN 🗇 BAS	яс 📋 н	ACHINE LANGU	AGE 🗀 O	THER	D G	RAPHS, CHARTS &	SIMPLE CALC.
USER TYPE: 1			TERACTIVE GR				HAND CALCULA	
UNITS OF CALCULATION	: 🗅 :	SI UNITS		☐ ENG	LISH		□ вотн	
CHECK ALL APPROPRIAT	E BOXES:							
HEAT TRANSFER:		FINITE	DIFFERENCE		☐ RESPONS!	FACTOR	STEADY ST.	ATE
SOLAR COMP. CALCU	LATED:	₩ DIFFUS	E/DIRECT/RE-	RADIATED	☐ DIFFUSE	DIRECT	D TOTAL	
INTEGRATION:		SIMPLE			☐ IMPLICE		OTHER	
SHADING:	-	ANY SO	LAR OBSTRUCT	ION	-	ONLY	□ NO SHADING	G
MOVABLE SHADING:		-	SEASONAL S			SWITCHING		
MASS EFFECT IS CAL		M TRANSII	ENT HEAT FLO	w	_		ASSUME NO	
ROOM TEMP. BASED	ON:	SURFACE			AIR ONLY		□ NOT CALCUI	
INSIDE TEMPERATUR	E:		SCHEDULE BY	USER	☐ FIXED BY		□ VARIED BY	
U-VALUES:		•	W/WIND SPEE		D REMAIN		MOVABLE II	
INFILTRATION:			ANGE PER HOU		CRACK M			
INTERNAL LOADS IN	CLUDE:		LE & LATENT			LAT. TOTAL	□ VARIES W/I	
VENTILATION:		O SENSIBI			☐ LATENT	DAT. IOTAL	☐ SENSIBLE ( ☐ VARIES BY OR COMMANT	SCHEDULE
DAYLIGHT COEFFICI	ENTS:	SKY, RE	FL. & DIREC	r	SKY & RI	FL.	SKY ONLY	
ZONES PER RUN:		> 25					1 or	VLY
SYSTEM MODELING:		- \	EFFIC. INPU				COMPONENT	
ECONOMIC ANALYSIS:	<b>.</b>	☐ ANNUAL			☐ SIMPLE I		□ LIFE CYCLE	
OUTPUT:	•			-	_			
	<b>ب</b>	_						
	COMPONEN		ZONE	_	BUILDING	•		
	HOUR		DAY		☐ HONTH	•	SEASON	YEAR
TEMPERATURES:	AIR		SURFACE		GRAPHIC F	LOT		
FUEL USE BY:	O MONTHLY OTHER				CONSUMPTION PEAK DEMAND	, [	SYSTEM COMPONE ENERGY SYSTEMS TOTAL BUILDING	5 , <i>j</i>



SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

GERMANY

Section Section

HARDWARE:							70 C	ecolos d
COMPUTER TYPE:	☐ IBM	•	□ coc	٠.	☐ UNIVAC	X OTHER _	187	45/Siemt
CORE REQUIRED:	> 50	DK	<b>≥</b> €100	) - 500 K	C 25	5 - 100 K	□ < 25	K
SUPPORT:	□ USER	's <b>c</b> ui	DE	☐ DATA	MANUAL	OTHER		
EQUIPMENT:	☐ CRT	•	<b>≥</b> PRINT	ER	☐ TEXTRONIX	OTHER		
COSTS:								
ASSUMING PURCHASE O	F SOFTWAR	E FOR	USE ON PRESENT	TIME-SH	ARING:			
FIRST COST:					· · · · · · · · · · · · · · · · · · ·			
IN-OFFICE EQUIPM	IN-OFFICE EQUIPMENT:		CRT		PRINTER			
SOFTWARE PURCHAS	SOFTWARE PURCHASE:		CARD DECK					
SUPPORT INFORMAT	SUPPORT INFORMATION:		USER'S GUIDE		DATA HANUA	ır	OTHER	
TIME TO INPUT AND	DEBUG:		MAN-	DAYS	MAN	-Bours		
RUN -COST/TIME:								
INPUT SET-UP TIME	£:	_	MAN-	DAYS	HAN	-HOURS		
TYPICAL* RUK TIM	i:	D >	I HR.	□ 60	M - 30 M	□ 30 H -	10 H	□ < 10 H
TYPICAL* CPU TIM	E:	<b>-</b> >	1000 SEC.	<b>□</b> 10	0 - 1000 SEC.	□ 5 - 100	SEC.	□ < 5 SEC.
*FOR THIS FORM, ASSUM SECTION 2.	Œ TYPICA	т. то	BE A SINGLE-2	ONED 100	SQUARE METER RE	SIDENCE WITH A	LL OUTPUTS C	HECKED (/) IN
ASSUMING USE OF SOFT	WARE ON E	UBLIC	TIME-SHARING	NETWORKS	:			
NAMES AND CONTACT THROUGH THEM).	S OF TIME	-shar	NG SERVICES W	HICH HAV	E THIS PROGRAM A	VAILABLE (EXAC	COSTS CAN	BE OBTAINED
<del> </del>					<del> </del>			
	<del></del>		<del></del>					·
			· · · · · · · · · · · · · · · · · · ·				·	
						•		

IEA

ITALY

#### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS

TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO: LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS

GENERAL:				
TOOL NAME: More	AVAILABLE THROUGH: CNR			
DEVELOPED BY: B. Boni, M. Dalponte,				
R. Rozzi,				
Fiat Engineering	-			
via Belfiore 23 - Torino -	PHONE NO.:			
	SUPPORTED BY:	Dr. Franco Vivona		
DATE DEVELOPED:		Direzione CNR/PFE		
DATE OF LAST REVISION:		Via Nizza 128		
		00198 Roma		
	PHONE NO.:	06-854389		
BRIEF DESCRIPTION: More is a sophisticated				
loads using transfer functions.	(Please find	d enclosed paper)		
		·		
	- <del> </del>			
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.				
	•	· ·		

#### **TOOL HARDWARE & AVAILABLE FORMS:**

- MAIN FRAME COMPUTER
- ☐ HICRO-COMPUTER
- HAND CALCULATOR
- ☐ GRAPHIC OR MANUAL

- ☐ CARD DECK

   TAPE
   TIME SHARING
   LISTING HARD COPY
- ☐ TAPE ☐ LISTING
- ☐ TEMPLATES, CHARTS, TABLES DEVICE

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

(COMPLETE SECTIONS 1, 2, 3)

(COMPLETE SECTIONS 1, 2, 4)

(COMPLETE SECTIONS 1, 2, 5)

(COMPLETE SECTIONS 1, 2, 6)



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

ITALY

SECTION

INTENDED USE:				
INTENDED FOR USE BY:				
🖾 ARCHITECT 🖾 ENGINEER 🔲 TECHNICIAN 🗗 RESEARCH	ANALYST			
PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):	Think 191			
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DE	EVEL.   POST-D	FSIGN SE	RV. ☑ RESI	******
PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):		, 20 10K 3E	74 FR KE21	ARCH
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN DE	VEL. M POST-D	ESIGN SEI	RV. KO RESI	ARCH
MAJOR & MINOR ENERGY COMPONENTS A				
IXI HEATING IXI COOLEND	DHW		MISCELLANEOL	ıc
LOADS SPACE TEMPS.	☐ LOADS ☐ SOLAR ACTIV ☐ SOLAR PASSI ☐ ECONOMICS	E	FANS O PUMPS O MISC. ELE	CTRICAL.
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 LOCAL ENERGY COSTS GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.) LIGHTING REQUIREMENTS	وموموموهم	900088000 000088808	00000000	00000000
SCHEMATIC DESIGN DATA	~	-	u	u
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES	. 60000	SESSE	00000	00000
ARCHITECTURAL DESIGN DEVELOPMENT DATA	_	_		U
BUILDING MATERIALS & ASSOCIATED DATA (R, Q, E, ETC.) BUILDING MASS DATA SHADING COEFFICIENTS & DAYLIGHT TRANSHISSION INTERIOR SURFACE DATA	0000	31 NO.	0000	0000
ENGINEERING DESIGN DEVELOPMENT DATA		•		
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL	00000	000000	. 000000	وممومه
		-	<del></del>	~ /

MORE

IEA

BOLAR RED

ITALY

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



MA MINE		& ANAL	YSIS MOD	ELS	S	
一个里才用个						
WEATHER D	ATA:					
TEMPERATURE DATA:	HOURLY 1	TAPE M TYPICAL DAY DEGREE DAYS ME. MO	D MONTHLY DATA	ANNUAL DATA  AVE. MONTHLY T	☐ MONTHLY DEGREE DAYS EMP. ☐ DAILY	
SOLAR DATA:	D HOURLY T	TAPE TYPICAL D	Y PROFILE	☐ MONTHLY AVE. D	AILY & TOTAL	
SOLAR ORIENS. CALC:			ANY VERT. & HORIZ.		& 4 CARDINAL DIREC.	
DAYLIGHT CALC:	HOUR-BY-		EAR & CLOUDY DAY/MON	TH TYPICAL	DAY/MONTH	
CALCULATIO	N PRO	CEDURES:				
		<del></del>				
LANGUAGE: S FORTRAN DEASIC DEACHINE LANGUAGE DOTHER DESCRIPTION GRAPHS, CHARTS & SIMPLE CALC.  USER TYPE: DINTERACTIVE DINTERACTIVE GRAPHIC SPREPARE FILE DEAND CALCULATION						
UNITS OF CALCULATION			PHIC ☑ PREPAR! ☐ ENGLISH	<del>-</del> · ·	ND CALCULATION	
CHECK ALL APPROPRIAT	_	2 011215	_ ENGLISH	ы.	BOTH	
HEAT TRANSFER:	2 201122 1	☐ FINITE DIFFERENCE	K RESPONSI	FACTOD	STEADY STATE	
SOLAR COMP. CALCU	LATED:	_		_	TOTAL	
INTEGRATION:		SIMPLE EULER	☐ IMPLICIT		OTHER	
SHADING:		ANY SOLAR OBSTRUCTI		<del>-</del>	NO SHADING	
MOVABLE SHADING:		M DAILY & SEASONAL SW		. –	NOT CALCULATED	
MASS EFFECT IS CA	LCULATED:	TRANSIENT HEAT FLOW		_	ASSUME NO MASS AFFECT	
ROOM TEMP. BASED		SURFACE & AIR	⊠ AIR ONL)	_	NOT CALCULATED	
INSIDE TEMPERATUR	E:	☐ INPUT SCHEDULE BY U	<del>-</del>	_	VARIED BY TOOL	
U-VALUES:		CHANGE W/WIND SPEED	_	_	HOVABLE INSULATION	
INFILTRATION:		AIR CHANGE PER HOUR		_	VARIES W/WIND SPEED	
INTERNAL LOADS IN	CLUDE:	SENSIBLE & LATENT S	_	-	SENSIBLE ONLY	
VENTILATION:		☐ SENSIBLE	☐ LATENT		VARIES BY SCHEDULE OR COMMAND	
DAYLIGHT COEFFICI	ENTS:	SKY, REFL. & DIRECT	☐ SKY & RI	FL.	SKY ONLY	
ZONES PER RUN:		D > 25	<b>3</b> 10 - 25	<b>2</b> - 10	□ 1 ONLY	
SYSTEM HODELING:		SYSTEM EFFIC. INPUT	SYSTEM C	PTIMIZING	COMPONENT SENSITIVITY	
ECONOMIC ANALYSIS:	:	ANNUAL COST	SIMPLE I	PAYBACK	LIFE CYCLE COSTING	
OUTPUT:						
LOAD DETERMINANTS:	COMPONENT	ZONE	☐ BUILDING			
LOADS OUTPUT BY:	13 HOUR	D DAY,	☐ MONTH	. D SEAS	SON D YEAR	
TEMPERATURES:	M AIR	SURFACE	GRAPHIC F			
FUEL USE BY:	D HONTHLY I	PEAK DEMAND	ANNUAL CONSUMPTION ANNUAL PEAK DEMAND OTHER	ENER	TEM COMPONENTS RGY SYSTEMS AL BUILDING ONLY	

MORE

ITALY



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:					,	
COMPUTER TYPE:	□ IBH	🗆 със	UNIVAC	☐ OTHER	DIGITAL V	X_11/780_
CORE REQUIRED:	□ > 500K	<b>⊠</b> 100 − 500 :	K 🗀 25 -	100 K	□ < 25 I	ξ.
SUPPORT:	USER'S GUIDE	DATA	MANUAL	OTHER		
EQUIPMENT:	<b>™</b> CRT	M PRINTER	TEXTRONIX	X) OTHER	PLOTTER	
COSTS:	of software for use	ON PRESENT TIME-S	HARING:			
FIRST COST:			<del></del> -			
IN-OFFICE EQUIPM	ENT: CRT		PRINTER		-	
SOFTWARE PURCHAS	E: CARD	DECK	TAPE		LISTING	
SUPPORT INFORMAT	ION: USER	'S GUIDE	DATA HANUAL		OTHER	
TIME TO INPUT AN	D DEBUG:	MAN-DAYS	MAN-E	IOURS		
RUN COST/TIME:			4			
INPUT SET-UP TIM	E: 1-	2 MAN-DAYS	MAN-E	IOURS		•
TYPICAL* RUN TIM	E: 🗆 > 1	HR. 🗆 6	0 н - 30 н	<b>⊠</b> 30 M	- 10 M	□ < 10 H
TYPICAL* CPU TIM	E: 🗀 > 10	00 SEC. 🔯 1	00 - 1000 SEC.	□ 5 ~ 1	00 SEC.	□ < 5 SEC.
*FOR THIS FORM, ASSU SECTION 2.	ME "TYPICAL" TO BE	A SINGLE-ZONED 10	O SQUARE METER RESI	DENCE WITH	ALL OUTPUTS CHI	ECKED (/) IN
ASSUMING USE OF SOF	TWARE ON PUBLIC TI	ME-SHARING NETWORK	<u>s</u> :			•
NAMES AND CONTACTHROUGH THEM).	TS OF TIME-SHARING	SERVICES WHICH HA	VE THIS PROGRAM AV	ALLABLE (EX	ACT COSTS CAN BE	OBTAINED .
Ing. B	runo Boni					
c/o Fi	at Engineer	ing				
Via Be	lfiore 23					
Torino					•	

MORE

IEA

BOLAR RED

ITALY

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



### FOR DESIGN TOOLS REQUIRING A MICRO-COMPUTER

ANDOM ACCESS MEMO	RY (RAM) REQUI	RED:	140	к	•	
DES THIS TOOL REC	UIRE A PRINTER	17 (25	YES	□ NO		
UPPORT:	M USER'S	MIDE	0	DATA MANUAL	OTHER	
OSTS:	•		•			
IRST COST:						
MICRO-COMPUTER:	~ 50.00	0.000.1	ire		•	
SOFTWARE:	ROM IC	DIS	c	TAPE	LISTING	·
SUPPORT INFORMA	TION:	USER'S GU	IDE	·	DATA HANUAL	OTHER
TIME TO INPUT,	ND DEBUG:		MAN-DAY	s	MAN-HOURS	
UN COST/TIME:						,
TYPICAL* INPUT	SET-UP TIME:	1_	_ man-day	s	MAN-HOURS	
TYPICAL* RUN TE	ME:	> 1	HRS.		MIN.	
TYPICAL* PRINT	TIME:		HRS.		min.	
OR THIS FORM, ASS	UME "TYPICAL"	TO BE A SI	NGLE-ZONE	D 100 SQUARE HE	TER RESIDENCE WITH AL	L OUTPUTS CHECKED (/) I

ITALY

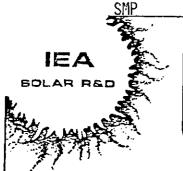


### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

### FOR DESIGN TOOLS REQUIRING A HAND-HELD CALCULATOR

HARDWARE:				·		
MANUFACTURER AND MODEL NUMBER	R: TEXAS IN	NSTRUM. TI-	59		• •	
DOES THIS TOOL REQUIRE A PRI	NTER?	res 🗆 no			•	
SUPPORT:   Support:	'S GUIDE	D DATA MANUA	L	OTHER		
COSTS:						
FIRST COST:						
HARDWARE:	CALCULATOR		PRINTER			
SOFTWARE:	MAGNETIC CARD		LISTING		OTHER	<del> </del>
SUPPORT INFORMATION:	USER'S GUIDE		DATA MANUAL	<del></del>	OTHER	
RUN COST/TIME:						
TYPICAL* INPUT SET-UP TIM	E:	HRS	MIN.		ı	
TYPICAL* RUN TIME:		HRS.	MIN.			·
TYPICAL* PRINT TIME:	<u> </u>	HRS.	MIN.			
*FOR THIS FORM, ASSUME "TYPIC SECTION 2.	AL" TO BE A SING	LE-ZONED 100 SQUA	RE METER RESI	DENCE WITH ALL O	UTPUTS CHECKED	(v') in .



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS





TASK VIII - PASSIVE AND HYBRID SOLAR	RETURN TO:
LOW ENERGY DWELLING	

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS

GENERAL:	-	odules Simulation)	AVAILABLE THROUGH:	<b>,</b> .
DEVELOPED BY:	FEDERICO	BUTERA ·	FEDERI CO	BUTERA
	SERGIO F	ARRUGGIA	ISTITUTO	DI FISICA TECNICA
		CO_RIZZO ILVESTRINI	PHONE NO.: 091 - 48	
DATE DEVELOPED:	1000		·	LIO NAZIONALE DELLE RICERC
DATE OF LAST REV	•	·		
BRIEF DESCRIPTIO	therma	lly connected.	PHONE NO.:  nermal behaviour of on  and sunspaces can be a	
		F TESTING REPORTS.	·	
TOOL HAP	RDWARE	& AVAILABLE F	ORMS:	
HAIN FRAME O	OMPUTER 🖸	MI CRO-COMPUTER	D HAND CALCULATOR	C GRAPHIC OR MANUAL
		DISC TAPE LISTING RECALL ONLY MEMORY—INTEGRATED CIRCUIT  (COMPLETE SECTIONS 1 2	☐ MAGNETIC CARD ☐ LISTING ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT  (COMPLETE SECTIONS 1, 2,	☐ TEMPLATES, CHARTS, TABLES ☐ BOOK ☐ DEVICE  (COMPLETE SECTIONS 1 2 6)

IEA SOLAR HED

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

ITALY

#### COMMENTS:

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

SMP

ITALY



# SURVEY FORM FOR



SOLAR RED	ENERGY DI	ESIGN TOOL	s		CTIO
Man Miles	& ANALY	SIS MODELS	;		SEC
INTENDED USE:					
INTENDED FOR USE BY:  ARCHITECT ENGINEER  PHASE FOR WHICH DESIGN TOOL WAS IT  PRE-DESIGN SITE ANALYS  PHASE(S) FOR WHICH DESIGN TOOL MA  PRE-DESIGN SITE ANALYS  MAJOR & MINOR EN	DEVELOPED (1 ONLY):  SIS D SCHEMATICS [ AY RE USEFUL (ANY NO.):  SIS D SCHEMATICS \$  ERGY COMPON	DESIGN DEVEL. POS	T-DESIGN SER T-DESIGN SER	ív. 🗶 res	SEARCH SEARCH
HEATING COOLING	-	☐ DHW		MISCELLANEC	ນປຣ
HVAC SYSTEMS HVAC PASSIVE SOLAR PASSIVE SOLAR ACTIVE SOLAR SHADING SYSTEM SHADING SYSTEM DESIGN ECONOMICS	E TEMPS.	DESIGN DESIGN SOLAR PARTIES DECONOMICS	SSIVE	D FANS D PUMPS D MISC. EL	ECTRICAL ESCALATOR
INPUT DATA REQUIR PRE-DESIGN AND SITE ANALYSIS DATA	<del></del>	DOES NOT ACCOMMODAT		RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
LOCATION - ASSOCIATED WEATHER BUILDING TYPE AND SCHEDULE OCCUPANCY RATES BUILDING AREA SPACE TEMPERATURES LOCAL ENERGY COSTS GENERIC BUILDING SHAPE DUE TO LOCAL CODE REQUIREMENTS (VENTI) LIGHTING REQUIREMENTS	DATA SITE RESTRICTIONS	موم فهمومو	و درمودودو	مووورياهم	
SCHEMATIC DESIGN DATA		-	_		. С
BUILDING SURFACE AREAS CLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES		0000	00000		
ARCHITECTURAL DESIGN DEVELOPMENT I	DATA	_	_		
BUILDING MATERIALS & ASSOCIATED BUILDING MASS DATA SHADING COEFFICIENTS & DAYLIGHT INTERIOR SURFACE DATA	DATA (R, a, E, ETC.)	000		0000	999
ENGINEERING DESIGN DEVELOPMENT DATE	ra .			•	
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM DESIGN			مهمهم	٥٥٥٥٥	00000

LOAD DETERMINANTS:

LOADS OUTPUT BY:

TEMPERATURES:

FUEL USE BY:

☐ COMPONENT

# HONTHLY CONSUMPTION

O MONTHLY PEAK DEMAND

🗾 AIR

□ OTHER

**■** 20NE

DAY

# SURFACE

☐ BUILDING

GRAPHIC PLOT

SEASON

☐ SYSTEM COMPONENTS ☐ ENERGY SYSTEMS

TOTAL BUILDING ONLY

☐ YEek

MONTH

ANNUAL CONSUMPTION D ANNUAL PEAK DEHAND

OTHER

IEA SURVEY FORM FOR ECTION SOLAR RED **ENERGY DESIGN TOOLS** & ANALYSIS MODELS ഗ WEATHER DATA: HOURLY TAPE T T ANNUAL DEGREE DAYS TEMPERATURE DATA: TYPICAL DAY . MONTHLY DATA ANNUAL DATA ☐ MONTHLY DEGREE DAYS AVE. HONTHLY 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. 6 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: □ BASIC ☐ MACHINE LANGUAGE ☐ OTHER ☐ GRAPHS, CHARTS & SIMPLE CALC. ☐ INTERACTIVE ' USER TYPE: ☐ INTERACTIVE GRAPHIC PREPARE FILE ☐ HAND CALCULATION UNITS OF CALCULATION: SI UNITS ☐ ENGLISH □ BOTH CHECK ALL APPROPRIATE BOXES: BEAT TRANSFER: finite difference ☐ RESPONSE FACTOR ☐ STEADY STATE SOLAR COMP. CALCULATED: diffuse/direct/re-radiated D DIFFUSE/DIRECT ☐ TOTAL INTEGRATION: SIMPLE EULER IMPLICIT □ OTHER SHADING: ANY SOLAR OBSTRUCTION O OVERHANG ONLY O NO SHADING HOVABLE SHADING: ☐ DAILY & SEASONAL SWITCHING # SEASONAL SWITCHING D NOT CALCULATED MASS EFFECT IS CALCULATED: TRANSIENT HEAT FLOW ☐ TIME CONSTANT FACTORS ☐ ASSUME NO MASS AFFECT ROOM TEMP. BASED ON: SURFACE & AIR AIR ONLY D NOT CALCULATED INSIDE TEMPERATURE: ☐ INPUT SCHEDULE BY USER FIXED BY TOOL VARIED BY TOOL U-VALUES: **₾** CHANGE W/WIND SPEED D REMAIN CONSTANT ☐ MOVABLE INSULATION INFILTRATION: AIR CHANGE PER HOUR CRACK METHOD W VARIES W/WIND SPEED INTERNAL LOADS INCLUDE: ☐ SENSIBLE & LATENT SEPARATE ☐ SENS. & LAT. TOTAL 📝 SENSIBLE ONLY VENTILATION: TI SENSIBLE □ LATENT VARIES BY SCHEDULE OR COHMAND DAYLIGHT COEFFICIENTS: SKY, REFL. & DIRECT ☐ SKY & REFL. SKY ONLY ZONES PER RUN: □ 10 - 25 **2** - 10 D 1 ONLY SYSTEM MODELING: SYSTEM EFFIC. INPUT SYSTEM OPTIMIZING COMPONENT SENSITIVITY ECONOMIC ANALYSIS: ANNUAL COST ☐ SIMPLE PAYBACK LIFE CYCLE COSTING OUTPUT:

ITALY

IEA BOLAR RED

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

ITALY



### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE	<u>:</u>		•			
COMPUTER TYPE:	<b>∌</b> 1BM	□ сос	□ UNIVAC	OTHER	,	4
CORE REQUIRED:	□ > 500K	<b>2</b> 100 - 500 1	C 🗆 25	- 100 K	□ < 25 1	
SUPPORT:	☐ USER'S GUIDE	D DATA	MANUAL	TOTHER D	escription	of olgorithm
EQUIPMENT:	CRT '	☐ PRINTER				used
COSTS:						
ASSUMING PURCHASE	OF SOFTWARE FOR USE	ON PRESENT TIME-SH	ARING:			
FIRST COST:	•			F		
IN-OFFICE EQUIP	MENT: CRT		PRINTER		•	
SOFTWARE PURCHA	•	DECK			LISTING	
SUPPORT INFORMA		S GUIDE				
TIME TO INPUT: A		MAN-DAYS	MAN			
RUN COST/TIME:		•				
INPUT SET-UP TIE	ME:	MAN-DAYS	3 HAN	-HOURS		
	HE: 🗀 > 1 H					<b>Љ</b> < 10 н
	Æ: □ > 100					
*FOR THIS FORM, ASSI SECTION 2.	ME "TYPICAL" TO RE	A SINGLE-ZONED 100	SQUARE METER RE	SIDENCE WITH A	LL OUTPUTS CHE	CKED (,/) IN
ASSUMING USE OF SOF	TWARE ON PUBLIC TIM	E-SHARING NETWORKS	:			
1100001: IIII,17:	CTS OF TIME-SHARING	•	E THIS PROGRAM AV	VAILABLE (EXACT	COSTS CAN BE	OBTAINED
	DI FISICA TECNI	CA	CUC			
	DI INGEGNERIA		CENTE	RO UNIVERSI	TARIO DI CA	LCOLO
VIALE DELI	LE SCIENZE	·	VIALE	DELLE SCI	ENZE	
90128 P/	ALERMO (ITALY)		90128	PALERMO	(ITALY)	

IEA SOLAR RED

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

ITALY



TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO:
LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS

GENERAL:			
TOOL NAME: AZIZ			,
DEVELOPED BY: FEDERICO BUT	ERA	AVAILABLE THROUGH: FEDERICO	
SERGIO FARRU		<del></del>	<del></del>
GIANFRANCO R			DI FISICA TECNICA
GIANNI SILVE		VIALE DEL	LE SCIENZE - PALERMO (ITALY 488780
DATE DEVELOPED: 1980		SUPPORTED BY: CONS	IGLIO NAZIONALE DELLE RICER
DATE OF LAST REVISION: JUNE	1982		
01 111261	nases of multisto rnal partitions i	SMP, is intended to rey buildings design s simplified in order may be simulated.	process. The description to reduce the number
PLEASE ATTACH ANY VALIDATION OR 1			
TOOL HARDWARE &		FORMS:	
MAIN FRAME COMPUTER D HI	CRO-COMPUTER	D HAND CALCULATOR	☐ GRAPHIC OR HANUAL
EX TAPE EX TIME SHARING CX LISTING - HARD COPY  (COMPLETE SECTIONS 1, 2, 3)	DISC TAPE LISTING RECALL ONLY MEMORY-INTEGRATED CIRCUIT OMPLETE SECTIONS 1, 2,	☐ MAGNETIC CARD ☐ LISTING ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT	☐ TEMPLATES, CHARTS, TABLES ☐ BOOK ☐ DEVICE

IEA BOLAR RED

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

ITALY



The language	& ANAL	YSIS N	MODELS			SE(
		<u>.</u>	· · · · · · · · · · · · · · · · · · ·			_)
INTENDED USE:						•
INTENDED FOR USE BY:						
ARCHITECT ENGINEER	☐ TECHNICIAN	☐ RESEARC	T ANALYSE			:
PHASE FOR WHICH DESIGN TOOL WAS DEVI		C) KESEAKU	n AMALISI			
PRE-DESIGN   SITE ANALYSIS	□ SCHEMATICS	☐ DESIGN	DEVEL. El Post.	-DESIGN SEI	. D 5-0	F . D G !!
PHASE(S) FOR WHICH DESIGN TOOL HAY I			D 1032	DESIGN SE	RV. 🗆 RES	LAKUH
pre-design	☐ SCHEMATICS	☐ DESIGN	DEVEL. D POST-	DESIGN SEE	RV. □ RESI	EARCH
MAJOR & MINOR ENER	RGY COMP	ONENTS	ADDRESS	ED BY	TOOL	
MEATING COOLING	☑ LIGH		DHW		MISCELLANEO	JS
LOADS  SPACE TEMPS.  SPACE I MPS.  HVAC SYSTEMS  PASSIVE SOLAR  ACTIVE SOLAR  SHADING  SYSTEM DESIGN  CONOMICS  UNDERGROUND  LOADS  MASS  LOADS  LOAD	CLNG. ST	DADS C(LUX) LEVELS YSTEM DESIGN CONOMICS AYLIGHTING FC(LUX) LEVELS RTIFICIAL LING REDUCTION	□ LOADS □ SOLAR ACTI □ SOLAR PASS □ ECONOMICS	VE	D FANS D PUMPS D MISC. ELE	ECTRICAL
INPUT DATA REQUIRED	<u>):</u>		DOES NOT	MINIMUM	RECOMMENDED	TOTAL POSSIBLE
PRE-DESIGN AND SITE ANALYSIS DATA			ACCOMMODATE	INPUT	INPUT	INPUT
LOCATION - ASSOCIATED WEATHER DAT BUILDING TYPE AND SCHEDULE OCCUPANCY RATES BUILDING AREA SPACE TEMPERATURES LOCAL ENERCY COSTS GENERIC BUILDING SHAPE DUE TO SIT LOCAL CODE REQUIREMENTS (VENTIL., LIGHTING REQUIREMENTS	E RESTRICTIONS		وووهمووو	وطموموموه	Acycocok	айсойхося
SCHEMATIC DESIGN DATA						
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES						accad.
ARCHITECTURAL DESIGN DEVELOPMENT DATA	<b>.</b>			_		~
BUILDING MATERIALS & ASSOCIATED DA BUILDING MASS DATA SHADING CCEFFICIENTS & DAYLIGHT TO INTERIOR SURFACE DATA		>			وممم	মতাবাজ
ENGINEERING DESIGN DEVELOPMENT DATA						
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL				) Description of the control of the	وووووو	מממממ

AZIZ

ITALY



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



THAT I		a AIVA	ILYSIS	MODEL	s )	Thursday, and	<b>3</b> 00 ∫
WEATHER [	DATA:			······································			
TEMPERATURE DATA:	5 HOURLY	TAPE Ø TYPICAL I DEGREE DAYS DE AVE	DAY <b>S</b> O MONT E. MONTHLY M:	THLY DATA   AND MAX.   A	NNUAL DAI	A D MONTHLY	Y DEGREE DAYS DAILY
SOLAR DATA:	MOURLY		L DAY PROFII			E. DAILY & TOTA	
SOLAR ORIENS. CALC:	any ori	IEN. INCL. SLOPED		ERT. & HORIZ.			
	☐ SLOPED	FACING SOUTH	SURFAC	E REFLECTANCE	D nox	IZ. & 4 CARDINA	T DIREC.
DAYLIGHT CALC:	☐ HOUR-BY	-HOUR TYPICA AVERAGE OTHER	1 CLEAR & CL	HINOM/YAG YGUO.	TYPI	CAL DAY/MONTH	
CALCULATIO	ON PRO	CEDURES:				,	
LANGUAGE: 🔁 FORT			NCHACE -	OTT TO			
USER TYPE:	INTERACTIVE	' D INTERACTIVE		OTHER			
UNITS OF CALCULATIO	N: <u>D</u> ≥r:	SI UNITS	D EN			HAND CALCULAT	100
CHECK ALL APPROPRIA	TE BOXES:		<b>_</b>			□ BOTH	
HEAT TRANSFER:		FINITE DIFFERENCE	CE.	RESPONSE FACT	OR	STEADY STA	Tr
SOLAR COMP. CALC	ULATED:	d DIFFUSE/DIRECT/		D DIFFUSE/DIREC		D TOTAL	1.5
INTEGRATION:		C SIMPLE EULER		☐ IMPLICIT	•	OTHER	
SHADING:		M ANY SOLAR OBSTRU	JCTION	OVERHANG ONLY		□ NO SHADING	
MOVABLE SHADING:	•	D DAILY & SEASONAL	SWITCHING	ST SEASONAL SWIT		D NOT CALCULA	TED
MASS EFFECT IS CA	ALCULATED:	TRANSIENT HEAT F		☐ TIME CONSTANT			
ROOM TEMP. BASED	ON:	SURFACE & AIR		☐ AIR ONLY	***************************************	D NOT CALCULA	
INSIDE TEMPERATUR	Œ:	☐ INPUT SCHEDULE B	Y USER	TIMED BY TOOL		₩ VARIED BY 1	
U-VALUES:	•	CHANGE W/WIND SP	EED	T REMAIN CONSTA		☐ MOVABLE INS	
INFILTRATION:		AIR CHANGE PER H	OUR	CRACK METHOD	_	NOTABLE 185	
INTERNAL LOADS IN	CLUDE:	SENSIBLE & LATEN	T SEPARATE	☐ SENS. & LAT.	TOTAL.	SENSIBLE ON	
VENTILATION:		☐ SENSIBLE		□ LATENT		VARIES BY S	
. DAYLIGHT COEFFICE	ENTS:	D SKY, REFL. & DIR	ECT	☐ SKY & REFL.		SKY ONLY	
ZONES PER RUN:		D > 25	□ 10 - 25	□ 2	- 10	<b>₽</b> 1 ONL	Y
SYSTEM MODELING:		SYSTEM EFFIC. IN	PUT	EX SYSTEM OPTIMIZ	:ING	C COMPONENT S	
ECONOMIC ANALYSIS	•	ANNUAL COST		SIMPLE PAYBACK	1	LIFE CYCLE	COSTING CO
OUTPUT:		. •					
LOAD DETERMINANTS:	☐ COMPONENT	T 🙇 ZONE	ſ	BUILDING			İ
LOADS OUTPUT BY:	🗷 hour	₽ DAY	•	E- MONTH	D-r	EASON	
TEMPERATURES:	AIR 🖾	☐ SURFACE		GRAPHIC PLOT	. HOT'S	PVOON	D XEM
FUEL USE BY:	MONTHLY OF MONTHLY IN OTHER	CONSUMPTION	□ YMMYT	CONSUMPTION PEAK DEMAND		YSTEM COMPONENT NERGY SYSTEMS	rs



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



### FOR DESIGN TOOLS REQUIRING A. MAIN FRAME COMPUTER

·					
HARDWARE:					
COMPUTER TYPE:	<b>Ж</b> 18М	□ coc	□ UNIVAC	OTHER	
CORE REQUIRED:	□ > 500K	<b>100 - 500</b>	K 🗆 25	– 100 K	□ < 25 K
SUPPORT:	USER'S GUIDE	□ DAT	A HANUAL	OTHER De	scription of Algorithm
EQUIPMENT:	CRT '	☐ PRINTER	☐ TEXTRONIX	OTHER	ise
COSTS:					
ASSUMING PURCHASE OF	SOFTWARE FOR USE	ON PRESENT TIME-	SHARING:		
FIRST COST:					
IN-OFFICE EQUIPMENT	NT: CRT_		PRINTER		
SOFTWARE PURCHASE			TAPE		LISTING
SUPPORT INFORMATIO			DATA MANUAL		
TIME TO INPUT AND			MAN-		
RUN COST/TIME:					
INPUT SET-UP TIME:	·	MAN-DAYS	MAN-1	HOURS	
TYPICAL* RUN TIME:	□ > 1 H	R. 🗀 (	60 м - 30 м	□ 30 M - 10	н 🖾 < 10 н
TYPICAL* CPU TIME:	: □ > 100	O SEC. 🗀 J	00 - 1000 SEC.	Æ 5 + 100 s	EC. □ < 5 SEC.
*FOR THIS FORM, ASSUME SECTION 2.	TYPICAL TO BE	A SINGLE-ZONED 10	00 SQUARE METER RES	IDENCE WITH ALL	OUTPUTS CHECKED (,') IN
ASSUMING USE OF SOFTW	ARE ON PUBLIC TIM	E-SHARING NETWORK	<u>ss</u> :		
NAMES AND CONTACTS THROUGH THEM).	OF TIME-SHARING	SERVICES WHICH HA	VE THIS PROGRAM AV	ALLABLE (EXACT (	COSTS CAN BE OBTAINED
ISTITUTO DI	FISICA TECNI	CA	CUC	2	
FACOLTA' DI	INGEGNERIA	<u> </u>	CEN	NTRO UNIVERS	ITARIO DI CALCOLO
VIALE DELLE	SCIENZE				IENZE
90128 PAL	ERMO (ITALY)	-			-(ITALY)

IEA BOLAR RAD

(COMPLETE SECTIONS 1, 2, 3)

NORWAY

### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS



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

(COMPLETE SECTIONS 1, 2, 6)

		Ing 116
GENERAL:	2000	Lyngby - Danmark
TOOL NAME: BYVOK	AVAILABLE THROUGH:	* .
DEVELOPED BY:	_	Institute of Technolog
B.T. Larsen,	Trondheim,	
Norwegian Building Research		
Institute, Oslo, Norway	PHONE NO.: (075)	94000
	SUPPORTED BY:	
DATE DEVELOPED: 1970	Department	of Heating, Ventila-
DATE OF LAST REVISION: 1972	ting and Sa	anitary Engineering,
	Norwegian I	Institute of Technolog
	PHONE NO.: _(075) 9	34000
BRIEF DESCRIPTION: For one day the program	calculates hourl	ly heating or cooling
loads of a room (zone) using the		
also calculates hourly temperature		
air if the room is ventilated by		
	<u> </u>	
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.		
TO 01 11 - D 11 11 - 1		
TOOL HARDWARE & AVAILABLE FO	PMS:	• •
MAIN FRAME COMPUTER ☐ MICRO-COMPUTER ☐	HAND CALCULATOR	GRAPHIC OR MANUAL
CARD DECK DISC TAPE TAPE TIME SHARING DISTING LISTING - HARD COPY RECALL ONLY MEMORY-	☐ MACNETIC CARD ☐ LISTING ☐ RECALL ONLY MEMORY INTEGRATED CIRCUIT	☐ TEMPLATES, CHARTS, TABLES ☐ BOOK ☐ DEVICE
(COMPLETE SECRETARIA INTEGRATED CIRCUIT		(COMPLETE SECTIONS 1 2 A)

(COMPLETE SECTIONS 1, 2, 4)

(COMPLETE SECTIONS 1, 2, 5)

NORWAY



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION ,

#### COMMENTS:

Program is a computer implementation of:

- D.G. Stephenson and G.P. Mitalas: Cooling load calculations by thermal response factor method. Ashrae transactions, vol. 73, part 1, 1967.
- G.P. Mitalas and D.G. Stephenson:
   Room thermal response factors.
   Ashrae transactions, vol. 73, part 1, 1967.
- K. Kimura and D.G. Stephenson: Solar Radiation on cloudy days Ashrae transactions, vol. 75, part 1, 1969.
- K. Kimura and D.G. Stephenson: Theoretical Study of cooling load caused by lights. Ashrae transactions, vol. 74, part 2, 1968.

IEA BOLAR RED

**BYVOK** 

NORWAY

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

INTENDED USE:						
INTENDED FOR USE BY:						
☐ ARCHITECT ☑ ENGINEER	☐ TECHNICIAN	RESEARCI	H ANAT VCT			
PHASE FOR WHICH DESIGN TOOL WAS DEVELOR		L .LDDIAKO,	. AVALISI			
☐ FRE-DESIGN ☐ SITE ANALYSIS	☐ SCHEMATICS	DESIGN 1	DEVEL. TO POST	-DESIGN SEI	ov 🗖 pres	E A D GVI
PHASE(S) FOR WHICH DESIGN TOOL MAY BE I	SEFUL (ANY NO.):			. D#310N BEI	RV. 🗆 RESI	LARCH
☐ PRE-DESIGN ☐ SITE ANALYSIS	☐ SCHEMATICS	DESIGN I	DEVEL.   POST	-DESIGN SER	. ⊠ RESI	EARCH
MAJOR & MINOR ENERG	Y COMPON	JENTS				
⊠ HEATING ⊠ COOLING	LIGHTING		DHW			
LOADS SPACE TEMPS. HVAC SYSTEMS PASSIVE SOLAR ACTIVE SOLAR SHADING STATEM DESIGN CECONOMICS UNDERGROUND LOADS MASS  LOADS SPACE TEMPS. LOADS LOA	S. DADS  S. D FC (LU  DES D SYSTE  D GAYLI  D LOADS  ED LOADS	X) LEVELS CM DESIGN CMICS	D LOADS D SOLAR ACT D SOLAR PAS D ECONOMICS	IVE SIVE	MISCELLANEON FANS PUMPS MISC. ELE ELEV. & E	CTRICAL
INPUT DATA REQUIRED:		-	DOES NOT	MINIMUM	RECOMMENDED	TOTAL POSSIBLE
PRE-DESIGN AND SITE ANALYSIS DATA			ACCOMMODAT	E INPUT	INPUT	INPUT
LOCATION - ASSOCIATED WEATHER DATA BUILDING TYPE AND SCHEDULE OCCUPANCY RATES BUILDING AREA SPACE TEMPERATURES LOCAL ENERGY COSTS GENERIC BUILDING SHAPE DUE TO SITE RI LOCAL CODE REQUIREMENTS (VENTIL,, INS. LIGHTING REQUIREMENTS	ESTRICTIONS SUL., ETC.)		وومومومو		00000000	مممعممهم
SCHEMATIC DESIGN DATA		1.				u
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES	· · · · · · · · · · · · · · · · · · ·		0000		00000	
ARCHITECTURAL DESIGN DEVELOPMENT DATA			_		u	ب
BUILDING MATERIALS & ASSOCIATED DATA BUILDING MASS DATA SHADING C'EFFICIENTS & DAYLIGHT TRANS INTERIOR SURFACE DATA			0000	হাধ্যমান্ত	0000	0000
ENGINEERING DESIGN DEVELOPMENT DATA						
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL					. 200000	מסססם

BYVOK

NORWAY



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



May Mark		( & A	NALYSI	S MODEL	s)		<b>■</b> 88
WEATHER D	ATA:		· · · · · · · · · · · · · · · · · · ·	<del> </del>			
TEMPERATURE DATA:	HOURLY		CAL DAY D MON	THLY DATA DATA	ANNUAL DAT.	A [] MONTHLY LY TEMP.   D	
SOLAR DATA:	☐ HOURLY		YPICAL DAY PROFI			E. DAILY & TOTAL	
SOLAR DRIENS. CALC:	ANY ORI	EN. INCL. SLOPE FACING SOUTH		ERT. & HORIZ. CE REFLECTANCE	☐ HOR	IZ. & 4 CARDINAL	DIREC.
DAYLIGHT CALC:	☐ HOUR~BY-	-HOUR D T	YPICAL CLEAR & C	LOUDY DAY/MONTH	☐ TYPI	CAL DAY/MONTH	
CALCULATIO	N PRO	CEDURES	<u>:</u>				
LANGUAGE: D FORTE	RAN BAS	SIC   MACHI	NE LANGUAGE 😥	OTHER Algol	☐ GRA	APHS, CHARTS & 5	IMPLE CALC.
USER TYPE:	INTERACTIVE		CTIVE GRAPHIC			HAND CALCULATION	
UNITS OF CALCULATION	i: 🗷 S	I UNITS	□ E	NGLISH		□ вотн	
CHECK ALL APPROPRIAT	E BOXES:						
HEAT TRANSFER:		☐ FINITE DIF	FERENCE	E RESPONSE FAC	TOR	STEADY STATE	
SOLAR COMP. CALCU	LATED:	DIFFUSE/DI	RECT/RE-RADIATED	DIFFUSE/DIRE	CT	☐ TOTAL	
INTEGRATION:		SIMPLE EULE	ER	☐ IMPLICIT		☐ OTHER	
SHADING:		ANY SOLAR O	BSTRUCTION	OVERHANG ONL	r & fin	S NO SHADING	
MOVABLE SHADING:		D'DAILY & SEA	SONAL SWITCHING			□ NOT CALCULAT	TED
MASS EFFECT IS CA	LCULATED:	TRANSIENT F	EAT FLOW	TIME CONSTAN	T FACTORS	ASSUME NO MA	ASS AFFECT
ROOM TEMP. BASED	ON:	SURFACE & A	IR	AIR ONLY		□ NOT CALCULAT	
INSIDE TEMPERATUR	E:	INPUT SCHEI	OULE BY USER	TIXED BY TOO	L	□ VARIED BY TO	
U-VALUES:		CHANGE W/WI	ND SPEED	REMAIN CONST	ANT	☐ MOVABLE INSI	
INFILTRATION:		☐ Alr CHANGE	PER HOUR	CRACK METHOD		☐ VARIES W/WIN	
INTERNAL LOADS IN	CLUDE:	SENSIBLE &	LATENT SEPARATE	SENS. & LAT.	TOTAL	S SENSIBLE ON	
VENTILATION:		SENSIBLE	÷.	☐ LATENT		□ VARIES BY SO OR COMMAND	
DAYLIGHT COEFFICI	ENTS:	SKY, REFL.	& DIRECT	SKY & REFL.		SKY ONLY	
ZONES PER RUN:		D > 25	🗖 10 - S	25	2 - 10	⊠ 1 ONLY	:
SYSTEM MODELING:		SYSTEM EFFI	C. INPUT	SYSTEM OPTIM	IZ1NG	COMPONENT SE	NSITIVITY
ECONOMIC ANALYSIS:	:	ANNUAL COST		SIMPLE PAYBA	CK	☐ LIFE CYCLE O	OSTING
OUTPUT:							
LOAD DETERMINANTS:	COMPONENT	t 🔯 z	ONE	☐ BUILDING			
LOADS OUTPUT BY:	M HOUR	<b>□ D</b>	AY	☐ MONTH	ם	SEASON	D YEAR
TEMPERATURES:	<b>⊠</b> AIR	<b>⊠</b> 5	URFACE	GRAPHIC PLOT		<del></del> -	14.44
FUEL USE BY:	MONTHLY O			L CONSUMPTION L PEAK DEMAND		SYSTEM COMPONENT ENERGY SYSTEMS TOTAL BUILDING O	/

BYVOK

NORWAY



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:					
COMPUTER TYPE:	□ IBM	□ cmc	☑ UNIVAC	☐ OTHER	
CORE REQUIRED:	□ > 500K	□ 100 ~ 500	K 💆 25	- 100 K	□ < 25 K
	USER'S GUIDE				
EQUIPMENT:	ER CRT				
COSTS:				<del></del>	
ASSUMING PURCHASE OF	F SOFTWARE FOR USE	ON PRESENT TIME-S	HARTNG .	•	
FIRST COST:					
IN-OFFICE EQUIPME	INT: CRT		PRINTER	. •	
SOFTWARE PURCHASE		DECK			1.7677110
SUPPORT INFORMATI		'S GUIDE			LISTING
TIME TO INPUT AND		MAN-DAYS	HAN-	_	OTHER
RUN COST/TIME:				10003	
INPUT SET-UP TIME	:	MAN-DAYS	4 MAN-	HOURS	
TYPICAL* RUN TIME	: □ > 1 H	R. 🗆 60	н – 30 н	□ 30 M - 10	н 🖾 < 10 н
TYPICAL* CPU TIME	: 🗆 > 100				
					OUTPUTS CHECKED (,/) IN
ASSUMING USE OF SOFT					
			•		
THROUGH THEM).	or line-sharing	SERVICES WHICH HAV	E THIS PROGRAM AV	AILABLE (EXACT	COSTS CAN BE OBTAINED
	·				
	<u>-</u>				
··········					•
		_			

IEA

### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS

NORWAY



TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO:

(COMPLETE SECTIONS 1, 2, 3)
(COMPLETE SECTIONS 1, 2, 4)

INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 6)

LOW ENERGY DWELLI SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS	NG  Laboratoriet for Varmeisoler  Danmarks Tekniske Højskole  Bygning 118  2800 Lyngby - Danmark
GENERAL:	,
TOOL NAME: ENCORE	AVAILABLE THROUGH:
DEVELOPED BY:	Norwegian Building
B.T. Larsen	Research Institute
Norwegian Building	Oslo , Norway
Research Institute, O	PHONE NO.: (02) 46 98 80
Oslo, Norway	SUPPORTED BY:
DATE DEVELOPED: 1977	Hans Engelbretsen
DATE OF LAST REVISION: 1983	Norwegian Building Res. Inst.
BRIEF DESCRIPTION: Encore is a program for Residential buildings. Within cert	PHONE NO.: (02) 46 98 80  calculating energy consumption of ain limits (max.20 rooms, 50 surfaces,
etc.) Buildings of any shape and re	oom subdivision can be analysed. Calcu-
lations are done hour by hour accordance	rding to the "transfer function method"
of Ashrae. Contrary to most energy	programs, infiltration is calculated e. Both stack and wind forces are taken into account.
TOOL HARDWARE & AVAILABLE FO	ORMS:
El Maria serve servera	HAND CALCULATOR
☐ CARD DECK ☐ DISC ☐ TAPE ☐ TAPE ☐ TIME SHARING ☐ LISTING ☐ LISTING — HARD COPY ☐ RECALL ONLY HEMORY—	☐ MAGNETIC CARD ☐ TEMPLATES, CHARTS, TABLES ☐ LISTING ☐ BOOK ☐ RECALL ONLY MEMORY ☐ DEVICE INTEGRATED CIRCUIT

(COMPLETE SECTIONS 1, 2, 5)

IEA BOLAR RED

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS NORWAY



INTENDED US	SE:						
INTENDED FOR USE BY:	<del></del>		•				
☐ ARCHITECT 🔯	ENGINEER	☐ TECHNICIAN	. RESEARC	CH ANALYST			
PHASE FOR WHICH DESIG	N TOOL WAS DEVELO	PED (1 ONLY):	•				
☐ PRE-DESIGN ☐	SITE ANALYSIS	☐ SCHEMATICS	☐ DESIGN	DEVEL.   POST-	DESIGN SER	tv. 🔼 RESE	EARCH
PHASE(S) FOR WHICH DE	SIGN TOOL MAY BE	USEFUL (ANY NO	.):				
R PRE-DESIGN	SITE ANALYSIS	☐ SCHEMATICS	DESIGN	DEVEL. POST-	DESIGN SER	V: K) RESE	ARCH
MAJOR & MIN	OR ENERG	Y COMP	ONENTS	ADDRESSI	ED BY	TOOL:	
MEATING	☐ COOLING	LIG	HTING	<b>™</b> DHW		MISCELLANEOU	ıs
LOADS SPACE TEMPS. HVAC SYSTEMS PASSIVE SOLAR ACTIVE SOLAR SHADING SYSTEM DESIGN ECONOMICS UNDERGROUND LOADS MASS	LOADS SPACE TEM	PS. DEMS DEMS DEMS DEMS DEMS DEMS DEMS DEMS	LOADS FC (LUX) LEVELS FC (LUX) LEVELS SYSTEM DESIGN ECONOMICS DAYLIGHTING FC (LUX) LEVEL ARTIFICIAL LING REDUCTION	☑ LOADS ☐ SOLAR ACTI ☐ SOLAR PASS ☐ ECONOMICS S		☐ FANS ☐ PUMPS ☐ MISC. ELE ☐ ELEV. & E	
INPUT DATA				DOES NOT ACCOMMODATE	MINIHUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
LOCATION - ASSOCIA' BUILDING TYPE AND ' OCCUPANCY RATES BUILDING AREA	TED 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	000000000		000000000	00000000
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES  ARCHITECTURAL DESIGN DEVELOPMENT DATA	0000		00000	
BUILDING MATERIALS & ASSOCIATED DATA (R, Q, E, ETC.) BUILDING MASS DATA SHADING O'EFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA ENGINEERING DESIGN DEVELOPMENT DATA	0000	<b>\$</b> \$ \$ \$	0000	0000
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL	00000	网络门口路路		ومموو

IEA SOLAR RED

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

NORWAY



一致了用个	-								ーノ
WEATHER D								<u> </u>	
TEMPERATURE DATA:	M HOURLY  ANNUAL	TAPE   T DEGREE DAYS	YPICAL DAY	☐ MONT	HLY DATA N. AND MAX.	ANNUAL I	DATA []	MONTHLY DEGI	
SOLAR DATA:	M HOURLY	TAPE [	TYPICAL DA	Y PROFIL	<b>E</b> 1	☐ MONTHLY	AVE. DAILY	& TOTAL	
SOLAR ORIENS. CALC:		EN. INCL. SL FACING SOUTH			RT. & HORIZ. E REFLECTANCE		ioriz. & 4	CARDINAL DI	REC.
DAYLIGHT CALC:	☐ HOUR-BY	-Hour [	TYPICAL CLI	EAR & CL	OUDY DAY/MONTI	. on	PICAL DAY/	MONTH	
CALCULATIO	ON PRO	CEDURE	ES:				,		
LANGUAGE: SFORT	RAN 🗍 BA	SIC 🗖 MAG	CHINE LANGUA	GE 🔲	OTHER	0	GRAPHS, CH	ARTS & SIMP	LE CALC.
	INTERACTIVE	☐ INT	ERACTIVE GRAI	PHIC	☑ PREPARE	FILE	☐ HAND C	ALCULATION	
UNITS OF CALCULATIO	-	SI UNITS .		□ EN	GLISH		☐ BOTH		
CHECK ALL APPROPRIA	TE BOXES:								
HEAT TRANSFER:		FINITE 1			🛛 RESPONSE		STE.	ADY STATE	
SOLAR COMP. CALC	ULATED:	☐ DIFFUSE/	DIRECT/RE-RA	DIATED	☑ DIFFUSE/D	IRECT	D TOTA	AL	
INTEGRATION:		SIMPLE 1	EULER		☐ IMPLICIT		☐ OTH	ER	
SHADING:		ANY SOLA	R OBSTRUCTIO	ж	OVERHANG	<del>оны</del> & f	ins 🗆 100 :	SRADING '	-
HOVABLE SHADING:		☐ DAILY &	SEASONAL SWI	TCHING	C. SEASONAL	SWITCHING	□ NOT	CALCULATED	
MASS EFFECT IS C	ALCULATED:	☐ TRANSIEN	T HEAT FLOW		TIME CONS	TANT FACTO	RS 🗖 ASSI	JME NO MASS	AFFECT
ROOM TEMP. BASED	ON:	☐ SURFACE	& AIR		AIR ONLY		TOM	CALCULATED	
INSIDE TEMPERATU	RE:	🔼 INPUT SO	CHEDULE BY US	ER	☐ FIXED BY	TOOL	□ VAR	ED BY TOOL	
U-VALUES:		CHANGE W	/WIND SPEED	-	REMAIN CO	NSTANT	☐ MOVA	ABLE INSULAT	ION
INFILTRATION:		AIR CHAN	GE PER HOUR		CRACK MET	нор	⊠ VAR	tes w/wind s	PEED
INTERNAL LOADS I	NCLUDE:	SENSIBLE	& LATENT SE	PARATE	□ SENS. & L	AT. TOTAL	⊠ SENS	SIBLE ONLY	
VENTILATION:		SENSIBLE	;		. LATENT			IES BY SCHED	ULE
DAYLIGHT COEFFIC	IENTS:	SKY, REF	L. & DIRECT		SKY & REF	L.	☐ SKY	ONLY	
ZONES PER RUN:		25	2	10 - 25	·	<b>D</b> 2 - 10	1	□ 1 ONLY	
SYSTEM MODELING:		SYSTEM E	FFIC. INPUT		SYSTEM OF	TIMIZING	☐ COME	ONENT SENSI	YTLVIT
ECONOMIC ANALYSIS	S:	ANNUAL C	DST		SIMPLE PA	YBACK	☐ LIFE	CYCLE COST	ING
OUTPUT:									
LOAD DETERMINANTS:	COMPONENT	T 5	3 ZONE		BUILDING				
LOADS OUTPUT BY:	HOUR	5	DAY		MONTH	ı	SEASON'	٠,	⊠ YEaR
TEMPERATURES:	M AIR		SURFACE		GRAPHIC PL		_	,	
FUEL USE BY:		CONSUMPTION PEAK DEMAND			CONSUMPTION PEAK DEMAND		SYSTEM C		

ENCORE

NORWAY



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

☐ IBM	□ със	<b>⊠</b> UNIVAC		MINI COMPUTE
□ > 500K	□ 100° <b>-</b> 500	)K ⊠ 25 -	- 100 K □ < 2	25 K
🔼 USER'S GUIDE	⊠ DA*	TA HANUAL	OTHER	
<b>⊠</b> CRT	PRINTER	☐ TEXTRONIX	OTHER	
SOFTWARE FOR USE	ON PRESENT TIME	-SHARING:		
NT: CRT		PRINTER		
: CARL	DECK	TAPE X *) (	see com- LISTING	
ON: USEF	's GUIDENKr.	100,- data manual		
DEBUG:	2 MAN-DAYS	HAN-I	HOURS	
·	MAN-DAYS	3 <u>man-</u> i	ROURS	
: 🗆 > 1	HR. 🗆	60 M - 30 M	□ 30 M - 10 M	⊠ < 10 M
: 🗆 > 10	000 SEC.	100 - 1000 SEC.	☑ 5 - 100 SEC.	☐ < 5 SEC.
E "TYPICAL" TO BE	A SINGLE-ZONED	100 SQUARE METER RES	IDENCE WITH ALL OUTPUTS	CHECKED (,') IN
WARE ON PUBLIC TI	ME-SHARING NETWO	RKS:		
S OF TIME-SHARING	SERVICES WHICH	HAVE THIS PROGRAM AV	AILABLE (EXACT COSTS CAN	BE OBTAINED .
	SOFTWARE FOR USE  NT: CARC ON: USEF  DEBUG:  :	DEBUG: 2 MAN-DAYS    MAN-DAYS   AND MARE ON PUBLIC TIME-SHARING NETWORE    Cont	DESIGNATION SOON DESCRIPTION SOON DESCRIPTION SOON DESCRIPTION SOON DESCRIPTION  DEBUG:  MAN-DAYS  MAN-DAYS  MAN-HOURS  ND-100	

**ENCORE** 

NORWAY



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

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). IEA BOLAR RED

### THE NETHERLANDS

### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO: LOW ENERGY DWELLING

TUBTASK B - MODELLING & SIMULATION
GUBTASK C - DESIGN METHODS

GENERAL:	
TOOL NAME: KLI	AVAILABLE THROUGH: University of Technology
DEVELOPED BY: FAGO - Eindhoven	P.o.Box 513,
University of Technology	5600 MB EINDHOVEN
	PHONE NO.: 040 - 47 24 00
	SUPPORTED BY:
DATE DEVELOPED: since 1971	
DATE OF LAST REVISION: June 1982	
	PHONE NO.:
BRIEF DESCRIPTION: KLI is a computermodel with	
•	
in buildings can be simulate	d under the influence of the outdoor-
climate and any present heat	-sources inside the building.
	<del></del>
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	
TOOL HARDWARE & AVAILABLE FO	DRMS:
M HAIN FRAME COMPUTER ☐ HICRO-COMPUTER ☐	HAND CALCULATOR GRAPHIC OR HANUAL
CARD DECK DISC TAPE TAPE  STIME SHARING LISTING LISTING - HARD COPY RECALL ONLY MEMORY-INTEGRATED CIRCUIT  (COMPLETE SECTIONS 1, 2, 3)	☐ MAGNETIC CARD ☐ TEMPLATES, CHARTS, TABLE: ☐ LISTING ☐ BOOK ☐ RECALL ONLY MEMORY ☐ DEVICE ☐ INTEGRATED CIRCUIT  (COMPLETE SECTIONS 1, 2, 6)

KLI THE NETHERLANDS SURVEY FORM FOR IE A <u>N</u>0 SOLAR R&D **ENERGY DESIGN TOOLS** ECTI & ANALYSIS MODELS INTENDED USE: INTENDED FOR USE BY: ARCHITECT ENGINEER TECRNICIAN RESEARCH ANALYST PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY): PRE-DESIGN D SITE ANALYSIS SCHEMATICS ☐ DESIGN DEVEL. ☐ POST-DESIGN SERV. RESEARCH PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.): ☐ FRE-DESIGN SITE ANALYSIS ☐ SCHEMATICS DESIGN DEVEL. POST-DESIGN SERV. MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL: COOLING ☐ LIGHTING ☐ DHW LOADS
SPACE TEMPS.
HYAC SYSTEMS
PASSIVE CING.
SHADING
SYSTEM DESIGN
ECONOMICS
UNDERGROUND LOADS
SLOPED GLAZING
MASS LOADS
SPACE TEMPS.
HVAC SYSTEMS
PASSIVE SOLAR
ACTIVE SOLAR
SHADING ☐ LOADS
☐ FC (LUX) LEVELS
☐ SYSTEM DESIGN
☐ ECONOMICS
☐ DAYLIGHTING
☐ FC (LUX) LEVELS
☐ ARTIFICIAL LING.
REDUCTION LOADS
SOLAR ACTIVE
SOLAR PASSIVE
CONOMICS ☐ FANS
☐ PUMPS
☐ MISC. ELECTRICAL
☐ ELEV. & ESCALATOR SYSTEM DESIGN CONOMICS UNDERGROUND LOADS HASS SLOP: INPUT DATA REQUIRED: MINIMUM RECOMMENDED POSSIBLE DOES NOT ACCOMMODATE INPUT PRE-DESIGN AND SITE ANALYSIS DATA INPUT INPUT LOCATION - ASSOCIATED WEATHER DATA
BUILDING TYPE AND SCHEDULE
OCCUPANCY RATES
BUILDING AREA
SPACE TEMPERATURES
LOCAL ENERGY COSTS
CENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)
LIGHTING REQUIREMENTS 000000000 SCHEMATIC DESIGN DATA BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES ARCHITECTURAL DESIGN DEVELOPMENT DATA

BUILDING MATERIALS & ASSOCIATED DATA (R, a, E, ETC.) BUILDING MASS DATA SHADING C'EFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA

ENGINEERING DESIGN DEVELOPMENT DATA

MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LICHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL

THE NETHERLANDS



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



TANK		( a	ANAL	Y 515	MODEL	$\mathbf{s}$		■ <u>\</u> \
WEATHER D	ATA:		, <del>.</del>					
TEMPERATURE DATA:	HOURLY	TAPE 🗀 DEGREE DAY	TYPICAL DAY	HINOM [] NIM YLHTMC	LY DATA   AI	NNUAL DATA VE. MONTHI	.   MONTHLY	DEGREE DAYS
SOLAR DATA:	K HOURLY		☐ TYPICAL DA				DAILY & TOTAL	
SOLAR ORIENS. CALC:	ANY ORE	EN. INCL.	SLOPED		T. & HORIZ.	[□ HORI	Z. 6 4 CARDINAL	DIREC.
	SLOPED	FACING SOU		SURFACE	REFLECTANCE	_		
DAYLIGHT CALC:	HOUR-BY		TYPICAL CL	LEAR & CLO	UDY DAY/HONTH	☐ TYPIC	AL DAY/MONTH	
							*	
CALCULATIO	N PRO	CEDUF	RES:					
LANGUAGE: D FORT	RAN 🗍 BA	sic 🗖 i	MACHINE LANGUA	rce pa o.	ALGOT 60	□ GRA	PHS, CHARTS & S	TWPIE CALC
user type: 🔀	INTERACTIVE		NTERACTIVE GRA	<i>,</i> ,	PREPARE FILE		HAND CALCULATI	
UNITS OF CALCULATION		SI UNITS		☐ ENG	,		□ вотн	
CHECK ALL APPROPRIA	TE BOXES:						_	
HEAT TRANSFER:		X FINIT	E DIFFERENCE		RESPONSE FACT	OR	STEADY STAT	E
SOLAR COMP. CALC	ULATED:	D DIFFUS	SE/DIRECT/RE-R	ADIATED	☐ DIFFUSE/DIREC	т	☐ TOTAL	-
INTEGRATION:		C SIMPLE	EULER		M IMPLICIT		☐ OTHER	
SHADING:		ANY SO	DLAR OBSTRUCTI	ON	DO OVERHANG ONLY	:	NO SHADING	
MOVABLE SHADING:		M DAILY	& SEASONAL SW	ITCHING	SEASONAL SWIT		□ NOT CALCULA	TED
. HASS EFFECT IS CA	ALCULATED:		IENT HEAT FLOW		TIME CONSTANT		_	
ROOM TEMP. BASED	ON:	D SURFAC			M AIR ONLY	***************************************	□ NOT CALCULA	
INSIDE TEMPERATUR	Œ:	M INPUT	SCHEDULE BY U	SER	☐ FIXED BY TOOL		□ VARIED BY T	
U-VALUES:		. `	W/WIND SPEED		☐ REMAIN CONSTA		☐ MOVABLE INS	
INFILTRATION:		<b>*</b> * * * * * * * * * * * * * * * * * *	LANGE PER HOUR		CRACK METHOD	- 12	☐ VARIES W/WI	
INTERNAL LOADS IN	CLUDE:	, (	BLE & LATENT S		☐ SENS. 6 LAT.	TOTAL.	SENSIBLE ON	
VENTILATION:		SENSIE			☐ LATENT	101112	D VARIES BY S	
DAYLIGHT COEFFICE	ENTS:	SKY, R	EFL. & DIRECT		☐ SKY & REFL.		OR COMMAND  SKY ONLY	
ZONES PER RUN:		<b>⊠</b> > 25		10 - 25	_	- 10	□ 1 ONTL	٧
SYSTEM MODELING:		<b>/</b> \	EFFIC. INPUT		SYSTEM OPTIMI		COMPONENT S	
ECONOMIC ANALYSIS	:	☐ ANNUAL			☐ SIMPLE PAYBAC		LIFE CYCLE	
01170117								55512.05
OUTPUT:								
LOAD DETERMINANTS:	☐ COMPONEN	ī	Z ZONE	á	M BUILDING			
LOADS OUTPUT BY:	HOUR	•	DAY DAY	ĺ	A HONTH	<u>k</u>	SEASON	☐ YEAR
TEMPERATURES:	AIR		SURFACE	, j	GRAPHIC PLOT			
FUEL USE BY:	HONTHLY HONTHLY OTHER		D	ANNUAL	CONSUMPTION PEAK DEMAND	D I	SYSTEM COMPONENT ENERGY SYSTEMS FOTAL BUILDING	



THE NETHERLANDS

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:	•					
COMPUTER TYPE:	. 🗖 IBM	□ coc	☐ UNIVAC	☐ OTHER	BURROUGHS	
CORE REQUIRED:	□ > 500K	100 - 500	K 🗀 25	- 100 K	□ < 25.1	K
SUPPORT:	USER'S GUIDE		MANUAL		PLOTTER	
EQUIPMENT:	CRT CRT	PRINTER	TEXTRONIX	OTHER		
COSTS:  ASSUMING PURCHASE O	F SOFTWARE FOR USE			•		
FIRST COST:						
IN-OFFICE EQUIPME	ENT: CRT		PRINTER			
SOFTWARE PURCHASI	E: CARD	DECK	TAPE		LISTING	
SUPPORT INFORMAT	ION: USER	'S GUIDE	DATA MANUAL		OTHER	
TIME TO INPUT AND	DEBUG:	MAN-DAYS	MAN-	HOURS		
RUN COST/TIME:						
INPUT SET-UP TIME	<u>0,</u>	5-1 HAN-DAYS	MAN-I	lours		
TYPICAL* RUN TIME	:	HR. 🗆 60				X < 10 H
TYPICAL* CPU TIME	: 🗆 > 10	00 sec. )	00 - 1000 SEC. ONE YEAR OUT	PIII 5 - 1	00 SEC.	□ < 5 SEC.
*FOR THIS FORM, ASSUM SECTION 2.	E "TYPICAL" TO RE	A SINGLE-ZONED 100	O SQUARE METER RES	IDENCE WITH	ALL OUTPUTS CHE	CKED (/) IN
ASSUMING USE OF SOFT	WARE ON PUBLIC TI	ME-SHARING NETWORKS	<u>s</u> :			
NAMES AND CONTACT THROUGH THEM).	S OF TIME-SHARING	SERVICES WHICH HAV	/E THIS PROGRAM AV	MILABLE (EX	ACT COSTS CAN BE	OBTAINED
			<del></del>	<del></del>		·
			<u></u>			
<del></del>						
			<del></del>	· · · · · ·		

**BFEP** 

THE NETHERLANDS



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO: LOW ENERGY DWELLING

BUBTASK B - MODELLING & SIMULATION JUBTASK C - DESIGN METHODS

#### **GENERAL:**

TOOL NAME:	BFEP .	_ AVAILAB
DEVELOPED BY:	Augenbroe, G.L.M.	adre
Building	Physics Group	Dept
Dept. of	Civil Engineering	Delf
Delft Uni	versity of Technology	PHONE N
Delft, Th	e Netherlands	SUPPORT
DATE DEVELOPED	: started: 1979	BFEF
	EVISION: version 2.1, may 1982	at 1
		of ]

MLE THROUGH: Augenbroe, G.L.M. ess: Building Physics Group t. of Civil Engineering ft University of Technology, postbus 5048 **b.**: 015-783386<sup>2600</sup> GA DELFT, The Neth ren my: same as above is implemented on an AMDAHL 470V/7B the computer-centre of the Delft Univ. 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

#### TOOL HARDWARE & AVAILABLE FORMS:

M HAIN FRAME COMPUTER	☐ HICRO-COMPUTER
CARD DECK	DISC
M TAPE	☐ TAPE
☐ TIME SHARING	☐ LISTING
ME LISTING - HARD COPY	RECALL ONLY HEHORY
-	INTEGRATED CIRCUIT

of BFEP: (continued on attached sheet)

MAGNETIC CARD E LISTING RECALL ONLY MEHORY INTEGRATED CIRCUIT

HAND CALCULATOR

TEMPLATES, CHARTS, TABLES DEVICE

GRAPHIC OR MANUAL

(COMPLETE SECTIONS 1, 2, 5)

(COMPLETE SECTIONS 1, 2, 6)

(COMPLETE SECTIONS 1, 2, 3)

(COMPLETE SECTIONS 1, 2, 4)

**BFEP** THE NETHERLANDS IEA SURVEY FORM FOR SECTION SOLAR RED **ENERGY DESIGN TOOLS** & ANALYSIS MODELS 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 m DESIGN DEVEL. M POST-DESIGN SERV. ☐ SCHEMATICS ■ RESEARCH MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL: COOLING LIGHTING ☐ DHW MISCELLANEOUS LOADS
SPACE TEMPS.
H HVAC SYSTEMS
PASSIVE SOLAR
ACTIVE SOLAR
SHADING
SYSTEM DESIGN
ECONOMICS
UNDERGROUND
LOADS LOADS
SPACE TEMPS.
HAVAC SYSTEMS
PASSIVE CLNG.
SHADING
SYSTEM DESIGN
ECONOMICS
UNDERGROUND LOADS LOADS
SOLAR ACTIVE
SOLAR PASSIVE
CONOMICS I LOADS D FANS D PUMPS FC (LUX) LEVELS
SYSTEM DESIGN
ECONOMICS D MISC. ELECTRICAL
D ELEV. & ESCALATOR DAYLIGHTING
FC (LUX) LEVELS
ARTIFICIAL LING. REDUCTION SLOPED GLAZING LOADS HASS INPUT DATA REQUIRED: TOTAL DOES NOT MINIMUM RECOMMENDED POSSIBLE ACCOMMODATE INPUT INPUT INPUT PRE-DESIGN AND SITE ANALYSIS DATA LOCATION - ASSOCIATED WEATHER DATA LOCALION - ASSOCIATED WEATHER DATA

BUILDING TYPE AND SCREDULE

OCCUPANCY RATES

BUILDING AREA

SPACE TEMPERATURES

LOCAL ENERGY COSTS

GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS

LOCAL CODE REQUIREMENTS (VENTIL., INSUL., EIG.)

LICHTING REQUIREMENTS 000000000 00000000 SCHEMATIC DESIGN DATA BUILDING SURFACE AREAS CLAZING AREAS & ORIENTATIONS ROOM SHAPES OPERATING SCHEDULES & PROFILES ARCHITECTURAL DESIGN DEVELOPMENT DATA BUILDING MATERIALS & ASSOCIATED DATA (R, Q, E, ETC.) BUILDING MASS DATA SHADING C'EFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA ENGINEERING DESIGN DEVELOPMENT DATA MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LICHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL 000000 000000





	54	0011		11141 1 011	
BOLAR RED		ENERG'	Y DESIG	ON TOOLS	Ĕ
HO MINE		& ANA	LYSIS	MODELS	SE
一种	•		7977	a water as I water an	CO VOOR (FEET OR
WEATHER DA	TA:	full year	any of	synthetical referen her (user-defined)	ce year (sout) or
	HOURLY TA			LY DATA ANNUAL DATA AND MAX. AVE, MONTHS	
SOLAR DATA:	HOURLY TA	PE D TYPIC	AL DAY PROFILE	☐ HONTHLY AVE	E. DAILY & TOTAL
_ )LAR ORIENS. CALC: E	ANY ORIEN  SLOPED FA		ANY VER	T. & HORIZ.	IZ. & 4 CARDINAL DIREC.
	W HOUR-BY-H	OUR TYPIC ERAGE DE OTHER	al clear & clo any; user	UDY DAY/HONTH TYPIC	CAL DAY/HONTH
CALCULATION	PROC	EDURES:			·
LANGUAGE: 50 FORTRAN	D BASI	C   HACHINE L	ANGUAGE 🗀 0	THER GRA	APHS, CHARTS & SIMPLE CALC.
	ERACTIVE	☐ INTERACTIV	E GRAPHIC	PREPARE FILE and user-software	HAND CALCULATION
UNITS OF CALCULATION:	<b>23.</b> S1	UNITS	ENG!	and user-software	□ BOTH
CHECK ALL APPROPRIATE	BOXES:	7			
HEAT TRANSFER:		elemei <del>elepera</del>		RESPONSE FACTOR	STEADY STATE
SOLAR COMP. CALCULA	TED:	M DIFFUSE/DIRECT	/RE-RADIATED	DIFFUSE/DIRECT	TOTAL
INTEGRATION:		SIMPLE EULER		IMPLICIT	pother : pred-corr.
SHADING:	l	ANY SOLAR OBST	RUCTION .	OVERHANG ONLY	no shading
MOVABLE SHADING:	`	ALLY & SEASON	AL SWITCHING T	S SEASONAL SWITCHING	NOT CALCULATED
HASS EFFECT IS CALC		TRANSLENT HEAT	FLOW	TIME CONSTANT FACTORS	ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON	l <b>:</b>	SURFACE & AIR		AIR ONLY	NOT CALCULATED
INSIDE TEMPERATURE:		S INPUT SCHEDULE	BY USER	☐ FIXED BY TOOL	VARIED BY TOOL
U-VALUES:	·	CHANCE W/WIND (if so des	SPEED,	REMAIN CONSTANT	MOVABLE INSULATION
· INFILTRATION:		A IR CHANCE PER		CRACK METHOD	YARIES W/WIND SPECTO (if so desired)
INTERNAL LOADS INCL	UDE:	🔁 SENSIBLE & LAT	ENT SEPARATE	SENS. & LAT. TOTAL	SENSIBLE ONLY
VENTILATION:		SENSIBLE .		☐ LATENT	VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIEN	TS:	SKY, REFL. & D	IRECT	KY & REFL.	SKY ONLY
ZONES PER RUN:		図 > 25 .	10 - 25	2 + 10	☐ 1 ONLY
SYSTEM HODELING:		SYSTEM EFFIC.	INPUT	SYSTEM OPTIMITING	COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:		ANNUAL COST		SIMPLE PAYBACK	LIFE CYCLE COSTING
OUTPUT:	,				
LOAD DETERMINANTS:	COMPONENT	D ZONE		BUILDING	•
LOADS OUTPUT BY:	MOUR, OT		•	□ MONTH □	SEASON D YEAR
TEMPERATURES:	desired AIR	interval	ACE	S GRAPHIC PLOT	
	MONTHLY P	ONSUMPTION			SYSTEM COMPONENTS ENERGY SYSTEMS

THE NETHERLANDS



**BFEP** 

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

		••				
HARDWARE:					,	
COMPUTER TYPE:	<b>≅</b> 7 18H	(D)coc (in prep)	DINIVAC	(D)OTHER _	IP 1000 (i	n prep)
CORE REQUIRED:	□ > 500K	28 100 − 500 K (large syst	em) (sma	- 1 <sup>100</sup> K	□ < 25	K .
SUPPORT:	M USER'S CUIDE	DATA H	ANUAL	ON OTHER th	<u>leor. manu</u>	al
EQUIPMENT:	EQ. CRT	PRINTER	TEXTRONIX	OTHER		·
COSTS:						
ASSUMING PURCHASE OF	F SOFTWARE FOR US	E ON PRESENT TIME-SHA	RING:			
FIRST COST:						
IN-OFFICE EQUIPME	ENT: CRT	, <u></u>	PRINTER		•	
SOFTWARE PURCHASI	E: CAR	D DECK	TAPE \$350	00 (appr)	LISTING _	<u>included</u>
SUPPORT INFORMAT	ION: · USE	R's GUIDE included	DATA MANUAL	·	OTHER th	eor. man.(incl)
TIME TO INPUT AND	DEBUG: 1	-5 man-days	KAN-	-HOURS		
RUN COST/TIME:						problem-size
INPUT SET-UP TIM		severalman-days to		- 1		user experience
TYPICAL* RUN TIM	e: (turn-aro	und time inch 60	н – 30 м	□ 30 M - 1	10 H	(not incl)
TYPICAL* CPU TIME COMPUT-INTERV		000 SEC. 20 100 (11gr	īy accurate)	accepta	able acc)	□ < 5 SEC.
*FOR THIS FORM, ASSU	ME "TYPICAL" TO E	E A SINGLE-ZONED 100	SQUARE METER RES	SIDENCE WITH A	L OUTPUTS CH	ECKED ('.) IN
ASSUMING USE OF SOF	IWARE ON PUBLIC 1	THE-SHARING NETWORKS:				
NAMES AND CONTACT THROUGH THEM).	IS OF TIME-SHARIN	G SERVICES WHICH HAVE	THIS PROGRAM AV	ATLABLE (EXACT	COSTS CAN E	E OBTAINED
Not available	<u> </u>		<del></del>	·		
so-called ing	out-model is be filled d	eveloped for Bato read from a stand uring a (hardware area is lacking	lard input fi e-dep <del>endent)</del>	ile. The BF	EP approac	h enables
						1

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 BEEP

Standard BFEP-use comprises two stages:

stage 1: preparation-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:

- 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).

IEA, Task VIII, suppl. 2

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).

PASSIM

SWITZERLAND



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



[ASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION STASK C - DESIGN METHODS

RETURN TO:

**EMPA** 

Ueberlandstrasse 129 att. Mr. R. Hastings 8600 <u>Dübendorf</u>

				-	<del></del>
ENERAL:		•			
7.73: 6167	PASSIM	<u></u>	AVAILABLE TH	ROUGH:	Nicolas MOREL
בעברסטבם פא:	Nicolas MO	REL			LSB - EPFL
Laboratory fo	or Solar E	nergy	LESO -	Building	
and Building	Physics (	LSB)	1015	LAUSANNE	····
			PHONE NO.: _	021/47'4	5'47
			SUPPORTED BY:		
DATE DEVELOPED:	1981	· <del></del>	, Juliante St.	and EPFL	
ATE OF LAST REVISIO	Dec.	1981	· <del></del>		
This of that hereau	A:	1301	· <del>************************************</del>		
	•		<del></del>		· · · · · · · · · · · · · · · · · · ·
ı ·	Modal d		PHONE NO.:		<u> </u>
FRISE DESCRIPTION: _					s); the nodes may be
	connecte	ed by therma conduc	tance,natural	convection	n on radiation coupling.
			· · · · · · · · · · · · · · · · · · ·		
·					
PLEASE ATTACH ANY VA	LIDATION OR	TESTING REPORTS.			
1					
		•			
TOOL HARDY	WARE &	AVAILABLE F	ORMS:		
A MAIN FRAME COMPU			<del></del>	4 [	GRAPHIC OR HANUAL
C CARD DECK	1	D DISC .	☐ HAGNETIC CA		TEMPLATES, CHARTS, TABLES
Z TAPE D TIME SHARING	į	TAPE LISTING	LISTING RECALL ONLY		□ BOOK
M LISTING - HA		RECALL ONLY MEMORY -	INTEGRATED		D DEVICE
(COMPLETE SECTION		INTEGRATED CIRCUIT	(COMPLETE SECTI	IONS 1, 2, 5	(COMPLETE SECTIONS 1, 2, 6)
,	((	COMPLETE SECTIONS 1, 2,	4)		

PASSIM

**SWITZERLAND** 

IEA SOLAR RED E

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### 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** 

SWITZERLAND



MEGHANICAL SYSTEM DESIGN MEGHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LICHTING SYSTEM DESIGN LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL

### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

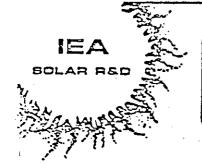


		ノヽ		
INTENDED USE:	•			
ANTENDED FOR USE RY:			-	
☐ ARCHITECT ☐ ENGINEER ☐ TECHNICIAN ☐ RESEARCH AN	ALYST			
PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):				
E RE-DESIGN DESIGN DEVE	1. 🗆 POST-0	ESIGN SER	V. 📭 RESI	EARCH
PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):			,	
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☑ DESIGN DEVE	L. A POST-D	esign ser	V. 💢 RESI	EARCH
MAJOR & MINOR ENERGY COMPONENTS AL	DDRESSE	D BY	TOOL	
S	DHT		MISCELLANEO:	.s
D SPACE TEMPS. D SPACE TEMPS. D FC (LUX) LEVELS D HVAC SYSTEMS D SYSTEMS D SYSTEM DESIGN.	O LOADS SOLAR ACTIV SOLAR PASSI ECONOMICS	E VE	D FAIS D PUMPS D MISC. ELE	ECTRICAL ESCALATOR
INPUT DATA REQUIRED: See comments next page	DOES NOT		RECOMMENDED.	TOTAL POSSIBLE
PRETIESION AND SITE ANALYSIS DATA	ACCOMMODATE	INPUT	INPUT	INPUT
LOCATION - ASSOCIATED WEATHER DATA SUILDING TYPE AND SCHEDULE OCCUPANCY RATES SUILDING AAEA SPACE TEMPERATURES LOCAL EMERGY COSTS GENERIC SLILDING SHAPE DUE TO SITE RESTRICTIONS LOCAL COUE RELIBEMENTS (VENTIL., INSUL., ETC.) LIGHTING REQUIREMENTS	ووووووووو	000000000		00000000
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS GLATING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHIDULES & PROFILES	00000	00000	00000	00000
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R. Q. C. ETC.) BUILDING MASS DATA SHADING C'EFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA	0000	0000	0000	0000
P11714777 147				

000000

**PASSIM** 

SWITZERLAND



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### COMMENTS:

The input data required is :

- (1) a description file for the system, which describes :
  - the chosen nodes (type, ie, floating, assigned temperature, or thermostatcontrolled; 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 externalheat 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)

PASSIM

IEA

BOLAR RED

LOAD DETERMINANTS:

LOADS OUTPUT MY:

TEMPERATURES:

FUEL USE BY:

COMPONE.T

🗷 HOUR

🖾 AIR

Z ZONE

SURFACE

O HONTHLY CONSUMPTION
O MONTHLY PEAK DEMAND
O OTHER daily Consumption
O OTHER

☑ DAY

BUILDING

K CRAPHIC PLOT

SEASON

SYSTEM COMPONENTS
ENERGY SYSTEMS
TOTAL BUILDING ONLY

ST YEAR

MONTH

SWITZERLAND

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



WEATHER DA	TA:						
TEMPERATURE DATA:	B. HOURLY TAN D ANNUAL DEC	FS   TYP GREE DAYS	ICAL DAY D HO	NTHLY DATA MIN. AND HAX.	ANNUAL DATA  AVE. MONTHL	MONTHLY DEGREE AY TEMP.   DAILY	DAYS
SOLAR DATA:	HOURLY TAX	PE 🔯	TYPICAL DAY PROF	ILE	MONTHLY AVE	DAILY & TOTAL	
SOLAR ORIENS. CALC:	ANY ORIEN.  SLOPED FAC	. INCL. SLOP CING SOUTH	ED ANY	VERT. & HORIZ. ACE REFLECTANC	□ HORI	Z. 4 4 CARDINAL DIREC	:•
/LIGHT CALC:	D HOUR-BY-HO	OUR :	TYPICAL CLEAR &	CLOUDY DAY/HON	TH D TYPIC	AL DAY/HONTH	
CALCULATION	1 PROC	EDURE	<u>s:</u>		•	•	
LANGUAGE: 🕱 FORTRAN	BASI	D HACE	INE LANGUAGE	OTHER	GRA	PHS, CHARTS & SIMPLE	CALC.
USER TYPE: 🔀 INT						RAND CALCULATION	
UNITS OF CALCULATION:	₽ si	UNITS		ENGLISH		D BOTH	
CHECK ALL APPROPRIATE	BOXES:						
HEAT TRANSFER:	J	S FINITE DI	FFERENCE	E RESPONS	E FACTOR	STEADY STATE	
SOLAR COMP. CALCULA	ITED:	DIFFUSE/D	irect/re-radiate	D 🔯 DIFFUSE.	/DIRECT	☐ TOTAL	
INTEGRATION:	į	SIMPLE EU	LER	M IMPLICI	r	OTHER	
SHADING:	1	ANY SOLAR	OBSTRUCTION	OVERHAN	ONLY	☐ NO SHADING	
MOVABLE SHADING:	1	DAILY & SI	EASONAL SWITCHING	G 🖸 SEASONAI	L SWITCHING	☐ NOT CALCULATED	
MASS EFFECT IS CALC	ULATED: 1	TRANSIENT	REAT FLOW	TIME CO	MSTANT FACTORS	ASSUME NO MASS AF	FECT
ROOM TEMP. BASED ON	i:	SURFACE &	AIR :	AIR ONL	r	☐ NOT CALCULATED	
INSIDE TEMPERATURE:	: 1	☑ INPUT SCH	SDULE BY USER	C FIXED IN	r TOOL	☐ VARIED BY TOOL	
U-VALUES:	I	CHANCE W/V	WIND SPEED	☐ REMAIN (	CONSTANT	MOVABLE INSULATION	N
INFILTRATION:	j	A IR CHANCE	E PER HOUR	CRACK H	ETHOD	T VARIES W/WIND SPE	ED
INTERNAL LOADS INCL	.UDE:	SENSIBLE 4	LATENT SEPARATI	E 🖸 SENS. &	LAT. TOTAL	SENSIBLE ONLY	
VENTILATION:	[	SENSIBLE		☐ LATENT		OR COMMAND	E
DAYLIGHT COEFFICIEN	l <b>1</b> 5:	SKY, REFL.	. & DIRECT	SKY & RI	EFL.	SKY ONLY	
ZONES PER RUN:	(	□ > 25	D 10 -	25	□ 2 - 10	☐ 1 ONLY	
SYSTEM MODELING:	Į	SYSTEM EFF	FIC. INPUT	SYSTEM (	PTIMIZING	COMPONENT SENSITIV	AILA
ECONOMIC ANALYSIS:	t	ANNUAL COS	ST.	SIMPLE T	PAYBACK	D LIFE CYCLE COSTING	c
OUTPUT:	•		•				

PASSIM

IEA

BOLAR RED S

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS SWITZERLAND



#### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE	•					,	
COMPUTER TYPE:	— D IBH	D 000	□ mia	AC	B. OTHER	VAX 11/7	80
CORE REQUIRED:	<b>这 &gt; 500</b> k	<u> </u>	500 K	□ 25 <b>-</b>			
SUPPORT:	USER'S CUIDE	0 :	DATA MANUAL		DE OTHER	Paper jo	ined
EQUIPMENT:	<b>У</b> Д СКТ	- PRINTER		RONIX			
COSTS:			401	2/4051			
ASSUMING PURCHASE	OF SOFTWARE FOR USE	ON PRESENT TIM	E-SHARING:				
FIRST COST:							
IN-OFFICE EQUIP	MENT: CRT		**************************************	INTER		-	
SOFTWARE PURCHA	SE: CARD	DECK					
SUPPORT INFORMA	TION: USER	S GUIDE	DA'	TA HANDAL		OTHER_	
TIME TO INPUT A	NO DEBUG:	MAN-DAYS	·	K-KAN	OURS		
RUN COST/TIME:	_		•				
INPUT SET-UP TI	ME: 2	HAN-DAYS		NAN-H	ours		
TYPICAL* RUN TI	HE: "医>11	ir. C	⊒ 60 H - 30 i	4	□ 30 H -	10 H	□ < 10 H
TYPICAL* CPU TI	ME: 🗆 > 100	o sec.	<b>X</b> 100 - 1000	SEC.	□ 5 <b>-</b> 10	O SEC.	C < 5 SEC.
FOR THIS FORM, ASS SECTION 2.	UME "TIPICAL" TO BE	A SINGLE-ZONED	100 SQUARE I	TETER RESI	DENCE WITH	ALL OUTPUTS	CHECKED (/) IN
ASSUMING USE OF SO	FTWARE ON PUBLIC TIE	E-SKARING NETW	ORKS:				
NAMES AND CONTA THROUGH THEM).	CTS OF TIME-SHARING	SERVICES WHICH	HAVE THIS PI	ROGRAM AVA	ILABLE (EXA	CT COSTS CAN	BE OBTAINED
· · · · · · · · · · · · · · · · · · ·	<del> </del>	•	_ ·_				
					<del></del>		******
	<del></del>			<del></del>	<del></del>	·	
		<del></del>					<del> </del>
	•						

MODPAS

IEA

BOLAR RED

SWITZERLAND

### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



TASK VIII -	- PASSIVE AND	HYBRID SOLAR	RETURN TO:
	LOW ENERGY	DWELLING	

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS	
GENERAL:	
TOOL NAME: MODPAS	Not oilohlo
DEVELOPED BY: _ J.C. Hadorn - D. Chuard	AVAILABLE THROUGH: Not available
	at present
Sorane S.A.	
Route du Chatelard 52	
1018 Lausanne	PHONE NO.: (021) 37 11 75
	SUPPORTED BY: Sorane S.A.
DATE DEVELOPED: May 1982	
DATE OF LAST REVISION: June 1982	
•	
BRIEF DESCRIPTION: MODPAS = Model for Pas	PHONE NO.:
solves a nodal network	describing the thermal interactions
· ·	nting parts of the system, by means
of equivalent conducta	
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	
	·
TOOL HARDWARE & AVAILABLE F	FORMS:
MAIN FRAME COMPUTER	☐ HAND CALCULATOR ☐ GRAPHIC OR MANUAL
CARD DECK DISC	<b></b>
☐ TAPE STAPE ☐ TIME SHARING POLISTING	☐ LISTING ☐ BOOK
☐ LISTING - HARD COPY ☐ RECALL ONLY MEMORY-	☐ RECALL ONLY MEMORY ☐ DEVICE INTEGRATED CIRCUIT
(COMPLETE SECTIONS 1, 2, 3)	(COMPLETE SECTIONS 1, 2, 6)

MODPAS

SWITZERLAND

BOLAR RED

## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

COMMENTS:

Example of a validation test : winter week

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



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



		ノし		
INTENDED USE:				
INTENDED FOR USE EY:				•
□ ARCHITECT M ENGINEER □ TECHNICIAN M RESEARCH AN.	ALVET			
PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 DNLY):	vrisi			
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☑ DESIGN DEVE	L. [] BOST-0	DESIGN SEI		
PHASE(5) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):		DC3100 3C	RV. 🖸 RES	EARCH
M PRE-DESIGN M SITE ANALYSIS D SCHEMATICS DE DESIGN DEVE	. <b>E</b> Post-1	DESIGN SER	IV. ⊠ RES	
MAJOR & MINOR ENERGY COMPONENTS AD				- Annual
MA HEATING COOLING LIGHTING I			TOOL:	
D LOADS D SPACE TEMPS. D SPACE TEMPS. D BYACK SYSTEMS D HVACK SYSTEMS D HVACK SYSTEMS D HVACK SYSTEMS D SYSTEM DESIGN	1 LOADS 1 SOLAR ACTIV 5 SOLAR PASSI ECONOMICS	'E	D FANS D PUMPS D MISC. ELE D ELEV. 6 1	ECTRICAL
INPUT DATA REQUIRED:	DOES NOT	MINIHUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
LOCATION - ASSOCIATED WEATHER DATA BUILDING TYPE AND SCHEDULE OCCUPANCY RATES BUILDING AREA SPACE TEMPERATURES -> 1; -> 00TPGT LOCAL ENERCY COSTS GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.) LIGHTING REQUIREMENTS		00000000	20000000000000000000000000000000000000	000000000
SCHEMATIC DESIGN DATA	_		•	
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROON SHAPES OPERATING SCHEDULES & PROFILES	<del>00</del> 000		2000 2000 2000 2000	තයකය
ARCHITECTURAL DESIGN DEVELOPMENT DATA	_	_	444	
BUILDING MATERIALS & ASSOCIATED DATA (R. a. c. ETC.) BUILDING MASS DATA SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA  And committees		කටකම		කතිකක
ENGINEERING DESIGN DEVELOPMENT DATA			•	
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM DESIGN	මිසිටමන් සියි	000000	ممممم	ממממם

MODPAS

SWITZERLAND



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### 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.



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



The state of the s	& AN	NALYSIS I	MODELS	
WEATHER DATA:				
TEMPERATURE DATA: ME HOUR	OR Ly tape (5 typic al decree days (5	AL DAYS   HONTHLY AVE. HONTHLY MIN.	DATA ANNUAL AND MAX. AND AXE. MO	DATA   MONTHLY DEGREE DAY
SOLAR DATA:	LY TAPE 💢 TY	PICAL DAY PROFILE	OR MONTHLY	AVE. DAILY & TOTAL
SOLAR ORIENS. CALC: KANY	ORIEN. INCL. SLOPED ED FACING SOUTH	ANY VERT.		HORIZ. & 4 CARDINAL DIREC.
	-BY-HOUR TY AL AVERACE OT	PICAL CLEAR & CLOUD HER	Y DAY/HONTH D T	YPICAL DAY/MONTH
CALCULATION PR	OCEDURES	·	,	
LANGUAGE: D FORTRAN [2]	BASIC   MACHIN	E LANGUACE 🔲 OTH	ER 🗇	GRAPHS, CHARTS & SIMPLE CALC
USER TYPE: D INTERACTI	•		E PREPARE FILE	☐ HAND CALCULATION
UNITS OF CALCULATION:	SI UNITS	☐ ENGLI	•	□ BOTH
CHECK ALL APPROPRIATE BOXES:	•			,
HEAT TRANSFER:	A EINITE DIFF	ERENCE [	RESPONSE FACTOR	STEADY STATE
SOLAR COMP. CALCULATED:	E DIFFUSE/DIR	ECT/RE-RADIATED	DIFFUSE/DIRECT	☐ TOTAL
INTEGRATION:	SIMPLE EULE	a p	K IHPLICIT	☐ OTHER
SHADING:	ANY SOLAR O	BSTRUCTION [	OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	₽ DAILY & SEA	SONAL SWITCHING C	SEASONAL SWITCHING	NOT CALCULATED
MASS EFFECT IS CALCULATED	: 🏿 TRANSIENT H	EAT FLOW	TIME CONSTANT FACTO	ORS ASSUME NO MASS AFFECT
ROOM TEMP. BASED ON:	M SURFACE & A	ir E	AIR ONLY	NOT CALCULATED
INSIDE TEMPERATURE:	INPUT SCHED	PLE BY USER C	FIXED BY TOOL Q	R WARIED BY TOOL
U-VALUES:	CHANGE W/WI	ND SPEED 💆	REMAIN CONSTANT	☐ HOVABLE INSULATION
INFILTRATION:	AIR CHANGE	PER HOUR [	CRACK METHOD	☐ VARIES W/WIND SPEED
INTERNAL LOADS INCLUDE:	SENSIBLE 4	LATENT SEPARATE [	SENS. & LAT. TOTAL	☑ SENSIBLE ONLY
VENTILATION:	SENSIBLE		] LATENT	VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICIENTS:	SKY, REFL.	L DIRECT	SKY & REFL.	SKY DKLY
ZONES PER RUN:		□ 10 - 25	<b>□</b> 2 - 10	□ 1 ONLY
SYSTEM HODELING:	SYSTEM EFFI	C. INPUT	SYSTEM OPTIMIZING	COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	☐ ANNUAL COST	. ت	) SIMPLE PAYBACK	LIFE CYCLE COSTING
OUTPUT:				
LOAD DETERMINANTS: COMP	ONE.II 💢 Z	38C	BUILDING	
LOADS OUTPUT BY: ET HOUR	□ <b>2</b> .	AY 🗆	HONTH	□ SEASON □ NEAR
TEMPERATURES: 13 AIR	TEL S	URFACE E	GRAPHIC PLOT	
TRONT	HLY CONSUMPTION HLY PEAK DEMAND R A NAUTHTION OVER	ANNUAL CO ANNUAL PE		SYSTEM COMPONENTS DENERGY SYSTEMS DETOTAL BUILDING ONLY

**MODPAS** 

SWITZERLAND



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### COMMENTS:

The main uses of this tool are:

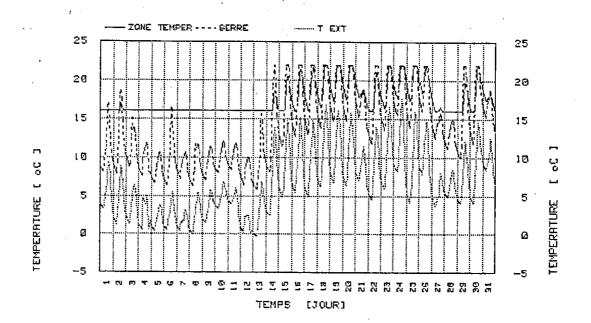
- Check of the maximum/minimum temperature of rooms air in greenhouse passive systems.
- Optimisation of thermal mass
- Interest and need for shading devices
- general thermal haviour of a passive house or greehouse during typical weeks or days

Example of output: follows

MODPAS SWITZERLAND

SORANE SA / MAI 1982

SERRE / DOUBLE ESPACE 1



MOIS DE CALC HOEUD 1 3 20	CUL 3 APPOINT CHAUFFAGE 0 1160741 3286630	APPOINT FROID 57608 31183 865654	POTENTIEL RECUPERABLE 57608 31183 865654
Simula	ation, hour by	hour during	March, of a

Large Greenhouse (2250m²) in suiterland,
using 20 nodes

**MODPAS** 

SWITZERLAND



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### FOR DESIGN TOOLS REQUIRING A MICRO-COMPUTER

HARDWARE:			•
MANUFACTURER AND MODEL NUMBER:	HP 9845 B		
RANDOM ACCESS MEMORY (RAM) REQUI	red: _ ~ 1001	bytes	
DOES THIS TOOL REQUIRE A PRINTER			
	UIDE DATA 1		ort description_
	•		
COSTS:		•	
FIRST COST:			
HICRO-COMPUTER: unknow	wn	•	•
<del></del>		TAPELISTING	·
		DATA MANUAL	
TIME TO INPUT AND DEBUG:			
RUN COST/TIME:	<del></del>		
TYPICAL* INPUT SET-UP TIME:	MAN-DAYS	1 to 3 MAN-HOURS	
	~ 5 HRS.	min.	
TYPICAL* PRINT TIME:		MIN. with plo	ots
*FOR THIS FORM, ASSUME "TYPICAL" SECTION 2.	TO BE A SINGLE-ZONED 100	SQUARE METER RESIDENCE WITH ALL	OUTPUTS CHECKED (/) IN
(period	of simulation:	1 year (8760 steps)	
·	•		, e

IGLOU

SWITZERLAND



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



TASK VIII - PASSIVE AND HYBRID SC	DLAR RETURN TO:
LOW ENERGY DWELLING	

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS

GENERAL		
TOOL NAME:	IGLOU	AVAILABLE THROUGH:
DEVELOPED BY:	MOTOR-COLUMBUS ING. AG	MOTOR-COLUMBUS, ING. AG
<u></u>	Parkstrasse 27, 5400 Baden	Parkstrasse 27, 5400 Baden
	and	
	Höhere Techn. Lehranstalt	PHONE NO.: 056 20 11 21
	Brugg-Windisch	SUPPORTED BY: Motor-Columbus, ING.AG.
DATE DEVELOPED:	1979	Parkstrasse 27, 5400 Bade
DATE OF LAST REV	VISION:11.03.1982	J. Lanz, A. Schopfer
<u> </u>	***	PHONE NO.: 056 20 11 21
BRIEF DESCRIPTIO	N: Wärmetechnische Analysen	im Hochbau
	J. Lanz, A. Schopfer	
	Schwelzer Ingenieur und A	rchitekt, Heft 20/1981
<u> </u>		
4		
PLEASE ATTACH AN	Y VALIDATION OR TESTING REPORTS.	
		•
TOOL HAR	DWARE & AVAILABLE FOR	RMS∙
MAIN FRAME CO		
CARD DEC TAPE  TIME SHAP	DISC TAPE	AND CALCULATOR

IGLOU

SWITZERLAND



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



		ノヽ	· · ·	
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 I	DEVEL. 🗖 POST-I	FSICK SE	RV. 🗆 RESI	
PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):		201011 001	L KES	AKCH
PRE-DESIGN    SITE ANALYSIS	DEVEL.   POST-F	ESIGN SE	RV. 🖸 RESI	ABCH
MAJOR & MINOR ENERGY COMPONENTS				
₩ UFLITUO M non tue	☐ DHW		MISCELLANEOL	IS
DADS DIAGRATIC  DIAGR		E VE	D FANS D PUMPS MISC. ELE	CTRICAL SCALATOR
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 LOCAL ENERGY COSTS GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.) LIGHTING REQUIREMENTS			80000000	. <b>20000000</b>
SCHEMATIC DESIGN DATA	•	_	-	_
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES	0000			ZIKICI KIK
ARCHITECTURAL DESIGN DEVELOPMENT DATA		_	_	
BUILDING MATERIALS & ASSOCIATED DATA (R, Q, E, ETC.) BUILDING MASS DATA SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA	0000	0000		
ENGINEERING DESIGN DEVELOPMENT DATA			_	
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL			. 00000	

EA AR RED

SWITZERLAND

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

Yearner ?		& AN	ALYSIS	MODELS	3		SE
WEATHER DA	ATA:						
TEMPERATURE DATA:	HOURLY T			HLY DATA   ANN	UAL DATA	MONTHLY	DEGREE DAYS
SOLAR DATA:	☐ HOURLY T	APE . 🔯 TYPI	CAL DAY PROFIL	E MON	THLY AVE	. DAILY & TOTAL	
SOLAR ORIENS. CALC:		N. INCL. SLOPED ACING SOUTH		RT. & HORIZ. E REFLECTANCE	☐ HORE	Z. & 4 CARDINA	DIREC.
DAYLIGHT CALC:	HOUR-BY-			OUDY DAY/HONTH	TYPIC	AL DAY/MONTH	
CALCULATIO	N PROC	EDURES:	,		•		
LANGUAGE: 🖪 FORTE	AN 🗀 BAS	IC MACHINE	LANGUAGE	OTHER	☐ GRA	PHS, CHARTS & S	SIMPLE CALC.
USER TYPE: 💆 IN	NTERACTIVE	☐ INTERACTI	VE GRAPHIC	PREPARE FILE		HAND CALCULAT	ion
UNITS OF CALCULATION	: ⊠ s	UNITS .	□ EN	GLISH		□ вотн	
CHECK ALL APPROPRIATE	E BOXES:						
HEAT TRANSFER:		☐ FINITE DIFFER	ENCE	RESPONSE FACTO	Ŕ	STEADY STAT	TE .
SOLAR COMP. CALCUI	LATED:	DIFFUSE/DIREC	T/RE-KADIATED	☐ DIFFUSE/DIRECT		TOTAL	
INTEGRATION:		SIMPLE EULER		☐ IMPLICIT		OTHER	•
SHADING:		M ANY SOLAR OBS	TRUCTION	OVERHANG ONLY		D NO SHADING	
MOVABLE SHADING:		DAILY & SEASO	NAL SWITCHING	SEASONAL SWITC	HING	□ NOT CALCULA	TED
MASS EFFECT IS CAL	CULATED:	TRANSIENT HEA	T FLOW	TIME CONSTANT	FACTORS	ASSUME NO	ASS AFFECT
ROOM TEMP. BASED O	ON:	SURFACE & AIR		AIR ONLY		□ NOT CALCULA	TED
. INSIDE TEMPERATURE	£:	M INPUT SCHEDUL	E BY USER	FIXED BY TOOL		□ VARIED BY 1	OOL
U-VALUES:		CHANGE W/WIND	SPEED	REMAIN CONSTAN	T	☐ MOVABLE INS	ULATION
INFILTRATION:		M AIR CHANGE PE	R HOUR	CRACK METHOD		☑ VARIES W/WI	ND SPEED
INTERNAL LOADS INC	LUDE:	SENSIBLE & LA	TENT SEPARATE	☐ SENS. & LAT. T	OTAL	SENSIBLE ON	īLY
VENTILATION:		SENSIBLE		☐ LATENT		VARIES BY S	CHEDULE
DAYLIGHT COEFFICIE	ENTS:	🖸 SKY, REFL. &	DIRECT	SKY & REFL.		SKY ONLY	
ZONES PER RUN:		区 > 25	□ 10 - 2	5 🗆 2	- 10	□ 1 ON1	.Y
SYSTEM HODELING:		SYSTEM EFFIC.	INPUT	SYSTEM OPTIMIZ	ING	COMPONENT S	ENSITIVITY
ECONOMIC ANALYSIS:		ANNUAL COST		SIMPLE PAYBACK	:	LIFE CYCLE	COSTING
OUTPUT:			•				÷
LOAD DETERMINANTS:	COMPONENT	🔼 ZON	Б	BUILDING			
LOADS OUTPUT BY:	₽ HOUR	<b>⊠</b> DAY		□ HONTH	. 🗅	SEASON	☐ YE&R
TEMPERATURES:	M AIR	. <b>K)</b> sur	FACE	GRAPHIC PLOT			
FUEL USE BY:	MONTHLY ( MONTHLY I OTHER			L CONSUMPTION L PEAK DEMAND		SYSTEM COMPONEN ENERGY SYSTEMS TOTAL BUILDING	

IGLOU

SWITZERLAND



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

UADDWADD						
HARDWARE:						
COMPUTER TYPE:	☐ IBM	□ coc	UNIVAC	M OTHER	PRIME	·
CORE REQUIRED:	<b>20 &gt;</b> 500K	□ 100 - 500	K 🗀 25	- 100 K	□ < 25 t	ζ.
SUPPORT:	USER'S G	IDE 🔼 DAT	A MANUAL	OTHER_		
EQUIPMENT:	CRT CRT	PRINTER	<b>™</b> TEXTRONIX	OTHER_		
COSTS:					•	
ASSUMING PURCHASE OF	SOFTWARE FOR	USE ON PRESENT TIME-	QUADING.			
FIRST COST:		COS ON TRESENT TIME	SHARING:	•	•	
IN-OFFICE EQUIPMEN	JT •	CRT	DD 710000			
SOFTWARE PURCHASE:					-	
SUPPORT INFORMATIO		CARD DECK		·-		
TIME TO INPUT AND		USER'S GUIDE			OTHER	<del></del>
RUN COST/TIME:	DEBUGE	MAN-DAYS	MAN-	·HOURS		
·		1-10				
		1-10 MAN-DAYS				
TYPICAL* RUN TIME:	_	> 1 HR.				
		> 1000 SEC.				
*FOR THIS FORM, ASSUME SECTION 2.	"TYPICAL" T	DEE A SINGLE-ZONED 10	00 SQUARE METER RES	IDENCE WITH	ALL OUTPUTS CHE	CKED (/) IN
ASSUMING USE OF SOFTW	ARE ON PUBLI	C TIME-SHARING NETWORK	K5:			
NAMES AND CONTACTS	OF TIME-SHA	RING SERVICES WHICH HA	 AVE THIS PROGRAM AV	AILABLE (EXA	CT COSTS CAN BE	OBTAINED
J. Lanz, A	. Schoof	er				
		. AG	<del></del>	<u> </u>	· · · · · · · · · · · · · · · · · · ·	<del></del>
		Baden	-		· · · · · · · · · · · · · · · · · · ·	
tel. 056 2			<del>-</del>		<del></del>	
	<del></del>		· · ·			<del></del>

BAUDYN

SWITZERLAND



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

TASK VIII - PASSIVE AND HYBRID  LOW ENERGY DWELLI  SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS	
DEGICAL INCLINEDS	
GENERAL:	
TOOL NAME: BAUDYN	CUI ADD / AND A
DEVELOPED BY: SULZER / Ponomareff	AVAILABLE THROUGH: SULZER / Winterhein
J. John J. J. J. J. J. J. J. J. J. J. J. J. J.	
	PHONE NO.:
DATE DEVELOPED: 81	SUPPORTED BY: PONOMAREFF
DATE OF LAST REVISION:	
Third programmy Coloulates durants to	PHONE NO.: (052) 814148
BRIEF DESCRIPTION: Calculates dynamic heat	flows in a room model. Including
dir and surface tempera	tures. Can also be used to calculate
the loads of heating an	d cooling systems.
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	
TOOL HARDWARE & AVAILABLE FO	DDMO.
DI MATH FRANC COMMUNICA	
D 2122	HAND CALCULATOR GRAPHIC OR MANUAL
CARD DECK DISC	☐ MAGNETIC CARD ☐ TEMPLATES, CHARTS, TABLES
TIME SHARING INSTITUTE LISTING LISTING PART COPY RECALL ONLY MEMORY	☐ LISTING ☐ BOOK ☐ RECALL ONLY MEMORY ☐ DEVICE INTEGRATED CIRCUIT
(COMPLETE SECTIONS 1, 2, 3)	(COMPLETE SECTIONS 1, 2, 6)
(COMPLETE SECTIONS 1, 2, 4)	Coold Late Sections 1, 2, 5)

BAUDYN

SWITZERLAND



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

	<del>*************************************</del>			/
INTENDED USE:				
INTENDED FOR USE BY:				
☐ ARCHITECT	H ANALYST			
PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):				
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN I	DEVEL. 🗇 POST-D	ESIGN SER	. ⊠ RESE	ARCH
PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):				
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☑ DESIGN I	DEVEL. 🖸 POST-D	ESIGN SER	.V: ⊠ RESE	ARCH
MAJOR & MINOR ENERGY COMPONENTS	ADDRESSE	D BY	TOOL:	
⊠ HEATING ⊠ COOLING ⊠ LIGHTING	☐ DHW		MISCELLANEOU	s
LOADS STACE TEMPS. SPACE TEMPS.	□ LOADS □ SOLAR ACTIV □ SOLAR PASSI □ ECONOMICS		☐ FANS ☐ PUMPS ☐ MISC. ELE ☐ ELEV. 6 E	CTRICAL SCALATOR
INPUT DATA REQUIRED:	DOES NOT	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	ووووووووو	وطهموموهم	M COMMOO M	وووووووو
SCHEMATIC DESIGN DATA		•		
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES	000	00000	<b>2</b> 2000	00000
ARCHITECTURAL DESIGN DEVELOPMENT DATA	•			
BUILDING MATERIALS & ASSOCIATED DATA (R, Q, E, ETC.) BUILDING MASS DATA SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA	000	0000	<b>B B B B B B B B B B</b>	0000
ENGINEERING DESIGN DEVELOPMENT DATA		,		
HECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL	00000	عوصمود	000000	30000



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



	}\ *-						. \		ン
WEATHER DA				-	_				
								☐ MONTHLY DEGR EMP. ☐ DAILY	
SOLAR DATA:	HOURLY TA	APE	TYPICAL DA	Y PROFILE		☐ MONTHLY A	VE. D	AILY & TOTAL	
SOLAR ORIENS. CALC:	ANY ORIEN				r. & HORIZ.	_	<del>RIZ</del> . i	2 6 ≠ CARDINAL DIF	REC.
	HOUR-BY-H		TYPICAL CL	LEAR & CLOI	IDY DAY/HONE	TH 🗅 TYP	ICAL 1	DAY/MONTH	
O & 1 O 10 4 TO 10	N DDGG	ب⊏17 ا دب	EO.						
CALCULATIO		•							
LANGUAGE: 🕏 FORTRA	UN D BAS	ic 🗅 if	ACHINE LANGUA	AGE 🗖 01	ther	C	RAPHS,	, CHARTS & SIMPI	LE CALC.
USER TYPE: IN	NTERACTIVĖ	, — -	TERACTIVE GRA		PREPARE	E FILE	_	ND CALCULATION	
UNITS OF CALCULATION:	; <b>E</b> 51	I UNITS		☐ ENGI	LISH	•	<b>D</b> 1	вотн	
CHECK ALL APPROPRIATE	BOXES:				-				
HEAT TRANSFER:			DIFFERENCE		RESPONSE		_	STEADY STATE	•
SOLAR COMP. CALCUL	LATED:	_	E/DIRECT/RE-R	RADIATED	_			TOTAL	
INTEGRATION:		☐ SIMPLE			☐ IMPLICIT		_	OTHER	
SHADING:		ANY SO	LAR OBSTRUCTI	ION	OVERHANC		_	NO SHADING	
MOVABLE SHADING:		DAILY O	& SEASONAL SW	*ITCHING	SEASONAL	L SWITCHING	B	NOT CALCULATED	
MASS EFFECT IS CAL	LCULATED:	TRANSI	ENT HEAT FLOW	ı	TIME CO	NSTANT FACTOR	s 🗖	ASSUME NO MASS	AFFECT
ROOM TEMP. BASED O	Σ₩:	SURFACI	E & AIR		AIR ONLY	Y		NOT CALCULATED	
INSIDE TEMPERATURE	\$:	☐ INPUT	SCHEDULE BY U	USER	☐ FIXED BY	Y TOOL	×	VARIED BY TOOL	
U-VALUES:		☐ CHANGE	W/WIND SPEED	. c	☐ REMAIN	CONSTANT	0	MOVABLE INSULAT	TION
INFILTRATION:		AIR CH	ANCE PER HOUR	3.	CRACK M	ETHOD		VARIES W/WIND	SPEED
INTERNAL LOADS INC	CLUDE:	SENSIB	LE & LATENT S	SEPARATE	☐ SENS. &	LAT. TOTAL		SENSIBLE ONLY	
VENTILATION:		SENSIB!	LE	-	☐ LATENT		83	VARIES BY SCHEI OR COMMAND	DULE .
DAYLIGHT COEFFICIE	ENTS:	SKY, R	EFL. & DIRECT		SKY & R	EFL.	0	SKY ONLY	
ZONES PER RUN:		25	i	<b>10 - 25</b>		□ 2 - 10		🖾 l only	
SYSTEM MODELING:		SYSTEM	EFFIC. INPUT	r	SYSTEM	OPTIMIZING	0	COMPONENT SENS	ITIVITY
ECONOMIC ANALYSIS:	:	☐ WMM0 VT	<b>∞</b> ST		SIMPLE	PAYBACK		LIFE CYCLE COST	TING
OUTPUT:									
LOAD DETERMINANTS:	COMPONENT	T	☐ ZONE	ì	BUILDING				
LOADS OUTPUT BY:	HOUR		□ DAY	. (	☐ MONTH	t	□ SEA	SON	T YEAR
TEMPERATURES:	⊠ AIR		SURFACE	Į	GRAPHIC:	PLOT '			
FUEL USE BY:	MONTHLY O				CONSUMPTION PEAK DEMAN		- ENE	STEM COMPONENTS	/

BAUDYN

SWITZERLAND



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

Section

#### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE	: • 					
COMPUTER TYPE:	☐ IBM	Ø coc	UNIVAC	Ø OTHER _	PRIME	
CORE REQUIRED:	□ > 500K	<b>□</b> 100 - 50	0 K 🔲 25	- 100 K	☑ < 25	K ,
SUPPORT:	E USER'S CUIDE	□ DA	TA MANUAL	OTHER _		
EQUIPMENT:	S CRT	☑ PRINTER	☐ TEXTRONIX	OTHER_		<u> </u>
COSTS:						
***************************************	OF SOFTWARE FOR USE	ON PRESENT TIME	-SHARING:			•
FIRST COST:						
IN-OFFICE EQUIP	PMENT: CRT	<u> </u>	PRINTER		•	
SOFTWARE PURCHA	ASE: CARD	DECK	TAPE		LISTING	<del></del>
SUPPORT INFORM	ATION: USER	'S GUIDE	DATA MANUA	u	OTHER	
TIME TO INPUT'	AND DEBUG:	MAN-DAYS	MAN	-Hours		
RUN COST/TIME:		V.				
INPUT SET-UP T	IME:	MAN-DAYS		-HOURS	÷	
TYPICAL* RUN T	IME: 🗀 > 1	HR. 🗅	60 M - 30 M	□ 30 M -	10 н	□ < 10 H ·
TYPICAL* CPU T	IME: □ > 10	00 SEC.	100 - 1000 SEC.	□ 5 <del>-</del> 10	O SEC.	
*FOR THIS FORM, ASS SECTION 2.	SUME "TYPICAL" TO BE	A SINGLE-ZONED	100 SQUARE METER RE	SIDENCE WITH	ALL OUTPUTS O	HECKED (/) IN
ASSUMING USE OF SO	OFTWARE ON PUBLIC TI	ME-SHARING NETWO	RKS:			
NAMES AND CONTA	ACTS OF TIME-SHARING	SERVICES WHICH	HAVE THIS PROGRAM A	VAILABLE (EXA	ACT COSTS CAN	BE OBTAINED
-	,					
<del>- ,</del>						
· · · · · · · · · · · · · · · · · · ·		<del></del>	-			
<del></del>	<u> </u>					
	· · · · · · · · · · · · · · · · · · ·				······································	

STEMOD / DYWAN

IEA

SWITZERLAND

### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



TASK VIII - PASSIVE AND HYBRID SOLAR LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS

RETURN TO:

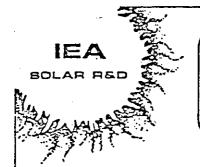
EMPA

Ueberlandstrasse 129 att. Mr. R. Hastings 8600 <u>Dübendorf</u>

<b>GENERAL:</b>				,
TOOL NAME:	STEMOD	/ DYWAN	AVAILABLE THROUGH	: U. Roth, Dipl.Arch.ETH
DEVELOPED BY:	Büro 'ur'	·		Büro f. Raumplanung
	Turneršti	r. 24		Turnerstr. 24
	8006 Züri	ich	<del>-</del>	8006 Zürich
				01/361.33.21
DATE DEVELOPED:	1981			
			·	
	,			
			PHONE NO.:	
F DESCRIPTION	) N:			
•				
<del></del>				
			<del></del>	
PLEASE ATTACH AN	CY VALIDATION O	R TESTING REPORTS.	<del></del>	· .
	i indibilitie o	K ILIIING KLIGKII.		
TOOL HAP	RDWARE	& AVAILABLE F	ORMS:	
AND FRAME (	COMPUTER D	HI CRO-COMPUTER	HAND CALCULATOR	GRAPHIC OR HANDAL
CARD DEC	CK ARING	DISC TAPE LISTING RECALL ONLY MEMORY-	☐ MAGNETIC CARD ☐ LISTING ☐ RECALL ONLY MEN	D TEMPLATES, CHARTS, TABLES D BOOK D DEVICE
	- HARD COFY	INTEGRATED CIRCUIT	(COMPLETE SECTIONS	COMPLETE SECTIONS 1. Z. 6)

STEMOD / DYWAN

SWITZERLAND



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### 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.

pr applies to STEMOD

□ applies to DYWAN



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



INTENDED (	JSE:			•
INTENDED FOR USE B	Y:	•		
ARCHITECT	☐ ENGINEER	TECHNICIAN	T RESEARCH ANALYST	
PHASE FOR WHICH DE	SICH TOOL WAS DEVELO	OPED (1 ONLY):		•
☐ PRE-DESIGN	SITE ANALYSIS	☐ SCHEMATICS	D DESIGN DEVEL. D POST-DESIGN	GN-SERV. RESEARCH
ृ⊅ं E(S) FOR WHICH	DESIGN TOOL HAY BE	USEFUL (ANY NO.):	4	
PRE-DESIGN	SITE ANALYSIS	☐ SCHEMATICS	DESIGN DEVEL. CE POST-DESIGN	GN SERV. ØE RESEARCH
MAJOR & M	INOR ENER	GY COMPO	NENTS ADDRESSED	BY TOOL:
HEATING -	<b>⊗</b> □ COOLING	☐ LIGHTIN		☐ MISCELLANEOUS
DOADS D SPACE TEMPS. D HVAC SYSTEM E PASSIVE SOLA D ACTIVE SOLA D SHADING D SYSTEM DESIG D ECONOMICS D UNDERGROUND LOADS D MASS	R PASSIVE C SHADING SYSTEM DE SN DECONOMICS UNDERGROU	EMS D SYST LNG. D ECON D DAYL SIGN F ND LOADS	S	D FANS D PUMPS O MISC. ELECTRICAL D ELEV. & ESCALATOR

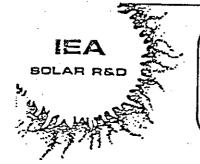
INPUT DATA REQUIRED:	DOES NOT	HINIMIN	RECONMENDED	TOTAL POSSIBLE
PRE-DESIGN AND SITE ANALYSIS DATA	ACCOMMODATE	INPUT	INPUT	INPUT
OCATION - ASSOCIATED WEATHER DATA JULDING TYPE AND SCHEDULE OCCUPANCY RATES BUILDING AREA SPACE TEMPERATURES LOCAL EMERGY COSTS GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS LOCAL CODE REQUIREMENTS (VENTIL.; INSUL., ETC.) LICHTING REQUIREMENTS	<b>※</b> <b>加多</b> 及增量等度包	ස්පයස්ථයයන්	000000000	agaaaaaa
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES	ON STATE OF THE ST		00000	00000
ARCHITECTURAL DESIGN DEVELOPMENT DATA			,	
BUILDING HATERIALS & ASSOCIATED DATA (R, \alpha, ETC.) BUILDING MASS DATA SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA			0000	0000
ENGINEERING DESIGN DEVELOPMENT DATA				1
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL	M CHEST STATES	99999	٥٥٥٥٥٥	ممححح



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



一个孩子用个个	•.					丿
WEATHER D	ATA:					
TEMPERATURE DATA:	HOURLY :	TAPE   TYPICAL   DEGREE DAYS   AVI	DAY	DATA ANNUAL AND HAX.	DATA D HONT	HLY DEGREE DAYS
SOLAR DATA:	HOURLY 1	MPE E TYPIC	AL DAY PROFILE	M HONTHL	Y AVE. DAILY & To	DTAL.
SOLAR ORIENS. CALC:		IN. INCL. SLOPED FACING SOUTH	ANY VERT.	& HORIZ.  DEFLECTANCE	HORIZ. & 4 CARD	INAL DIREC.
'YLIGHT CALC:	HOUR-BY-		AL CLEAR & CLOUD	HTHOMYYAG YG	TYPICAL DAY/HONT	ŧ
CALCULATIO	N PRO	CEDURES:				
LANGUAGE: D FORTE	AN COM BAS	SIC D MACHINE LA	UNGUAGE TOTH	ER .	GRAPHS, CHARTS	E STUDIE CALC
		☐ INTERACTIVE		☐ PREPARE FILE	☐ HAND CALCUT	
UNITS OF CALCULATION	_	I UNITS	☐ ENGLI	SH	□ both	
CHECK ALL APPROPRIATE	E BOXES:		•			
HEAT TRANSFER:		☐ FINITE DIFFEREN	ICE [	RESPONSE FACTOR	60□ 5 <del>==+31</del>	
SOLAR COMP. CALCUI	LATED:	K DIFFUSE/DIRECT/	RE-RADIATED C	DIFFUSE/DIRECT	☐ TOTAL	
INTEGRATION:		SIMPLE EULER	C	] IMPLICIT	OTHER	
SHADING:		ANY SOLAR OBSTR	UCTION [	OVERHANG ONLY	□ NO SHADI	NG
HOVABLE SHADING:		K DAILY & SEASONA	T SALLCHING C	SEASONAL SWITCHING	G D NOT CALC	ULATED
MASS EFFECT IS CAL	CULATED:	TRANSIENT HEAT	FLOW [	TIME CONSTANT FAC		
ROOM TEMP. BASED (	ON:	SURFACE & AIR		3 AIR ONLY	☐ NOT CALC	
INSIDE TEMPERATURE	: (	INPUT SCHEDULE	EY USER	FIXED BY TOOL	□ VARIED 1	Y TOOL
U-VALUES:		CHANGE W/WIND S	PEED C	REMAIN CONSTANT	☐ MOVABLE	INSULATION
INFILTRATION:	6	AIR CHANGE PER	HOUR C	CRACK METHOD	VARIES V	/WIND SPEED
INTERNAL LOADS INC	LUDE:	SENSIBLE & LATE	NT SEPARATE	SENS. & LAT. TOTAL	L 🗆 SENSIBLE	ONLY
VENTILATION:		☐ SENSIBLE	_	LATENT	OR COMMA	y schedule ·
DAYLIGHT COEFFICIE	INTS:	K SKY, REFL. & DI	RECT _	SKY & REFL.	SKY ONLY	
ZONES PER RUN:		□ > 25	10 - 25	□ 2 + 10	D <b>E</b>	ONLY
SYSTEM MODELING:		SYSTEM EFFIC. I	NPUT [	SYSTEM OPTIMIZING	☐ COMPONEN	T SENSITIVITY
ECONOMIC ANALYSIS:		ANNUAL COST		SIMPLE PAYBACK	☐ LIFE CYC	LE COSTING
OUTPUT:			,			
LOAD DETERMINANTS:	COMPONE.	T 🗀 ZONE		BUILDING		
LOADS OUTPUT BY:	□ HOUR	<b>⊗</b> □ DAY	×	HONTH	SEASON	⊗¤ year
TEMPERATURES:	☐ AIR	☐ SURFA	Œ D	GRAPHIC FLOT		_
FUEL USE BY:		CONSUMPTION PEAK DEMAND	ANNUAL CO ANNUAL PE		SYSTEM COMPO	es /



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

					•		
-\RDWARE	<u>:</u>						
COMPUTER TYPE:	<b>₫</b> 13H		:	☐ UNIVAC	OTHER _		
CORE REQUIRED:	□ > 500K	<b>⊗</b> □	100 - 500 K	. 🗶	25 + 100 K		
SUPPORT:	🗷 user's		DATA H				
EQUIPMENT:	☐ CRT	· E PRI	NTER	☐ TEXTRONIX			•
COSTS:					,		
ASSUMING PURCHASE (	OF SOFTWARE F	OR USE ON PRES	FRT TIME_CU.	PTNC.	:		
IRST COST:		<u> </u>	CHI TIPE SEA	AINO:			
IN-OFFICE EQUIP	ENT:	CRT	-	<b>D</b> DTV#FD			
SOFTWARE PURCHAS	SE:						•
SUPPORT INFORMAT	TION:				AL	-	•
TIME TO INPUT A		· H	AN-DAYS			UTHER	<del></del>
UN COST/TIME:					: .		
INPUT SET-UP TIE	Œ:	n		жи	N-HOURS		
TYPICAL* RUN TIE	Œ; C	) > 1 HR.	D 60 1		□ 30 H - 1	lo H	□ < 10 H
TYPICAL* CPU TIM		> 1000 SEC.	□ 100	- 1000 SEC.	<b>□</b> 5 - 100	SEC.	< 5 szc
OR THIS FORM, ASSU							ECKED (/) IN
SSUMING USE OF SOF							
	THAKE ON PUB						
	TC OF STA						
NAMES AND CONTACT THROUGH THEM).	TS OF TIME-SI	MARING SERVICES	WHICH HAVE	THIS PROGRAM	AVAILABLE (EXACT	COSTS CAN 3	E OBTAINED
NAMES AND CONTAC	TS OF TIME-SI	WARING SERVICES	WHICH HAVE	THIS PROGRAM	AVAILABLE (EXACI	COSTS CAN B	E OBTAINED
NAMES AND CONTAC	TS OF TIME-SI	WRING SERVICES	WHICH RAVE	THIS PROGRAM	AVAILABLE (EXACI	COSTS CAN S	E OBTAINED
NAMES AND CONTAC	TS OF TIME-SI	TARING SERVICE	WHICH HAVE	THIS PROGRAM	AVAILABLE (EXACI	COSTS CAN B	E OBTAINED

PROGRAMME MUR-DIODE

SWITZERLAND



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

TASK VIII -	PASSIVE	AND	HYBRID	SOLAR	RETURN TO:
	LOW END	:DOV	DWELL	u^	

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS

<b></b>		·		
GENERAL TOOL NAME:	-	e Mur-Diode	AVAILABLE THROUGH:	O. Rudaz
DEVELOPED BY:	O. Rudaz	· · · · · · · · · · · · · · · · · · ·	<u> </u>	O. Guisan
	Ecole de	Physique		same address
<del></del> -	24 q. E.	Ansermet		
	1211 Ge	eneve 4	PHONE NO.:	(022) 21 93 55
<u></u>				Universite de Geneve
DATE DEVELOPED	:Juillet	1981		
DATE OF LAST R	EVISION:	_		
			PHONE NO.:	
BRIEF DESCRIPT	ION: _Etude	d'une cellute-te		laire passive avec
·	mur-d	liode et stockage.	Mesures, simul	ation et validation.
		· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·
	*			
PLEASE ATTACH	ANY VALIDATION	OR TESTING REPORTS.		
			•	
TOOL HA	RDWAR	& AVAILABLE F	ORMS:	
🗷 MAIN FRAME	COMPUTER	☐ MICRO-COMPUTER	HAND CALCULATOR	GRAPHIC OR MANUAL
5 51311m	HARING	DISC TAPE LISTING RECALL ONLY MEMORY INTEGRATED CIRCUIT  (COMPLETE SECTIONS 1 2	**	(counter received 1 2 ()

PROGRAMME MUR-DIODE

SWITZERLAND



### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS



#### 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.ar 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



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

	<del></del> -		-	
INTENDED USE:		•		
INTENDED FOR USE BY:				
□ ARCHITECT □ ENGINEER □ TECHNICIAN ☑ RESEARCH AN				
PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):	INLIST			
□ PRE-DESIGN □ SITE ANALYSIS □ SCHEMATICS □ DESIGN DEVE	IL. 🗖 POST-DE	CICN CED	V. ⊠ RESE	LDCU
PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):	<u>L</u> 1031 bi	JION JEN	. WESE	AMOR
☐ PRE-DESIGN ☐ SITE ANALYSIS ☐ SCHEMATICS ☑ DESIGN DEVE	IL. 🗖 POST-DE	SIGN SERV	/ ■ RESE	ARCH
MAJOR & MINOR ENERGY COMPONENTS AL	DDRESSE	D BY	TOOL:	
	DHM		MISCELLANEOU	s
☐ SPACE TEMPS. ☐ SPACE TEMPS. ☐ FC (LUX) LEVELS ☐ HVAC SYSTEMS ☐ HVAC SYSTEMS ☐ SYSTEM DESIGN	□ LOADS □ SOLAR ACTIVE □ SOLAR PASSIV □ ECONOMICS		O FANS O PUMPS O MISC. ELE O ELEV. & E	
INPUT DATA REQUIRED:	DOES NOT	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 ENERCY COSTS GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.) LIGHTING REQUIREMENTS	网络阿拉巴阿姆特			00000000
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS CLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES		00000		00000
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
Building Materials & Associated Data (R, Q, E, ETC.) Building Mass Data Shading Coefficients & Daylight Transmission Interior Surface Data	000		X X X X X	0000
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL	000000	عوووه		

PROGRAMME MUR-DIODE

SWITZERLAND



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

Section Section

	<b>~</b> •.		<del> </del>		<del></del>			
WEATHER D	A T A .	6 mir	utes-dat	:a				
TEMPERATURE DATA:	_	-			LY DATA 🔲 ANNUAL	, DATA	☐ MONTHLY D	EGREE DAYS
	ANNUAL D	EGREE DAYS	on South	ONTHLY MIN	LY DATA ANNUAL AND MAX. AND AVE. H Cal wall	IONTHLY	TEMP. DA	ILY
SOLAR DATA:	HOURLY T	APE	TYPICAL D	AY PROFILE	D MONTHL	Y AVE.	DAILY & TOTAL	
SOLAR ORIENS. CALC:	ANY ORIE	N. INCL. S	SLOPED TH	☐ ANY VER ☐ SURFACE	T. & HORIZ.	HORIZ	. & 4 CARDINAL	DIREC.
DAYLIGHT CALC:	(4) O 1071	HOUR		LEAR & CLO	UDY DAY/HONTH			
			<del>-</del>		<del></del>			
CALCULATIO	N PRO	CEDUF	ES:					
LANGUAGE: X FORTR	AN D BAS	ic 🗆 i	ACHINE LANGU	AGE 🗀 O	THER	] GRAP	HS. CHARTS & ST	MPLE CALC:
_	NTERACTIVE						HAND CALCULATION	
UNITS OF CALCULATION				□ ENG			] вотн	
CHECK ALL APPROPRIAT	•		•	_		•		
HEAT TRANSFER:	nd masew	M FINITE	DIFFERENCE		RESPONSE FACTOR		STEADY STATE	
SOLAR COMP. CALCU	LATED: red	DIFFUS	E/DIRECT/RE-1	RADIATED	D DIFFUSE/DIRECT		☐ TOTAL	
INTEGRATION:		SIMPLE			☐ IMPLICIT		☐ OTHER	
SHADING:		ANY SO	LAR OBSTRUCT	Ion	OVERHANG ONLY		NO SHADING	
MOVABLE SHADING:		☐ DAILY	& SEASONAL ST	JITCHING	SEASONAL SWITCHIN	G	NOT CALCULATI	ED
MASS EFFECT IS CA	LCULATED:	TRANSI	ENT HEAT FLO		☐ TIME CONSTANT FAC	TORS	ASSUME NO MAS	SS AFFECT
ROOM TEMP. BASED	ON:	SURFAC	E & AIR		AIR ONLY		□ NOT CALCULATE	ED
INSIDE TEMPERATUR	E:	☐ INPUT	SCHEDULE BY (	JSER	T FIXED BY TOOL		VARIED BY TOO	OL.
U-VALUES:		☐ CHANGE	W/WIND SPEET	•	E REMAIN CONSTANT		MOVABLE INSUI	LATION
INFILTRATION: nec	,ligeabl	e⊠ AIR CH	ANGE PER HOUF	t .	CRACK METHOD		□ VARIES W/WIN	SPEED
INTERNAL LOADS IN	CLUDE:	SENSIB	LE & LATENT S	SEPARATE	☐ SENS. & LAT. TOTA	L	SENSIBLE ONLY	ť
VENTILATION:		SENSIB	LE		☐ LATENT		OR COMMAND	HEDULE
DAYLIGHT COEFFICI	ENTS:	🗅 SKY, R	EFL. & DIRECT	r	☐ SKY & REFL.		SKY ONLY	
ZONES PER RUN:	•	25	1	<b>1</b> 0 - 25	□ 2 - 1	0	☐ 1 ONLY	
SYSTEM HODELING:		SYSTEM	EFFIC. INPUT	•	SYSTEM OPTIMIZING		COMPONENT SEI	STIVITY
ECONOMIC ANALYSIS	:	□ ANNUAL	COST		SIMPLE PAYBACK		D rile cacre a	STING
OUTPUT:							•	
LOAD DETERMINANTS:	COMPONENT	r	D ZONE	1	☐ BUILDING			
LOADS OUTPUT BY:	🗅 hour 🔀	6 min	DAY	. 1	□ німон □	□ s	EASON	YEAR
TEMPERATURES:	AIR		SURFACE	1	GRAPHIC PLOT			
FUEL USE BY:	MONTHLY OF HONTHLY		D		CONSUMPTION PEAK DEMAND	□ E	YSTEM COMPONENTS NERGY SYSTEMS DTAL BUILDING ON	
			_				DOIDDING OF	·

PROGRAMME MUR-DIODE

SWITZERLAND



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

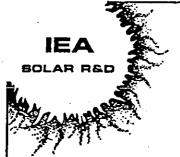
Section

#### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE	<u>:</u>				
COMPUTER TYPE:	☐ IBH	□ coc	UNIVAC	OTHER	
CORE REQUIRED:	□ > 500K	□ 100 <b>-</b> 5	i00 K 🗀 25	- 100 K 🔀 🤇	C 25 K
SUPPORT:	🛭 USER'S CUII			OTHER	·
EQUIPMENT:	CRT CRT	PRINTER	TEXTRONIX	OTHER	
COSTS:		•			
ASSUMING PURCHASE	OF SOFTHER FOR I	ICE ON DECEME TIME	C. CHARING		
FIRST COST:	OF SOFTWARE FOR I	SE UN PRESENT TIM	E-SHARING:		
IN-OFFICE EQUIP			PRINTER	- " '	
SOFTWARE PURCHA				LISTI	
SUPPORT INFORMA	rion: us	ER'S GUIDE	DATA MANUA	LOTHER	·
TIME TO INPUT A	ND DEBUG:	MAN-DAYS	KAM	-HOURS	
RUN COST/TIME:					
INPUT SET-UP TI	HE: _	MAN-DAYS	HAN	-HOURS	
TYPICAL* RUN TI	ME: 🗆 >	1 HR. [	Д 60 м - 30 м	□ 30 H - 10 H	□ < 10 M
TYPICAL* CPU TI	ME: 🗆 >	1000 SEC. [	☐ 100 - 1000 SEC.	□ 5 - 100 SEC.	□ < 5 SEC.
*FOR THIS FORM, ASS SECTION 2.	UME "TYPICAL" TO	BE A SINGLE-ZONED	100 SQUARE METER RE	SIDENCE WITH ALL OUTPUT	S CHECKED (/) IN
ASSUMING USE OF SO	FTWARE ON PUBLIC	TIME-SHARING NETW	ORKS:	•	
NAMES AND CONTACTOR	CTS OF TIME-SHARI	NG SERVICES WHICH	HAVE THIS PROGRAM A	VAILABLE (EXACT COSTS C	CAN BE OBTAINED .
·					
				· · · · · · · · · · · · · · · · · · ·	
			<del></del>	<del></del>	

SOLAR TRAP

SWITZERLAND



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO:
LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS		
GENERAL:		
TOOL NAME: SOLAR TRAP	AVAILABLE THROUGH;	Basler & Hofmann
DEVELOPED BY: Dr. C. Filleux / P. Jemelka		Consult. Engineers
Basler & Hofmann		
Consulting Engineers		
Forchstrasse 395	PHONE NO.: 01/5	5 11 22
8029 Zürich	SUPPORTED BY:	
DATE DEVELOPED: 1981		ler Energie-Forschungs-
DATE OF LAST REVISION:1981	Fonds	
Nodal decomposition of syst Black box for active parts		ference solutine method
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.  Validation over 1 year period in a a  TOOL HARDWARE & AVAILABLE FO		test-cell.
E WITH COLUMN COLUMN CO.		
☐ CARD DECK  ☐ TAPE DISC ☐ TAPE ☐ TIME SHARING ☐ LISTING ☐ LISTING ☐ LISTING ☐ RECALL ONLY MEMORY— INTEGRATED CIRCUIT	HAND CALCULATOR    MAGNETIC CARD   LISTING   RECALL ONLY MEMORY INTEGRATED CIRCUIT  (COMPLETE SECTIONS 1,	(COMPLETE SECTIONS 1 2 6)

SOLAR TRAP

SWITZERLAND



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

#### 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.



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

d ANAL TOIS WILL	, ELO	ノし		
77				_
INTENDED USE:				
INTENDED FOR USE BY:				
☐ ARCHITECT ☑ ENGINEER ☐ TECHNICIAN ☑ RESEARCH ANALY	YST			
PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):	•			•
🗅 PRE-DESIGN 🗎 SITE ANALYSIS 🔲 SCHEMATICS 🔯 DESIGN DEVEL.	D POST-I	ESIGN SER	v. 🛮 RESE	ARCH
PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):				
☐ PRE-DESIGN ☑ SITE ANALYSIS ☐ SCHEMATICS 👨 DESIGN DEVEL.	POST-t	ESIGN SER	v. 🛮 RESE	ARCH
MAJOR & MINOR ENERGY COMPONENTS ADD	DRESSE	D BY	TOOL:	
☑ HEATING ☐ COOLING ☐ LIGHTING ~ ☐ DHY	<b>a</b>	0	MISCELLANEOU	s
SPACE TEMPS.   SPACE TEMPS.   FC(LUX) LEVELS   HVAC SYSTEMS   SYSTEM DESIGN   LOADS SOLAR ACTIV SOLAR PASSI ECONOMICS	/E (VE	FANS PUMPS MISC. ELE		
25 MASS			<i>;</i>	
INPUT DATA REQUIRED:	DOES NOT	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
PRE-DESIGN AND SITE ANALYSIS DATA	ACCO, CODATE	111.01	10101	111102
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.) See next pag LIGHTING REQUIREMENTS	00000000 e	a dacaa:3000		000000000
SCHEMATIC DESIGN DATA .		•		
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES	8000	00000	00000	00000
ARCHITECTURAL DESIGN DEVELOPMENT DATA				
BUILDING MATERIALS & ASSOCIATED DATA (R, a, e, ETC.) BUILDING MASS DATA SHADING COEFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA	0000	0000	0000	0000
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM DESIGN	وموومه	ممموه		00000

SOLAR TRAP

SWITZERLAND



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### 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

EA AR R&D SWITZERLAND

## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



THE PARTY	in the state of th						
WEATHER D	ATA:		,	- <del></del>			
TEMPERATURE DATA:	M HOURLY TA	APE   TYPICA EGREE DAYS	l day 🔲 mon ave. monthly m		) ANNUAL DATA ) AVE. MONTH		
SOLAR DATA:	M HOURLY TA	APE 🗆 TY	ICAL DAY PROFI	re C	MONTHLY AV	E. DAILY & TOTAL	
SOLAR ORIENS. CALC:	ANY ORIEN			ERT. & HORIZ. CE REFLECTANCE	. HOR	IZ. & 4 CARDINAL	DIREC.
DAYLIGHT CALC:	☐ HOUR-BY-I		ICAL CLEAR & C	LOUDY DAY/MONTH	☐ TYPI	CAL DAY/MONTH	
CALCULATIO	N PROC	EDURES:				•	
LANGUAGE: KO FORTR		****	LANGUAGE 📋	OTHER	□ cr	APHS, CHARTS & S	IMPLE CALC.
USER TYPE: Ø I	NTERACTIVE	_	IVE GRAPHIC	☑ PREPARE		HAND CALCULATIO	
UNITS OF CALCULATION	: <b>⊠</b> s1	UNITS		NGLISH		D BOTH	
CHECK ALL APPROPRIAT	E BOXES:		_				
HEAT TRANSFER:		FINITE DIFFE	RENCE	RESPONSE	FACTOR	STEADY STATE	Ε
SOLAR COMP. CALCU	LATED:	DIFFUSE/DIRE	CT/RE-RADIATED	DIFFUSE/D	IRECT or	⊠ TOTAL	
INTEGRATION:		SIMPLE EULER		☐ IMPLICIT		OTHER	
SHADING:		ANY SOLAR OF	STRUCTION	OVERHANG	ONLY	O NO SHADING	
MOVABLE SHADING:		DAILY & SEAS	ONAL SWITCHING	SEASONAL :	SWITCHING	D NOT CALCULAT	TED .
MASS EFFECT IS CAL	LCULATED:	TRANSIENT HE	AT FLOW	TIME CONS	TANT FACTORS	ASSUME NO M	ASS AFFECT
ROOM TEMP. BASED	ON:	SURFACE & AT	R	AIR ONLY		□ NOT CALCULAT	red
INSIDE TEMPERATURE	E:	M INPUT SCHEDU	LE BY USER	☐ FIXED BY	rool	□ VARIED BY TO	OOL
U-VALUES:		CHANGE W/WIN	D SPEED	REMAIN CO	NSTANT	(M) MOVABLE INSI	JLATION
INFILTRATION:	•	AIR CHANGE F	ER HOUR	CRACK MET	HOD	☐ VARIES W/WIN	ND SPEED
INTERNAL LOADS INC	CLUDE:	SENSIBLE & L	ATENT SEPARATE	□ SENS. & LA	AT. TOTAL	SENSIBLE ON	LY
VENTILATION:		SENSIBLE		☐ LATENT		OR COMMAND	CHEDULE
DAYLIGHT COEFFICI	ENTS:	SKY, REFL. &	DIRECT	SKY & REF	L.	SKY ONLY	
ZONES PER RUN:		25	🗖 10 - :	<b>25</b> .	🗆 2 - 10 🗼	🔯 1 ONL)	ť
SYSTEM MODELING:		SYSTEM EFFIC	. INPUT	SYSTEM OF	TIMIZING	COMPONENT SI	ENSITIVITY
ECONOMIC ANALYSIS	:	ANNUAL COST		SIMPLE PA	(BACK	LIFE CYCLE C	COSTING
OUTPUT:							
LOAD DETERMINANTS:	COMPONENT			BUILDING			
LOADS OUTPUT BY:	M HOUR	<b>☑</b> DA	Y	MONTH	Ð	SEASON	<b>₩</b> YEAR
TEMPERATURES:	⊠ AIR	<b>⊠</b> su	RFACE	GRAPHIC PLO	or .		
FUEL USE BY:	MONTHLY OF MONTHLY E	EAK DEMAND		AL CONSUMPTION AL PEAK DEMAND	Ö	SYSTEM COMPONENT ENERGY SYSTEMS TOTAL BUILDING O	,

IEA BOLAR RED SWITZERLAND

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

Section

#### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

		-			
HARDWARE	•				
COMPUTER TYPE:	_ IBM	□ coc	☐ UNIVAC	OTHER PRIM	ME 450
CORE REQUIRED:	□ > 500K	□ 100 <b>-</b> 500 1	K ⊠ 25 -	100 K	□ < 25 K
SUPPORT:	USER'S GUIDE	D DATA	HANUAL	O OTHER Final	report to NEFF
EQUIPMENT:	☐ CRT	PRINTER	☐ TEXTRONIX	OTHER Calco	omb plotter
COSTS:					
ASSUMING PURCHASE O	F SOFTWARE FOR USE	ON PRESENT TIME-SI	HARING:		
FIRST COST:					
IN-OFFICE EQUIPM	ENT: CRT_		PRINTER		
SOFTWARE PURCHAS	E: CARD	DECK	TAPE	L	ISTING
SUPPORT INFORMAT	ION: USER	S GUIDE	DATA MANUAL	0	THER
TIME TO INPUT AN	D DEBUG:	MAN-DAYS	MAN-H	ours	
RUN COST/TIME:					
INPUT SET-UP TIM	E:	MAN-DAYS	2-3 MAN-H	OURS	
TYPICAL* RUN TIM	E: 🗀 > 1 H	R. 🗖 60	о м – 30 м	□ 30 м – 10 м	□ < 10 M ·
TYPICAL* CPU TIM	E: 🗆 > 100	0 SEC. 🗷 19	00 - 1000 SEC.	□ 5 - 100 SEC.	□ < 5 SEC.
*FOR THIS FORM, ASSU SECTION 2.	ME "TYPICAL" TO BE	A SINGLE-ZONED 100	or 1 season SQUARE METER RESI	DENCE WITH ALL OU	TPUTS CHECKED (,') IN
ASSUMING USE OF SOF	TWARE ON PUBLIC TIM	E-SHARING NETWORKS	<b>:</b>		
NAMES AND CONTAC THROUGH THEM).	TS OF TIME-SHARING	SERVICES WHICH HAV	/E THIS PROGRAM AVA	ILABLE (EXACT COS	TS CAN BE OBTAINED
	<del></del>	<del></del>			
			- <del> </del>		
	<del></del>				
	•			•	·

GARANTE CHE	SOLAR IRAP	1 207 IBH SWITZERLAND
i i i i i i i i i i i i i i i i i i i	AF SEP SE VIVE	SURVEY FORM FOR NERGY DESIGN TOOLS & ANALYSIS MODELS
C	OMMENTS:	ion of interest for passive solar task VIII:
		simulate three of the four commonly used
	- direct gain - isolated gain	Adres W. (1997)
	if Rd ESSNIO (0, 32003 - trombe Wall (	'dow)
Andreas Andreas Control of the Contr	ong rolfalby a vis da	ALS TOL RESON SACT RESONS METHODS WERE SHOWN OF ALL SACT PROSERVED OF SACT SACT SACT SACT SACT SACT SACT SACT
		PLEASY ATTRICT MALERANGES ON THATEST TO THE STATE.
Januar Lagura Lagura Britanar Laguray (Tanuar Britanar Britana	HERE CO STRUCTURE CO	TOTAL TO SECURE TRADE TO SECURE TO S
ATE (SATE EX) 1, 2, 5)	eard) Er Jage Earlinath ettimenili	12 PUNE SO - 42 PE POMB 1 PE

HELIOS 1

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS <u>SWITZERLAND</u>

SECTION

TASK VIII -	- PASSIVE AND	HYBRID SOLAR	RETURN TO:
	LOW ENERGY	DWELLING	

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS

CENEDAL	
GENERAL:  TOOL NAME: HELIOS 1	AVAILABLE THROUGH: EMPA Abt.151
DEVELOPED BY: EMPA Abt. 151	A STEED STATE OF THE STATE OF T
(Th. Frank)	
	PHONE NO.: 01/823 55 11
	SUPPORTED BY: NF
DATE DEVELOPED: 1980/82	
DATE OF LAST REVISION: JUNI 1982	
	PHONE NO.:
BRIEF DESCRIPTION: Single zone model for	simulating the thermal behavion of a
building taking into ac	count the radiation processes (short-
wave and longwave) at	the building envelope.
	•
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	
TOOL HARDWARE & AVAILABLE F	ORMS:
MAIN FRAME COMPUTER	☐ HAND CALCULATOR ☐ GRAPHIC OR MANUAL
E CARD DECK  D TAPE  TAPE  TIME SHARING  LISTING - HARD COPY  (COMPLETE SECTIONS 1, 2, 3)  COMPLETE SECTIONS 1, 2, 3)	MAGNETIC CARD   TEMPLATES, CHARIS, TABLES   BOOK   BOOK   DEVICE   INTEGRATED CIRCUIT   (COMPLETE SECTIONS 1, 2, 6)

SWITZERLAND



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

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

## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

Section

	<del></del>		<del></del>	
INTENDED USE:			**	
INTENDED FOR USE BY:				
☐ ARCHITECT ☑ ENGINEER ☑ TECHNICIAN ☑ RESEARCH	1 ANALYST			
PHASE FOR WHICH DESIGN TOOL WAS DEVELOPED (1 ONLY):				
☐ PRE-DESIGN ☑ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN E	DEVEL.   POST	-DESIGN SER	v. 🛭 RESE	ARCH
PHASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.):				
☐ PRE-DESIGN  ☐ SITE ANALYSIS ☐ SCHEMATICS ☐ DESIGN D	DEVEL.   POST-	-DESIGN SER	v. ₹ RESE	ARCH
MAJOR & MINOR ENERGY COMPONENTS	ADDRESS	ED BY	TOOL:	
□ HEATING    □ COOLING    □ LIGHTING	□ DHW		MISCELLANEOU	s
E LOADS  SPACE TEMPS.  SPACE TEMPS.  HVAC SYSTEMS  HVAC SYSTEMS  PASSIVE SOLAR  PASSIVE CLNG.  SHADING  SHADING  SYSTEM DESIGN  ECONOMICS  UNDERGROUND  LOADS  MASS  LOADS  FC (LUX) LEVELS  F		SIVE	☐ FANS ☐ PUMPS ☐ MISC. ELE ☐ ELEV. & E	
INPUT DATA REQUIRED:	DOES NOT		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 EMERGY COSTS GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.) LIGHTING REQUIREMENTS	وموهمومو		00000000	000000000
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SRAPES OPERATING SCHEDULES & PROFILES	9300		0000	00000
ARCHITECTURAL DESIGN DEVELOPMENT DATA				•
BUILDING MATERIALS & ASSOCIATED DATA (R, Q, E, ETC.) BUILDING MASS DATA SHADING C'EFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA	000		0000	0000
ENGINEERING DESIGN DEVELOPMENT DATA				
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL	30000			100000

**SWITZERLAND** 

## SURVEY FORM FOR

		ENERGY	DESIG	IN TOOLS		5
War		& ANAI	YSIS I	MODELS		SE
	: ::					・ノ
WEATHER DA	ATA:					
TEMPERATURE DATA:	HOURLY TA			DATA ANNUAL D		
SOLAR DATA:	HOURLY TA	APE TYPICAL	DAY PROFILE	☐ HONTHLY	AVE. DAILY & TOTAL	
SOLAR ORIENS. CALC:	ANY ORIEN		ANY VERT.		IORIZ. & 4 CARDINAL	DIREC.
DAYLIGHT CALC:	HOUR-BY-I		CLEAR & CLOUD	DY DAY/HONTH TY	PICAL DAY/MONTH	
CALCULATIO	N PROC	EDURES:			•	•
LANGUAGE: FORTRA	N BAS	IC MACHINE LAN	GUAGE 🗀 OTH	TER 🗆	GRAPHS, CHARTS & S	IMPLE CALC.
USER TYPE: D IN	TERACTIVÈ	☐ INTERACTIVE		☑ PREPARE FILE	☐ HAND CALCULATION	
UNITS OF CALCULATION:	: <b>2</b> 3 Sī	UNITS	☐ ENGLI	SH	□ вотн	
CHECK ALL APPROPRIATE	BOXES:				•	
HEAT TRANSFER:		FINITE DIFFERENC	E [	RESPONSE FACTOR	☐ STEADY STATE	Ε.
SOLAR COMP. CALCUL	ATED:	Z DIFFUSE/DIRECT/R	E-RADIATED [	DIFFUSE/DIRECT	TOTAL	
INTEGRATION:		SIMPLE EULER		IMPLICIT	□ OTHER	
SHADING:		ANY SOLAR OBSTRU	CTION	OVERHANG ONLY	NO SHADING	
HOVABLE SHADING:		DAILY & SEASONAL	SWITCHING [	SEASONAL SWITCHING	NOT CALCULA	TED
HASS EFFECT IS CAL	.CULATED:	☑ TRANSIENT HEAT F	LOW [	TIME CONSTANT FACTO	DRS 🗀 ASSUME NO M.	ASS AFFECT
ROOM TEMP. BASED O	N:	SURFACE & AIR	_	☐ AIR ONLY	□ NOT CALCULA	
INSIDE TEMPERATURE	i:	☐ INPUT SCHEDULE B		FIXED BY TOOL	☑ VARIED BY TO	
U-VALUES:		CHANCE W/WIND SP		REMAIN CONSTANT	MOVABLE INS	
INFILTRATION:		AIR CHANGE PER H		CRACK METHOD	☑ VARIES W/WII	
INTERNAL LOADS INC	•	SENSIBLE & LATEN		SENS. 6 LAT. TOTAL		
VENTILATION:		☐ SENSIBLE		_ LATENT	☑ VARIES BY SOOR COMMAND	
DAYLIGHT COEFFICIE	INTS:	SKY, REFL. & DIR	ECT [	SKY & REFL.	SKY ONLY	
ZONES PER RUN:			D 10 - 25	□ 2 <b>-</b> 10	☑ 1 ONL	¥
SYSTEM MODELING:		SYSTEM EFFIC. IN	-	SYSTEM OPTIMIZING	COMPONENT S	
ECONOMIG ANALYSIS:		ANNUAL COST	נ	SIMPLE PAYBACK	LIFE CYCLE	COSTING
OUTPUT:						
LOAD DETERMINANTS:	COMPONENT	ZONE	2	BUILDING		
LOADS OUTPUT BY:	₩ HOUR	□ DAY	. 🛭	HONTH	☐ SEASON	☐ YEAR
TEMPERATURES:	☑ AIR	SURFAC		GRAPHIC PLOT		
FUEL USE BY:	MONTHLY ( MONTHLY I OTHER	CONSUMPTION PEAK DEMAND	ANNUAL C	CONSUMPTION PEAK DEMAND	SYSTEM COMPONENT DENERGY SYSTEMS TOTAL BUILDING	

HELIOS I

<u>SWITZERLAND</u>



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

Section

### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

COMPUTER TYPE:	☐ IBM	<b>⊠</b> coc		UNIVAC	OTHER		
CORE REQUIRED:	□ > 500K	<b>1</b> 4	0 <del>- 300 K</del>	D 25	- 100 K	□ < 25 l	K
SUPPORT:	Ø USER'S GU	IDE	DATA HAN	UAL	OTHER		
EQUIPMENT:	ÆD CRT	M PRINT	er 🗅	TEXTRONIX	OTHER		·····
COSTS:		•					
ASSUMING PURCHASE O	TE COSTILATE FOR	HEE ON DRECEN	T TIME_CUADI	NC.			
	A SOFTWARE FOR	USE ON FRESEN	I II/IE-SHARI	<u>no</u> :			
FIRST COST:	/T-1000 .				_		
IN-OFFICE EQUIPM		CRT					. 10
SOFTWARE PURCHAS					-, 00,		
SUPPORT INFORMAT		_		DATA MANUAL		OTHER	
TIME TO INPUT AN	`	MAN	-DAYS	MAN-	-HOURS	. *	
RUN COST/TIME: 1		•					
INPUT SET-UP TIM	Œ:	1 MAN	-DAYS _	MAN-	-HOURS		
TYPICAL* RUN TIP	Œ: 🗀 :	) 1 HR.	□ 60 M -	- 30 H	□ 30 M - 1	0 м	□ < 10 M
TYPICAL* CPU TIP	Œ:	> 1000 SEC.	<b>2</b> 100 -	1000 SEC.	<b>5 -</b> 100	SEC.	□ < 5 SEC.
FOR THIS FORM, ASSU SECTION 2.	ME "TYPICAL" T	D BE A SINGLE-	ZONED 100 SQ	UARE METER RES	SIDENCE WITH AL	L OUTPUTS CH	ECKED (/) IN
ASSUMING USE OF SOF	TWARE ON PUBLI	C TIME-SHARING	NETWORKS:				
NAMES AND CONTAC THROUGH THEM).	CTS OF TIME-SHA	RING SERVICES	WRICH HAVE T	HIS PROGRAM A	AILABLE (EXACE	COSTS CAN B	E OBTAINED
EMPA Ab	t. 151						
	00 Düben	dowf					

BLAST SOLAR RED

### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS

TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO: LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS

GENERAL:	
TOOL NAME: BLAST 3.0	AVAILABLE THROUGH: U.S. Army Construction
DEVELOPED BY: U.S. Army Construction	Engineering Research Laboratory
Engineering Research Laboratory	P.O. Box 4005
P.O. Box 4005	Champaign, Illinois 61820
Champaign, Illinois 61820	PHONE NO.:
	SUPPORTED BY: U.S. Army Construction
DATE DEVELOPED: March, 1981	Engineering Research Laboratory
DATE OF LAST REVISION: March, 1981	P. <u>O. Box 4005</u>
	Champaign, Illinois 61820
ř	PHONE NO.:
BRIEF DESCRIPTION: BLAST 3.0 is a computer progra	m which predicts energy consumption and
energy systems performance and cost in buil	
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	

### TOOL HARDWARE & AVAILABLE FORMS:

# HAIN FRAME COMPUTER	☐ MICRO-COMPUTER	-	_
. E CARD DECK E TAPE	D DISC	•	

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

- D LISTING
  D REGALL ONLY MEMORY-INTEGRATED CIRCUIT E TIME SHARING C LISTING - EARD COPY
- D HAGNETIC CARD
  D L'STING
  D RECALL ORLY MEMORY INTEGRATED CIRCUIT:
- (COMPLETE SECTIONS 1, 2, 6)

(COMPLETE SECTIONS 1, 2, 3)

(COMPLETE SECTIONS 1, 2, 4)

(COMPLETE SECTIONS 1, 2, 5)

IEA BOLAR RED

JISA

## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### 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.

BL/ST **IEA** SOLAR RAD

### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS

SECTION

**USA** 

#### INTENDED USE:

INTENDED FOR USE BY:

K ARCHITECT

T ENGINEER

TECHNICIAN

TO RESEARCH ANALYST

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

PRE-DESIGN

SITE ANALYSIS

☐ SCHEMATICS

E SCHEMATICS

D DESIGN DEVEL. D POST-DESIGN SERV.

RESEARCH

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

SITE ANALYSIS

DESIGN DEVEL.

POST-DESIGN SERV.

RESEARCH

#### MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL: 1 LIGHTING

Ď HEATING LOADS

TO STACE TEMPS.

TO HVAC SYSTEMS

TO PASSIVE SOLAR

ACTIVE SOLAR

ACTIVE SOLAR

TO STADING

TO SYSTEM DESIGN

TO ECONOMICS

TO UNDERGROUND

LOADS

LOADS

D LOADS
D SPACE TEMPS.
D HVAC SYSTEMS
D PASSIVE CING.
D SEADING
D SYSTEM DESIGN
D ECONOMICS
UNDERCROUND LOADS
D SLOPED GLAZING
MASS

D LOADS
D FC (LID) LEVELS
D SYSTEM DESIGN
E ECONOMICS
D DAYLIGHTING
FC (LID) LEVELS
ARTIFICIAL LING.
REDUCTION

LDADS
DI SOLAR ACTIVE
DI SOLAR PASSIVE
DI ECONOMICS

DOES NOT

D FANS
D PUHPS
D MISC. ELECTRICAL
ELEV. & ESCALATOR

MISCELLANEOUS

INPUT DATA REQUIRED:

PRE-DESIGN AND SITE ANALYSIS DATA

LOCATION - ASSOCIATED WEATHER DATA SUILDING TYPE AND SCHEDULE OCCUPANCY RATES EVILDING AREA SPACE TEMPERATURES LOCAL ENERGY COSTS CENERIC EVILDING SHAPE DUE TO SITE RESTRICTIONS LOCAL CODE RECUIREMENTS (VENTIL., INSUL., ETC.) LIGHTING REQUIREMENTS

SCHEMATIC DESIGN DATA

BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZOKING ROOM SHAPES OFFRATING SCHEDULES & PROFILES

ARCHITECTURAL DESIGN DEVELOPMENT DATA

EVILDING MATERIALS & ASSOCIATED DATA (R, o, c, ETC.) EVILDING MASS DATA SHALING C'EFFICIENTE & DAYLIGHT TRANSHISSION INTERIOF SURFACE DATA

ENGINEERING DESIGN DEVELOPMENT DATA

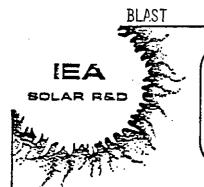
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LICHTING SYSTEM DESIGN LICHTING SYSTEM CONTROL LICHTING SYSTEM CONTROL

MINIMUM RECOMMENDED POSSIBLE INPUT INPUT INPUT ACCOMMODATE PETERSTER DUCK FEBRUA 000100



SECTION

The same of the sa		& ANA	LYSIS	MODE	_s		SEC.
で変す/育し WEATHER D	ATA:						
TEMPERATURE DATA:	E ANNUAL D					A D MONTHLY DEGREE	DAYS
SOLAR DATA:	M HOURLY T	APE DETERIC	L DAY PROFILE		MONTELY AV	E. DAILY & TOTAL	
SOLAR ORIENS. CALC:			ANY VERT		□ нок	IZ. 4 4 CARDINAL DIREC	<b>:</b> •
DAYLIGHT CALC:		BOUR TYPIC VERAGE OTHER		DAY/HONTE	□ TYPI	CAL DAY/MONTH	
CALCULATIO	N PROC	CEDURES:	•				
LANGUAGE: D FORTE	Wi 🗀 BAS	IC   HACKINE L	ANGUAGE DOT	yer	_ 3 CR	APHS, CHARTS & SIMPLE	CALC.
USER TYPE: 🗀 1	NTERACTIVE	☐ INTERACTIV		TREPARE F	_	HAND CALCULATION	
UNITS OF CALCULATION	: <u>1</u> 23 s	I UNITS	E ENGL	ISH		D BOTH	
CHECK ALL APPROPRIAT	TE BOXES:						
HEAT TRANSFER:	••	🗅 FINITE DIFFERE	<b>*</b> Œ	🗷 RESPONSE F	ACTOR	STEADY STATE	
SOLAR COMP. CALC	ilated:	Ø DIFFUSE/DIRECT	RE-RADIATED	፟ DIFFUSE/DI	RECT	TOTAL	
INTEGRATION:		🗅 SIMPLE EULER		☐ IMPLICIT	:	OTHER	
SHADING:		K ANY SOLAR OBST	RUCTION	OVERHANG O	KLY	☐ NO SHADING	
MOVABLE SHADING:	•	DAILY & SEASON	AL SWITCHING	SEASONAL S	WITCHING	D NOT CALCULATED	
MASS EFFECT IS CA	CCULATED:	TRANSIENT HEAT	FLOU	TIME CONST	ANT FACTORS	C ASSUME NO MASS A	FFECT
ROOM TEMP. BASED	ON:	SURFACE & ATR		AIR ONLY		NOT CALCULATED	
INSIDE TEMPERATU	Œ:	M INPUT SCHEDULE	BY USER	C FIXED BY T	OOL	E VARIED BY TOOL	
U-VALUES:		CHANGE W/WIND	SPEED .	E REMAIN CON	START	MOVABLE INSULATI	ON
INFILTRATION:		E AIR CHANGE PER	HOUR	CRACK METE	IOD	☑ VARIES W/WIND SP	EED
INTERNAL LOADS IN	CLUDE:	SENSIBLE & LAT	ENT SEPARATE	D SENS. 6 LA	T. TOTAL	SENSIBLE ONLY	
VENTILATION:		SENSIBLE		□ LATENT		VARIES BY SCHEDU OR COMMAND	Œ
DAYLIGHT COEFFICE	ENTS:	SKY, REFL. & D	IRECT	□ SKY & REFI		SKY OKLY	
ZONES PER RUN:		<b>⊠ &gt; 25</b>	<u>10 - 25</u>	1	□ 2 - 10 ·	1 0KZY	
SYSTEM MODELING:		S SYSTEM EFFIC.	INPUT	SYSTEM OF	THIZING	COMPONENT SENSIT	IVITY
ECONOMIC ANALYSIS	S:	TECO, LAUVINA 🔯	-	SIMPLE PAY	TBACK :	D life arche costi	SG
OUTPUT:							
LOAD DETERMINANTS:	E COMPONEN	T E DONE		D BUILDING		. *	
LOADS OUTFUT BY:	E HOUR	52 DAY	2	мокти	E	SEASON E	AARY C
TEMPELATURES:	AIA 🗷	□ SURF	VCE E	GRAPHIC PLO	)I		
FUEL USE BY:	MONTHLY  MONTHLY	CONSUMPTION PEAK DEMAND	D CTAIR S ANNUAL S CTAIR	CONSUMPTION PEAK DEMAND	25	SYSTEM COMPONENTS ENERGY SYSTEMS TOTAL BUILDING ONLY	



USA

Section

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

				• •	
HARDWARE					
COMPUTER TYPE:	□ IBH	නි යාද	D DNIVAC	OTHER	
CORE REQUIRED:	□ > 500x	☑ 100 - 500	) K 🗀 25	5 - 100 K	□ < 25 K
SUPPORT:	D USER'S GUID	E 🖸 DA1	TA HANUAL	D OTHER	
EQUIPMENT:	ED CRIT	TO PRINTER	☐ TEXTRONIX	OTHER _	<del></del>
COSTS:					
ASSUMING PURCHASE C	NE COETLIABE END II	er av breeter mile.	-684 b Tuc -		
FIRST COST:	F SOFTWARE FOR D	SE UN PRESENT TIPE-	SHARING:		
IN-OFFICE EQUIPM		т Х	1011 <del>-1</del>	X	
					1 *******
SOFTWARE PURCHAS		<del></del>			LISTING
	,		<del></del>		OTHER
TIME TO INPUT AN	D DEBUG:	. 4 HAN-DAYS		H-BOURS	
RUN COST/TIME:					-
INPUT SET-UP TIM	<u> </u>	2 HAN-DAYS	HY)	⊢HOURS	
TYPICAL* RUN TIM	E: <b>5</b> 5 > .	HR.	60 H - 30 H	□ 30 H - 1	10 H 🖸 < 10 H
TYPICAL* CPU TIM	±: □ >	1000 SEC.	100 - 1000 SEC.	<b>5</b> 5 - 100	SEC.
FOR THIS FORM, ASSU SECTION 2.	ME TYPICALT TO	ME A SINGLE-ZONED I	00 SQUARE METER RE	SIDENCE WITH AL	LL OUTPUTS CHECKED (.') IN
ASSUMING USE OF SOF	TWARE ON PUBLIC	TIME-SHARING NETWOR	uxs:		
NAMES AND CONTACT THROUGH THEM).	TS OF TIME-SHARI	SERVICES WHICH H	LAVE THIS PROGRAM A	VAILABLE (EXACT	COSTS CAN BE OBTAINED
Boeing Ti	me Share Serv	ice	Cyberr	et User Ser	yic <u>e</u>
	•				
	-	,			
<del> </del>					
			• •	•	

JEA BOLAR RED

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS \_\_\_\_



U.S.A.

TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO:
LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS

GENERAL:	
TOOL NAME: DEROB IV	AVAILABLE THROUGH: SOLENCO
DEVZLOPED BY: Francisco Arumi - Nos	P.O. Box 7907
University of Texas at Austin	Austin, TX 78712
School of Architecture	
Austin, TX 78712	PHONE NO.: 471-7729
••	SUPPORTED BY: SOLENCO
DATE DEVELOPED: 1979	P.O. Box 7907
DATE OF LAST REVISION: 1981	Austin, TX 78712
1	PHONE NO.: 471-7729
BRIEF DESCRIPTION: DEROB IV is a computer progr	ram which models in detail the various heat
	culates the energy Consumption of that building.
SI MIRES INVESTIGATION STATES AND INC. SALES	The state of the s
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	
FLEASE ALIACH ART VALIDATION ON IESTING ABFORDS	·
TOOL HARDWARE & AVAILABLE	FORMS:
☑ HAIN FRAME COMPUTER ☐ MICRO-COMPUTER	☐ HAND CALCULATOR ☐ GRAPHIC OR MANUAL
CARD DECK DISC TAPE DIAPE Time Sharing Dileting	D MAGNETIC CARD DEMPLATES, CHARTS, TABLES D L'STING D BOOK RECALL ONLY MEMORY DEVICE
D LISTING - HARD COPY E RECALL ORLY MEMORY-	• · · · · · · · · · · · · · · · · · ·
(COMPLETE SECTIONS 1, 2, 3) (COMPLETE SECTIONS 1, 2	(COMPLETE SECTIONS 1, 2, 5)

IEA BOLAR RED USA

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### COMMENTS:

#### DEROB IV

Movable shading: Possible by using movable insulation option. Daylighting subroutines available on request from code author.



USA



INTENDED USE:	••			
INTENDED FOR USE EY:				
ARCHITECT	ANALYST		•	
PHASE FOR WHICE DESIGN TOOL WAS DEVELOPED (1 ONLY):				
D PRE-DESIGN D SITE ANALYSIS D SCHEMATICS D DESIGN DE	EVEL. D POST-I	ESIGN SE	RV. 🖄 RESI	1000
PHASE(S) FOR WHICE DESIGN TOOL MAY BE USEFUL (ANY NO.):			th who.	-nn-n
🖾 PRE-DESIGN 🖾 SITE ANALYSIS 🔯 SCHEMATICS 🖾 DESIGN DE	VEL. 🔯 POST-1	ESIGN SE	RV. ☑ RESE	ARCH
MAJOR & MINOR ENERGY COMPONENTS A	ADDRESSE	D BY	TOOL:	
TV NETTENDO PO GODE DA DE LA COMPANIO	DHI.		MISCELLANEON	, IS
LOADS  SPACE TEMPS.  SPACE TEM	D LOADS D SOLAR ACTIV D SOLAR PASSI D ECONOMICS	E VE	☑ FANS ☐ PUMPS ☐ MISC. ELE ☐ ELEV. & E	CTRICAL SCALATOR
PRE-DESIGN AND SITE ANALYSIS DATA	DOES NOT	MINIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIBLE INPUT
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	DOBCCBCB	0.000000.00	DECEDENCE	
SCHEMATIC DESIGN DATA				
BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING ROOM SHAPES OPERATING SCHEDULES & PROFILES		00000	00000	
ARCHITECTURAL DESIGN DEVELOPMENT DATA		•	-	
BUILDING MATERIALS & ASSOCIATED DATA (R, a, c, ETC.) BUILDING MASS DATA SHADING CREFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA	C C C C C C C C C C C C C C C C C C C	0000	0000	MOMB
ENGINEERING DESIGN DEVELOPMENT DATA	-			
MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM CONTROL ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM DESIGN LIGHTING SYSTEM DESIGN LIGHTING SYSTEM CONTROL	පරිසිලටට	ממממכ		םמממטר

DEROB

USA



# SURVEY FORM FOR ENERGY DESIGN TOOLS.



<u>(</u>			1201411 1001	O U
SA WISS		& ANAL	ysis models	S   S
一个				
WEATHER D	ATA:			<i>2</i>
TEMPERATURE DATA:	M HOURLY TAPE  ANNUAL DEGREE	D TYPICAL DAY	O HONTHLY DATA O AND	NUAL DATA   MONTHLY DEGREE DAYS E. MONTHLY TEMP.   DAILY
SCLAR DATA:	MOURLY TAPE	☐ TYPICAL DA	Y PROFILE   HO?	NTELY AVE. DAILY & TOTAL
SOLAR DRIERS. CALC:	MANY ORIEN. INC SLOPED FACING	CL. SLOPED I	D ANY VERT. & HORIZ.	☐ HORIZ. 4 4 CARDINAL DIREC.
DAYLIGHT CALC:	☐ HOUR-BY-BOUR ☐ ANNUAL AVERAGE		EAR 4 CLOUDY DAY/MONTH	TYPICAL DAY/MONTE
CALCULATIO	N PROCED	URES:	•	
LANGUAGE: 🕏 FORT	RAN D MASIC	☐ HACHINE LANGUA	GE CTHER	C GRAPHS, CHARTS & SIMPLE CALC.
USER TYPE:	Interactive (	INTERACTIVE CHA	PHIC D PREPARE FILE	HAND CALCULATION
UNITS OF CALCULATION	אנו ופ 🗖 בו	<b>:</b> \$	E ENGLISH	□ BOTH
CHECK ALL APPROPRIAT	TE BOXES:			
BEAT TRANSFER:	<u> </u>	NITE DIFFERENCE	RESPONSE FACTO	OR STEADY STATE
SOLAR COMP. CALC	ULATED: 🔯 DI	FFUSE/DIRECT/RE-R	ADIATED M DIFFUSE/DIRECT	TOTAL
INTEGRATION:	. 🗅 SI	MPLE EULER	M IMPLICIT	·. DOTHER
SHADING:	E AN	Y SOLAR OBSTRUCTI	ON: OVERHANG ONLY	☐ NO SHADING
MOVABLE SHADING:	<b>™</b> DA	ILY & SEASONAL SW	ITCHING   SEASONAL SWITC	CHING NOT CALCULATED
MASS EFFECT IS CA	ALCULATED: 12 TR	ansiekī heat flow	TIME CONSTANT	FACTORS - ASSUME NO MASS AFFECT
ROOM, TEMP. BASED	on: 🗅 su	RFACE & AIR	M AIR ONLY	□ NOT CALCULATED
INSIDE TEMPERATUR	E: Sin	PUT SCHEDULE BY U	SER FIXED BY TOOL	E VARIED BY TOOL
U-VALUES:	. CH	ANGE W/WIND SPEED	REHAIN CONSTAN	T B HOVABLE INSULATION
INFILTRATION:	ĪR AI	r Change Per Hour	CRACK METHOD	□ VARIES W/WIND SPEED
INTERNAL LOADS IN	CLUDE: SE	NSIBLE & LATENT S	EPARATE 🗆 SENS. & LAI. 1	TOTAL SENSIBLE ONLY
- VENTILATION:	_	NSIBLE	□ LATENT	O VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICE	ients: 🗖 sk	Y, REFL. & DIRECT	□ SKY & REFL.	☐ SKY ONLY
ZONES PER RUN:	· - >	25	10 - 25 💆 2	- 10 D 1 ONLY
SYSTEM HODELING:	□ sx	STEM EFFIC. INPUT	SYSTEM OPTIMIZ	ZING COMPONENT SENSITIVITY
ECONOMIC ANALYSIS	5: □ W	NUAL COST -	SIMPLE PAYBACK	Life Cycle Costing
OUTPUT:				
LOAD DETERMINANTS:	COMPONENT	Z ZONE	B BUILDING -	
LOADS OUTPUT BY:	K HOUR	D DAY	K) HONTH	☐ SEASON 🍱 YEAR
TEMPERATURES:	<b>⊠</b> AIR	SURFACE	GRAPHIC PLOT	·
FUEL USE BY:	D MONTHLY CONSUM D MONTHLY PEAK D D OTHER	EMAND .	ANNUAL CONSUMPTION     ANNUAL PEAK DEMAND     OTHER	D SYSTEM COMPONENTS D ENERGY SYSTEMS TOTAL BUILDING ONLY

DEROB

U.S.A.

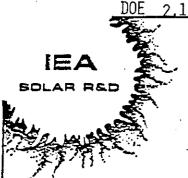


## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

#### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE	:•				
COMPUTER TYPE:	■ IBH	₩ coc	UNIVAC	OTHER	
CORE REQUIRED:				- 100 K □ < :	
SUPPORT:	☑ USER'S GUI	DE DAT	A MANUAL	OTHER	
EQUIPMENT:	<b>⊠</b> CRT	T PRINTER	☐ TEXTRONIX	OTHER	
COSTS:		-			
	OF SOFTWARE FOR	USE ON PRESENT TIME-	SHARING:		
FIRST COST:			· <del></del>		
IN-OFFICE EQUII	PMENT:	RT X	PRINTER	Χ	
SOFTWARE PURCHA	SF.	CARD DECK	TAPE	X LISTIN	G
SUPPORT INFORM				OTHER	
TIME TO INPUT		5 MAN-DAYS			
	CW DEBUG:	- BAN-DALS		,	
RUN COST/TIME:		2		-HOURS	
INPUT SET-UP T		2 man-days			·
TYPICAL* RUN T	_			□ 30 M - 10 M	
TYPICAL* CPU T	EME:	1000 SEC. S	100 - 1000 SEC.	□ 5 - 100 SEC.	C < 5 SEC.
*FOR THIS FORM, ASSECTION 2.	SUME "TYPICAL" T	DE A SINGLE-ZONED	100 SQUARE METER RES	SIDENCE WITH ALL OUTPUTS	CHECKED (,') IN
ASSUMING USE OF S	OFTWARE ON PUBLI	C TIME-SHARING NETWO	RKS:		
NAMES AND CONT. THROUGH THEM).	ACTS OF TIME-SHA	RING SERVICES WHICH	HAVE THIS PROGRAM A	VAILABLE (EXACT COSTS CA	N RE ORTAINED
					<del> </del>
					· · · · · · · · · · · · · · · · · · ·







TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO:
LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS

•	
GENERAL:	
TOOL HAME: DOE-2.1	AVAILABLE THROUGH: National Technical Infor-
DEVELOPED BY: Building Energy Analysis Group	mation Service - U.S. Department of Com-
Energy and Environment Division	merce - 5285 Port Royal Road
Lawrence Berkeley Laboratory	*
Berkeley, California	Springfield, Virginia 22161 PHONE NO. (703) 557-4650
	SUPPORTED BY: Building Energy Analysis Group
DATE DEVELOPED: May 1980	Energy and Environment Division
DATE OF LAST REVISION:	Lawrence Berkeley Laboratory
	Berkelev, California
•	PHONE NO.:
BRIEF DESCRIPTION: DOE-2 is a public domain compu	
the energy behavior of proposed and existing b	uildings and their associated heating
ventilation and air conditioning systems.	7.00
TOTAL CONTRACT OF THE PARTY OF	
PLEASE ATTACK ANY VALIDATION OR TESTING REPORTS.	
TOOL HARDWARE & AVAILABLE FO	RMS:
	HAND CALCULATOR E GRAPHIC OR MANUAL
CARD DECK  TAPE  TIME SHARING  USTING - EARD COPY  (COMPLETE SECTIONS 1, 2, 3)  (COMPLETE SECTIONS 1, 2, 4)	☐ MAGNETIC CARD ☐ TEMPLATES, CHARTS, TABLES ☐ L'STING ☐ BOOK ☐ RECALL ONLY MEMORY ☐ DEVICE ☐ INTEGRATED CIRCUIT (COMPLETE SECTIONS 1, 2, 6)  (COMPLETE SECTIONS 1, 2, 5)

\_DOE 2.1-

USA



SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



### 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



### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS



#### INTENDED USE:

INTENDED FOR USE EY:

ARCHITECT

EX ENGINEER

TECHNICIAN

RESEARCH ANALYST

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

T PRE-DESIGN T) SITE ANALYSIS

SCHEMATICS

DESIGN DEVEL. DOST-DESIGN SERV.

RESEARCH

PHASE(S) FOR WHICH DESIGN TOOL HAY BE USEFUL (ANY HO.):

PRE-DESIGN

TO HASS

SITE ANALYSIS

SCHEMATICS

☑ DESIGN DEVEL. ☑ POST-DESIGN SERV.

D RESEARCH

### MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL:

COOLING . EX HEATING E LIGHTING ☑ LOADS
☑ SPACE TEMPS.
☑ HYAC SYSTEMS
☑ PASSIVE CLING.
☑ SHADING
☑ SYSTEM DESIGN
☑ ECONOMICS
፫ UNDERGROUND LOADS
☑ SLOPED GLAZING
☑ HASS I LOADS ID LOADS

IS SPACE TEMPS.

IN HVAC SYSTEMS

IN PASSIVE SOLAR

ACTIVE SOLAR

ID SHADING

ID SYSTEM DESIGN

IN ECONOMICS

IN UNDERGROUND.

LADS D ECONOMICS
D DAYLIGHTING
FC (LUX) LEVELS
D ARTIFICIAL LING.
REDUCTION

D FC (LUX) LEVELS
SYSTEM DESIGN LOADS
D SOLAR ACTIVE
S SOLAR PASSIVE
E ECONOMICS

D DH₩

ED FANS
DD PUMPS
PD MISC. ELECTRICAL
DD ELEV. & ESCALATOR

### INPUT DATA REQUIRED:

PRE-DESIGN AND SITE ANALYSIS DATA

LOCATION - ASSOCIATED WEATHER DATA
BUILDING TYPE AND SCHEDULE
OCCUPANCY RATES
BUILDING AREA
SPACE TEMPERATURES
LOCAL ENERGY COSTS
GENERIC EUILDING SHAPE DUE TO SITE RESTRICTIONS
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)
LIGHTING REQUIREMENTS

SCHEMATIC DESIGN DATA

EUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING RODM SHAPES OPERATING SCHEDULES & PROFILES

ARCHITECTURAL DESIGN DEVELOPMENT DATA

BUILDING MATERIALS & ASSOCIATED DATA (R, &, c, 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 CONTROL LIGHTING SYSTEM CONTROL

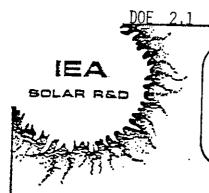
DOES NOT MINIMUM RECOMMENDED POSSIELE ACCOMMODATE INPUT INPUT INPUT **SERVING SERVING** CICURATION (NO.





WE	AT.	H	ER	DA	ιT	٩:
						-

WEATHER D	ATA:	•			
TEMPERATURE DATA:	BOURLY ANNUAL	TAPE E TYPICAL DA' DEGREE DAYS _ AVE.	Y D MONTHLY DATA MONTHLY MIN. AND MAX.	ANNUAL DATA	A D MONTHLY DEGREE DA LY TEMP. D DAILY
SOLAR DATA: .	₩ HOURTA	TAPE S TYPICAL	DAY PROFILE	☐ HONTELY AVI	E. DAILY & TOTAL
SOLAR ORIENS, CALC:	SLOPED	EN. INCL. SLOPED FACING SOUTH	O ANY VERT. 4 HORIZ.  D SURFACE REFLECTANCE	E HOR	IZ. & 4 CARDINAL DIREC.
DAYLIGHT CALC:	☐ HOUR-BY	-HOUR TYPICAL AVERAGE OTHER	CLEAR & CLOUDY DAY/HON	TH D TYPIC	CAL DAY/MONTH
CALCULATIO	N PRO	CEDURES:			
LANGUAGE: N FORT	ran 🗖 ba	SIC   HACHINE LANG	DAGE DOTHER	🛎 GRJ	APHS, CHARTS & SIMPLE CAL
USER TYPE:	INTERACTIVE	☐ INTERACTIVE (	RAPHIC D PREPAR	E FILE	HAND CALCULATION
UNITS OF CALCULATION	N: 🔯	SI UNITS			₹ BOTE
CHECK ALL APPROPRIAT	TE BOXES:				
EEAT TRANSFER:		FINITE DIFFERENCE	RESPONSI	E FACTOR	STEADY STATE
SOLAR COMP. CALC	ULATED:	D DIFFUSE/DIRECT/RE	-RADIATED DIFFUSE	/DIRECT	E TOTAL
INTEGRATION:		SIMPLE EULER	D, IMPLICI:	r ·	OTHER
SHADING:		ANY SOLAR OBSTRUC	TION DOVERRANC	ONLY	☐ NO SHADING
MOVABLE SHADING:	•	M DAILY & SEASONAL	SWITCHING D SEASONAL	L SWITCHING	☐ NOT CALCULATED
MASS EFFECT IS CA	ulculated:	🗷 TRANSIERT HEAT FL	ON TIME COI	NSTANT FACTORS	D ASSUME NO MASS AFFECT
ROOM TEMP. BASED	OK:	SURFACE & ATR	X AIR ONL		NOT CALCULATED
INSIDE TEMPERATUR	Œ:	INPUT SCHEDULE BY	USER 🔲 FIXED IN	TOOL	VARIED BY TOOL
U-VALUES:		CHANGE W/WIND SPE	ED E REMAIN	CONSTANT	MOVABLE INSULATION
INFILTRATION:	,	AIR CHANGE PER HO	UR D CRACK M	ETHOD	VARIES W/WIND SPEED
INTERNAL LOADS IN	CLUDE:	SENSIBLE & LATENT	SEPARATE SENS. 6	LAT. TOTAL	M SENSIBLE ONLY
VENTILATION:		⊠ sensible	☐ LATENT		VARIES BY SCHEDULE OR COMMAND
DAYLIGHT COEFFICE	ENTS:	SKY, REFL. & DIRE	CT D SKY & RE	EFL.	☐ SKY OMLY
ZONES PER RUN:	-	₩ > 25	🗖 10 - 25	□ 2 - 10 ·	- 🗖 1 ONLY
SYSTEM MODELING:		SYSTEM EFFIC. IMP	UT 🐪 🗷 SYSTEM O	PTIMIZING	COMPONENT SENSITIVITY
ECONOMIC ANALYSIS	:	ANNUAL COST .	SIMPLE !	AYBACK .	D LIFE CYCLE COSTING
OUTPUT:	•				
LOAD DETERMINANTS:	S COMPONEN	T 🖸 ZONE	Z BUILDING		•
LOADS OUTPUT EY:	AUCH 🖾	Ď DAY	DX MONTH		SEASON 💆 YEA
TEMPERATURES:	ED AIR	D SURFACE		<del>-</del>	
FUEL USE EN:		CONSUMPTION PEAK DEHAND	ANNUAL CONSUMPTION D ANNUAL PEAK DEMAND D CTHER	<b>1 1 1 1 1 1 1 1 1 1</b>	SYSTEM COMPONENTS ENERGY SYSTEMS TOTAL BUILDING ONLY



USA



FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:	- '	•			
COMPUTER TYPE:	₩ IBH	<b>⊠</b> coc	D UNIVAC	□ OTHER	
CORE REQUIRED:	□ > 500K	₫ 100 - 500	K D 25	- 100 K	□ < 25 K
SUPPORT:	☑ USER'S GUIDE	DATA	L HANUAL	□ OTHER	
EQUIPMENT:	D CRT	Z PRINTER	☐ TEXTRONIX	□ OTHER	
COSTS:					
ASSUMING PURCHASE OF	SOFTWARE FOR USE	ON PRESENT TIME-S	HARING:		
FIRST COST:		-			•
IN-OFFICE EQUIPMEN	RT: CRT	X	PRINTER	X	
SOFTWARE PURCHASE		DECK		 	LISTING
SUPPORT INFORMATIO	ON: USER'	s cuide X		Х	
TIME TO IMPUT AND	DEBUG: 3	HAN-DATS	Kan-		
RUN COST/TIME:				_	
INPUT SET-UP TIME:	:	2 HAN-DAYS	HAN-	HOURS	
TYPICAL* RUN TIME:	± <b>∆</b> >1 π	R. 🗀 60	Эн- 30 н	□ 30 H - 10	к 🛮 < 10 н
TYPICAL* CPU TIME:	□ > 100	0 SEC. 🗀 10	00 - 1000 SEC.		<del></del>
FOR THIS FORM, ASSUME	TYPICAL TO ME	A SINGLE-ZONED 100	SQUARE METER RES	IDENCE WITH ALL	DUTPUTS CHECKED (.') IN
SECTION 2.					
ASSUMING USE OF SOFTW			:		
ASSUMING USE OF SOFTW	ARE ON PUBLIC TIM	E-SHARING NETWORKS	-	Ulable (exact o	OSTS CAN BE OBTAINED
NAMES AND CONTACTS THROUGH THEM).  Airflow Science	OF TIME-SHARING	E-SHARING NETWORKS SERVICES WHICH HAV	T THIS PROGRAM AV		
ASSUMING USE OF SOFTW NAMES AND CONTACTS	OF TIME-SHARING	E-SHARING NETWORKS SERVICES WHICH HAV	E THIS PROGRAM AVA	User Service	3
NAMES AND CONTACTS THROUGH THEM).  Airflow Science	COrporation/F	E-SHARING NETWORKS SERVICES WEICH HAV	Cybernet  Centre T	User Service echnique Indu	striel de la
NAMES AND CONTACTS THROUGH THEM).  Airflow Science Arga Associates	COX  CARE ON PUBLIC TIME  COT TIME-SHARING:  COTPORATION/F	E-SHARING NETWORKS SERVICES WEICH HAV	Cybernet  Centre T  Construc	User Service echnique Indu tion Metallic	2

IEA SOLAR RED EN

## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

U.S.A.

TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO:
LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS

GENERAL:	•
TOOL NAME: EMPS 2.0	AVAILABLE THROUGH: Electric Power Research
DEVELOPED BY: D. R. Merriam	Institute, 3412 Hillview Ave.
Arthur D. Little, Inc.	Palo Alto, Calif. 94303
for Electric Power Research Inst.	Attn: Gary G. Purcell
•	PHONE NO.: (415) 855-2168
	SUPPORTED BY: Arthur D. Little, Inc.
DATE DEVELOPED: Feb. 1982	
DATE OF LAST REVISION: Feb. 1982	
	PHONE NO.: (617) 864-5770 x-5887
BRIEF DESCRIPTION: EMPS 2.0 models more common pa	
design residential buildings. Multiple	conditioned or unconditioned spaces,
which communicate by conductive and conv	ective transport, can be modeled.
Heat or cooling energy requirements to m	
<ul> <li>calculated for unitary, central or combi</li> </ul>	nation systems. System part load performance
PLEASE ATTACE ANY VALIDATION OR TESTING REPORTS.	
TOOL HARDWARE & AVAILABLE FO	RMS:
∑ NYIN LYNE CONDIES    □ NICHO-CONDUES    □	HAND CALCULATOR D GRAPHIC OR MANUAL
CAPD DECK  TAPE  TAPE  TAPE  THE SHARING  LY LISTING - BARD COPY  (COMPLETE SECTIONS 1, 2, 3)  COMPLETE SECTIONS 1, 2, 4)	☐ MAGNETIC CARD ☐ TEMPLATES, CHARTS, TABLES ☐ L'ETING ☐ BOOK. ☐ RECALL ONLY MEMORY ☐ DEVICE   INTEGRATED CIRCUIT - (COMPLETE SECTIONS 1, 2, 6)

IEA SOLAR RED

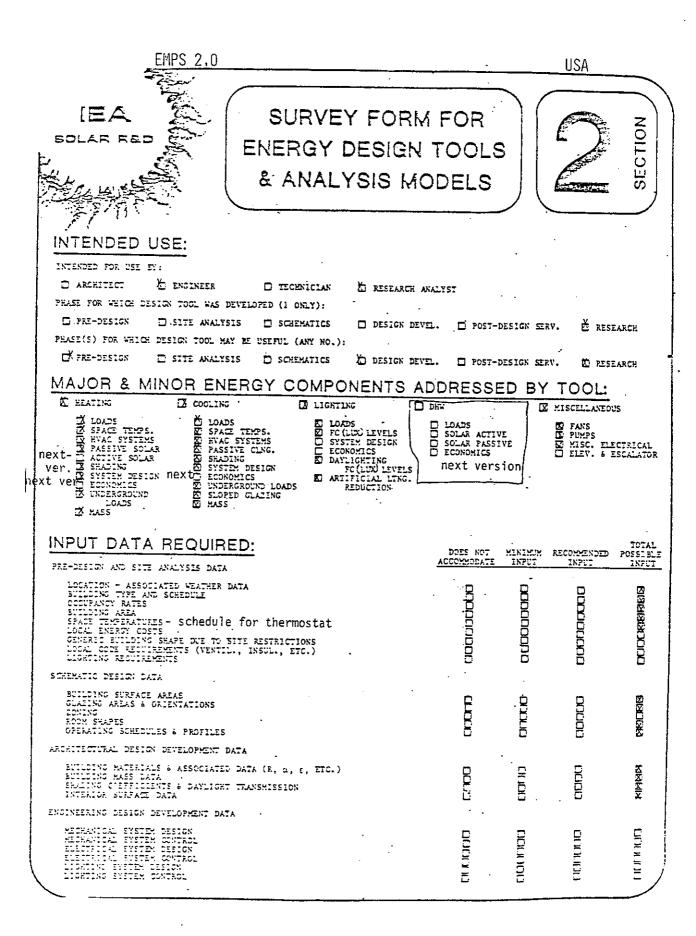
# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



USA

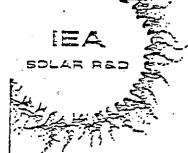
#### COMMENTS:

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.



ErIPS 2.0

USA



SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



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



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

Section

ZAN	a minero	O MODELS	0)
WEATHER DATA			
17	<u>:</u>		
	DURLY TAPE	ONTHLY DATA ANNUAL DA	
SOLAR DATA:	URLY TAPE TYPICAL DAY PRO	FILE D MONTHLY A	VE. DAILY & TOTAL
	Y ORIEN. INCL. SLOPED ANY OPED FACING SOUTH SUR	VERT. & HORIZ.	RIZ. & 4 CARDINAL DIREC.
	UR-BY-HOUR TYPICAL CLEAR & NUAL AVERAGE OTHER	CLOUDY DAY/HONTH TYP	ICAL DAY/MONTH
CALCULATION P	ROCEDURES:		,
LANGUAGE: FORTRAN	☐ BASIC ☐ MACHINE LANGUAGE	□ other □ c	RAPHS, CHARTS & SIMPLE CALC.
USER TYPE:   INTERAC			☐ HAND CALCULATION
UNITS OF CALCULATION:		ENGLISH	D BOTH
CHECK ALL APPROPRIATE BOXE			<u>_</u> 501
HEAT TRANSFER:	FINITE DIFFERENCE	☐ RESPONSE FACTOR	☐ STEADY STATE
SOLAR COMP. CALCULATED:	DIFFUSE/DIRECT/RE-RADIATE		☐ TOTAL
INTEGRATION:	SIMPLE EULER	☐ IMPLICIT	M OTHER
SHADING:	ANY SOLAR OBSTRUCTION	O OVERHANG ONLY	□ NO SHADING
MOVABLE SHADING:	DAILY & SEASONAL SWITCHIN		☐ NOT CALCULATED
MASS EFFECT IS CALCULAT	Si.	☐ TIME CONSTANT FACTOR:	_
ROOM TEMP. BASED ON:	SURFACE & AIR	☐ AIR ONLY	
INSIDE TEMPERATURE:	INPUT SCHEDULE BY USER	<u> </u>	NOT CALCULATED
U-VALUES:		FIXED BY TOOL	□ VARIED BY TOOL
	~	REMAIN CONSTANT	MOVABLE INSULATION
INFILTRATION: (Wind Internal Loads Include:	V.	CRACK METHOD	☐ VARIES W/WIND SPEED
	SENSIBLE & LATENT SEPARAT		SENSIBLE ONLY
VENTILATION:	A SENSIBLE	LATENT	OR COMMAND
DAYLIGHT COEFFICIENTS:	K SKY, REFL. & DIRECT	X natural and/o	or forced  Sky only
ZONES PER RUN:	D > 25	- 25 🔲 2 ~ 10	☐ 1 ONLY
SYSTEM HODELING:	🔀 ŞYSTEM EFFIC. INPUT	SYSTEM OPTIMIZING	COMPONENT SENSITIVITY
ECONOMIC ANALYSIS:	III ANNUAL COST	SIMPLE PAYBACK	LIFE CYCLE COSTING
OUTPUT:	`new version	new version	\new version
LOAD DETERMINANTS: D COM	IPONENT KI ZONE	¥ 2007-2000	
LOADS OUTPUT BY: TO HOL	7	BUILDING	
TEMPERATURES: AIR	<b>/</b>	A HONTH	SEASON YEAR COMf. temp.
		GRAPHIC PLOT	-
new version on MON	THE CONSUMPTION AND THE PEAK DEMAND NEW VERSON AND THE DOTH	UAL PEAK DEHAND	SYSTEM COMPONENTS LENERGY SYSTEMS TOTAL BUILDING ONLY

EMPS 2.0

U.S.A



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

3 SECTION

## FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:							
COMPUTER TYPE:	🔀 Івн	0	CDC	D UNIVAC	OTHER _	,	
				0 K - 🖂			K
SUPPORT:	X USER'S	UIDE	□ DA	TA MANUAL	OTHER _		
EQUIPMENT:	CRT CRT			☐ TEXTRONIX			
COSTS:		•					
C ASSUMING PURCHASE OF	SOFTWARE FO	R USE ON I	PRESENT TIME	-SHARING:			•
O FIRST COST: The office equipment of the contract of the cont	NT:	CRT		PRINTER			
T SOFTWARE PURCHASE	:			TAPE		LISTING	,
E SUPPORT INFORMATIO	ON:			DATA MAN		_	
R TIME TO INPUT AND				м		<del></del>	<u> </u>
RUN COST/TIME:				-			
INPUT SET-UP TIME:	:		MAN-DAYS	н	AN-HOURS		
TYPICAL* RUN TIME:		> 1 HR.	0	60 M - 30 M	□ 30 M ~	10 H	□ < 10 H
TYPICAL* CPU TIME:		> 1000 SE	.c. 🕱	100 - 1000 SEC.	□ 5 <b>-</b> 100	SEC.	□ < 5 SEC.
*FOR THIS FORM, ASSUME SECTION 2.	TYPICAL :	TO BE A SI	NGLE-ZONED	for annual 100 SQUARE METER	. analysis RESIDENCE WITH A	LL OUTPUTS CHI	ECKED (/) IN
ASSUMING USE OF SOFT	ARE ON PUBL	IC TIME-SH	ARING NETWO	KKS:			
NAMES AND CONTACTS THROUGH THEM).	OF TIME-SH	ARING SERV	ICES WHICH I	NAVE THIS PROGRAM	AVAILABLE (EXAC	T COSTS CAN BE	OBTAINED
	<del></del>			<del>.</del>			
	<u> </u>	<del></del>		<del></del>			
<del></del>			<del> </del>	<del></del>			
		1			+ • • • • • • • • • • • • • • • • • • •		
					•		

### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

U.S.A.

SECTION

TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO:
LOW ENERGY DWELLING

SUBTASK B - MODELLING & SIMULATION

SUBTASK C - DESIGN METHODS

OCHEDAL.	
GENERAL:	
TOOL NAME: SERI - RES	AVAILABLE THROUGH: National Energy Software Cent
DEVELOPED BY: SERI and Larry Palmiter	Argonne National Laboratory
Terry Wheeling	Argonne, IL 60439
Ecotope Group	-
2238 East Madison	PHONE NO.:
Seattle, NA 98112	SUPPORTED BY: Ecotope Group
DATE DEVELOPED: August, 1981	2238 East Madison
DATE OF LAST REVISION: August, 1981	Seattle, WA 98112
	· · · · · · · · · · · · · · · · · · ·
	PHONE NO.:
BRIEF DESCRIPTION: SERI-RES is a general purpose	thermal analysis computer program for
residential buildings.	
residential buildings.  Flease attack any validation or testing Reports.	
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.  TOOL HARDWARE & AVAILABLE F	

SERIRES

USA



### SURVEY FORM FOR **ENERGY DESIGN TOOLS** & ANALYSIS MODELS



N	T	E	N	D	Ε	D	U	S	Ε	

INTENDED	FOR	USE	E. :	
----------	-----	-----	------	--

- ARCHITECT E ENGINEER
- ☐ TECHNICIAN
- E RESEARCH ANALYST

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

- PRE-DESIGN 🗖 ŠITE ANALYSIS
- SCHEMATICS
- DESIGN DEVEL. D POST-DESIGN SERV.
- T RESEARCE

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

COOLING

- M PRE-DESIGN
- SITE ANALYSIS
  - SCHEMATICS

DHE:

D LOADS
D SOLAR ACTIVE
D SOLAR PASSIVE
D ECONOMICS

- DESIGN DEVEL. TO POST-DESIGN SERV.
- K RESEARCH

#### MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL: ☐ LIGHTING

HEATING E LOADS
SPACE TEMPS.
SPACE TEMPS.
SPACE TEMPS.
SPACE TEMPS.
SPASSIVE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPACE SOLAR
SPA

LOADS MASS

- E LOADS

  SPACE TEMPS.

  HVAC SYSTEMS

  PASSIVE CLNG.

  SHADING
  SYSTEM DESIGN
  CECONOMICS

  UNDERGROUND LOADS SLOPED CLAZING
- D LOADS
  D FC (LIEX) LEVELS
  D SYSTEM DESIGN
  D ECONOMICS
  D DAYLIGHTING
  FC (LIEX) LEVELS
  ARTIFICIAL LING.
  REDUCTION

- KISCELLANEOUS
  - TE FANS
    D PUMPS
    D MISC. ELECTRICAL
    ELEV. & ESCALATOR

### INPUT DATA REQUIRED:

PRE-DESIGN AND SITE ANALYSIS DATA LOCATION - ASSOCIATED WEATHER DATA

SUILDING TYPE AND SCHEDULE OCCUPANCY RATES BUILDING AREA SPACE TEMPERATURES
LOCAL ENERGY COSTS
GENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETG.)
LIGHTING REQUIREMENTS SCHEMATIC DESIGN DATA BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING

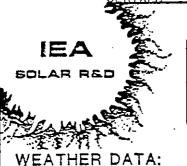
ROOM SHAPES . OPERATING SCHEDULES & PROFILES ARCHITECTURAL DESIGN DEVELOPMENT DATA

BUILDING MATERIALS & ASSOCIATED DATA (R, b, c, ETC.) BUILDING MASE DATA SHALING C'EFFICIENTS & 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

DOES NOT ACCOMMODATE	MIRIMUM INPUT	RECOMMENDED INPUT	TOTAL POSSIEL INPUT
	00000000	ococacca	
0000	. 000.3	00000	
נינסם	0000	. בממנו	
	100000	ביני נוסוסום	





一种产	· ·				<del></del>			·	
WEATHER DA	TA:								
TEMPERATURE DATA:	E BOURLY T.  ANNUAL DE	APE DIE EGREE DAYS	TTPICAL DAY	D HONTEL	Y DATA AND HAX.	ANNUAL DAT	A E	) HONTHLY DEG	REE DAYS Y
SOLAR DATA:	E HOURLY TA	APE [	3 TYPICAL DA	AY PROFILE		☐ MONTELY AV	E. DAIL	Y & TOTAL	
SOLAR ORIENS. CALC:	ANY ORIEN	N. INCL. SL ACING SOUTH	LOPED [	D ANY VERI E SURFACE	. & HORIZ. REFLECTANCE	□ HOF	NIZ. 6	CARDINAL DI	REC.
			TYPIČAL CI DOTHER		DY DAY/HONT	E	(CAL DA)	Y/MONTE	•
CALCULATION	N PROC	EDUR	ES:						
LANGUAGE: TO FORTRA	IN BAS	IC DHA	CHINE LANGUA	LGE 🗆 OT	HER	{^ CR	LAPHS, (	CHARTS & SIMP	TE CALC.
USER TYPE: IN IN	TERACTIVE	D INT	TERACTIVE GR	APRIC -	PREPARE	FILE [	CKAH C	CALCULATION	
UNITS OF CALCULATION:	: <b>⊠</b> s:	I UNITS		ENG!	.15H		<b>2</b> 30	TH	
CHECK ALL APPROPRIATE	•		•						
HEAT TRANSFER:		P FINITE	DIFFERENCE		RESPONSE	FACTOR	D 5.	TEADY STATE	
SOLAR COMP. CALCUL	ATED:	D DIFFUSE	:/DIRECT/RE-I	RADIATED	☑ DIFFUSE/	DIRECT	D I	DIAL	
INTEGRATION:		SIMPLE	EULER		D'IMPLICIT	•	O 01	THER	
SHADING:		ANY SOL	AR OBSTRUCT	ion	☑ OVERHANG	DNLY	D NO	SHADING	
MOVABLE SHADING:	•	DAILY &	SEASONAL S	SITCHING	SEASONAL	. SWITCHING	D N	OT CALCULATED	)
MASS EFFECT IS CAL	: מפדגעונס.	TRANSIE	ENT HEAT FLOA	ŧ	TIME CON	STANT FACTORS		esume no mass	AFFECT
ROOM TEMP. BASED O	ж:	SURFACE	L AIR		AIR ONLY		_ D N	DT CALCULATED	,
INSIDE TEMPERATURE	::	אין אין אין אין אין אין אין אין אין אין	CHEDULE IN (	USER	☐ FIXED BY	TOOL	🗷 V.	ARIED BY TOOL	
U-VALUES:		CHANGE	W/WIND SPEED	O	REMAIN C	TAATENC	X H	OVABLE INSULA	TION
INFILTRATION:		AIR CHA	UNGE PER HOU	R	CRACK ME	THOD COHT:	<b>2</b> 0 ∨.	ARIES W/WIND	SPEED
INTERNAL LOADS INC	LUDE:	SENSIB:	E & LATENT S	SEPARATE	🗆 SENS. 4	LAT. TOTAL	D Si	ENSIBLE ONLY	
.VENTILATION:		SENSIEL	Į.		☑ LATENT		O	aries by sche R command	dule
DAYLIGHT COEFFICIE	INTS:	_	EFL. & DIRECT				_	KY ONLY	
ZONES PER RUN:	•					<b>②</b> 2 - 10			
SYSTEM MODELING:		D SYSTEM	EFFIC. INPUT				_	OMPONENT SENS	
ECONOMIC ANALYSIS:	\$ •	□ WMMYT	<b>COST</b> -		SIMPLE F	PAYBACK	□ ı	ite acre as	STING
OUTPUT:									
LOAD DETERMINANTS:	COMPONENT	7	Z ZONE	1	M PRITTING				
LOADS OUTPUT BY:	B HOUR		DAY	1	HTMON 2	172	SEASO	К	₹ YEAR
TEMPERATURES:	₩ AZR		SURFACE	- (	GRAPHIC F	ינסבי			
FUEL USE EY:	D WONTHEN				CONSUMPTION PEAK DEMAND	·	ENERS	M COMPONENTS Y SYSTEMS BUILDING ONL	
`			_			-			

SERIRES

SERIRES

BOLAR RED

USA

# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS

SECTION

FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

CORE REQUIRED:   > 500K	COMPUTER TYPE:	E IBH	5	CDC	עואט אַ	ıc I	OTHER	Generally A	NSI standa
COSTS:  LISSUMING PURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:  FIRST COST:  IN-OFFICE EQUIPMENT:  SOFTWARE PURCHASE:  CARD DECK.  TAPE X  LISTING  SUPPORT INFORMATION:  USER'S GUIDE X  DATA HANUAL  OTHER  TIME TO INPUT AND DEBUG:  5 HAN-DAYS  HAN-HOURS  RUN COST/TIME:  INPUT SET-UP TIME:  2 HAN-DAYS  TYFICAL* RUN TIME:  D > 1 HR.  D 60 H + 30 H  TYFICAL* CPU TIME:  D > 1000 SEC.  D 100 - 1000 SEC.  D 5 - 100 SEC.  COR TRIS FORM, ASSUME "TYFICAL" TO BE A SINGLE-ZONED 100 SQUARE HETER RESIDENCE WITH ALL OUTPUTS CHECKED (,/) IN  ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING HETWORKS:	CORE REQUIRED:	□ > 500x		D 100 +	500 K	DS 25 - 1	00 K	□ < 25	x cod
COSTS:  LISTUMING 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 HANUAL OTHER  TIME TO INPUT AND DEBUG:  5 HAN-DAYS HAN-HOURS  RUN COST/TIME:  INPUT SET-UP TIME:  2 HAN-DAYS HAN-HOURS  TYFICAL* RUN TIME:  3 1 HR. 60 H - 30 H 30 M - 10 H 4 10 H  TYFICAL* CPU TIME:  5 > 1000 SEC. 60 N - 1000 SEC. 6 5 - 100 SEC. 6 5 SEC	SUPPORT:	₩ USER'S	coids	0	DATA HANUAL	r	OTHER		<u> </u>
SSUMING FURCHASE OF SOFTWARE FOR USE ON PRESENT TIME-SHARING:  IN-OFFICE EQUIPMENT: CRT X PRINTER X  SOFTWARE PURCHASE: CARD DECK TAFE X LISTING  SUPPORT INFORMATION: USER'S GUIDE X DATA HANUAL OTHER  TIME TO INPUT AND DEBUG: 5 MAN-DAYS MAN-HOURS  UN COST/TIME:  INPUT SET-UP TIME: 2 MAN-DAYS MAN-HOURS  TYFICAL* RUN TIME: 5 > 1 HR. 60 H + 30 H 30 M - 10 H 6 < 10 H  TYFICAL* CPU TIME: 7 > 1000 SEC. 100 SEC. 5 - 100 SEC. 6 5 SEC  FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (,') IN SECTION 2.  SESSMING USE OF SOFTWARE ON FUELIC TIME-SHARING NETWORKS:	QUIPMENT:	<b>B</b> 000 -		PRINTER	□ TEXT	ZINON	OTHER .		<del> </del>
IN-OFFICE EQUIPMENT: CRT X PRINTER X  SOFTWARE PURCHASE: CARD DECK TAFE 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  TYFICAL* RUN TIME: 3 > 1 HR. 60 H + 30 H 30 M - 10 H (10 H  TYFICAL* CPU TIME: 3 > 1000 SEC. 100 - 1000 SEC. 5 - 100 SEC. 65 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:	COSTS:								
IN-OFFICE EQUIPMENT: CRT X PRINTER X  SOFTWARE PURCHASE: CARD DECK TAFE X LISTING  SUPPORT INFORMATION: USER'S GUIDE X DATA HANUAL OTHER  TIME TO INPUT AND DEBUG: 5 MAN-DAYS MAN-HOURS  RUN COST/TIME:  INPUT SET-UP TIME: 2 MAN-DAYS MAN-HOURS  TYFICAL* RUN TIME: 5 > 1 MR. D 60 M - 30 M D 30 M - 10 M C 10 M  TYFICAL* CPU TIME: D > 1000 SEC. D 100 - 1000 SEC. D 5 - 100 SEC. C < 5 SEC  FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL DUTPUTS CHECKED (,') IN SECTION 2.  ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING METMORKS:		OF SOFTWARE	FOR USE ON	PRESENT TI	ME-SHARING:				
IN-OFFICE EQUIPMENT:  CRT X PRINTER X  SOFTWARE PURCHASE:  CARD DECK TAFE X LISTING  SUPPORT INFORMATION:  USER'S GUIDE X DATA HANUAL OTHER  TIME TO INPUT AND DEBUG:  5 MAN-DAYS MAN-HOURS  RUN COST/TIME:  INPUT SET-UP TIME:  2 MAN-DAYS MAN-HOURS  TYFICAL* RUN TIME:  3 > 1 HR. 60 H - 30 M 30 M - 10 M 4 (10 H  TYFICAL* CPU TIME:  3 > 1000 SEC. 60 100 - 1000 SEC. 65 - 100 SEC. 65 SEC  FOR TRIS FORM, ASSUME "TYFICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL DUTPUTS CHECKED (,') IN SECTION 2.  ASSUMING USE OF SOFTWARE ON FUELIC TIME-SHARING METMORKS:					-				
SOFTWARE PURCHASE:  CARD DECK TAFE X LISTING  SUPPORT INFORMATION:  USER'S CUIDE X DATA HANUAL OTHER  TIME TO INPUT AND DEBUG:  5 HAN-DAYS HAN-HOURS  RUN COST/TIME:  INPUT SET-UP TIME:  2 HAN-DAYS HAN-HOURS  TYFICAL* RUN TIME:  3 > 1 HR. 60 H - 30 H 30 M - 10 H  TYFICAL* CPU TIME:  5 > 1000 SEC. 60 100 - 1000 SEC. 65 - 100 SEC. 65 SEC.  FOR THIS FORM, ASSUME "TYFICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (,') IN SECTION 2.  ASSUMING USE OF SOFTWARE ON FUELIC TIME-SHARING METMORKS:		9T:	CRIT	X	PR	INTER	X	_	
SUPPORT INFORMATION:  USER'S GUIDE X DATA HANUAL OTHER  TIME TO INPUT AND DEBUG:  5 MAN-DAYS MAN-HOURS  RUN COST/TIME:  1NPUT SET-UP TIME:  2 MAN-DAYS MAN-HOURS  TYPICAL* RUN TIME:  3 > 1 HR.  60 M + 30 M  30 M - 10 M  4 < 10 H  TYPICAL* CPU TIME:  5 NAN-DAYS MAN-HOURS  TYPICAL* CPU TIME:  5 > 1 DOC - 1000 SEC.  5 - 100 SEC.  4 < 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 METWORKS:	SOFTWARE PURCHA	5E:						•	
INPUT SET-UP TIME:  2 MAN-DAYS  TYPICAL* RUN TIME:  3 > 1 HR.  60 H + 30 H  30 H - 10 H  C > 10 H  TYPICAL* CPU TIME:  3 > 1000 SEC.  100 - 1000 SEC.  5 - 100 SEC.  6 > 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 FUELIC TIME-SHARING METWORKS:	SUPPORT INFORMA	TION:	USER'S	CUIDE X	DV.	A HANUAL		OTHER	
INPUT SET-UP TIME:  2 MAN-DAYS  TYFICAL* RUN TIME:  3 > 1 HR.  60 M + 30 M  30 M - 10 M  C > 10 M  TYFICAL* CPU TIME:  3 > 1000 SEC.  100 - 1000 SEC.  5 - 100 SEC.  6 < 5 SEC.  FOR THIS FORM, ASSUME "TYFICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL DUTPUTS CHECKED (,') IN SECTION 2.  ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING METMORKS:	TIME TO INPUT A	D DEBUG:	5	MAN-DAY	s	HAN-HOU	IRS		
TYPICAL* RUN TIME: S > 1 HR. D 60 H + 30 M D 30 M - 10 M C < 10 H  TYPICAL* CPU TIME: D > 1000 SEC. D 100 - 1000 SEC. S 5 - 100 SEC. D < 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 FUELIC TIME-SHARING METWORKS:	RUN COST/TIME:		•					-	
TYPICAL* CPU TIME:   > 1000 SEC.   100 - 1000 SEC.   5 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 METMORES:	INPUT SET-UP TE	Œ:	2	MAN-DAY	5	MAN-HOU	125		
FOR THIS FORM, ASSUME "TYPICAL" TO BE A SINGLE-ZONED 100 SQUARE METER RESIDENCE WITH ALL OUTPUTS CHECKED (,') IN ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING METWORKS:	TYFICAL* RUN TI	Œ:	<b>戊</b> > 1 HR.		□ 60 H + 30 t	1	□ 30 H	- 10 M	□ < 10 H
SECTION 2. ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING METWORKS:	TYFICAL* CPU TE	<b>4</b> 5:	D > 1000	SEC.	D 100 - 1000	SEC.	<b>或</b> 5 - 1	00 SEC.	C < 5 SEC
ASSUMING USE OF SOFTWARE ON PUBLIC TIME-SHARING METWORKS:	FOR THIS FORM, ASS	ME "TYPICAL	TO BE A	SINGLE-ZONE	D 100 SQUARE I	TETER RESIDE	NCE WITH	ALL OUTPUTS CH	ECKED (,') IN
					- LA DU C .				
		-							PE ABELINES
					· -	<u> </u>		·	·- <u>-</u> -
		<u> </u>	<u> </u>		<del></del> -	<del></del>		<u></u>	<u> </u>

TRINSYS 11.1 II.S.A SURVEY FORM FOR EEA SOLAR RED ENERGY DESIGN TOOLS & ANALYSIS MODELS TASK VIII - PASSIVE AND HYBRID SOLAR RETURN TO: LOW ENERGY DWELLING SUBTASK B - MODELLING & SIMULATION SUBTASK C - DESIGN METHODS GENERAL: TOOL NAME: \_\_\_ IRNSYS 11.1 AVAILABLE THROUGH: Solar Energy Laboratory DEVELOPED EY: University of Wisconsin Solar Energy Laboratory 1500 Johnson Drive . Madison, Wisconsin 53706 PHONE NO.: (608) 263-1586 SUPPORTED BY: Solar Energy Laboratory DATE DEVELOPED: 3/75 J.<u>E. Braun</u> DATE OF LAST REVISION: 4/81 PHONE NO.: (608) 263-1589 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: E MAIN FRAME COMPUTER - - MICRO-COMPUTER D HAND CALCULATOR C GRAPHIC OF MANUAL COLAD DECK E TAPE E TIME SHARING ☐ DISC ☐ MAGNETIC CARD ☐ TEMPLATES, CHARTS, TABLES ☐ TAPE D L'STING
C RECALL ONLY MEMORY
INTEGRATED GIRCUIT D BOOK ☐ LISTING D DEVICE M LISTING - EARD COPY C RECALL ONLY MEMORY-INTEGRATED CIRCUIT (COMPLETE SECTIONS 1, 2, 6) (COMPLETE SECTIONS 1, 2, 3) (COMPLETE SECTIONS 1, 2, 5)

(COMPLETE SECTIONS 1, 2, 4)

IRNSYS LLJ

USA



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### COMMENTS:

The present version of TRNSYS is supplied with the following standard component models:

Data Reader Solar Radiation Data Processor Shading Algorithm Flat Plate Collector CPC Collector Mass Wall Direct Gain Window Pipe And Duct Pump/Fan Flow Divertor/Mixing Valve/Tee Piece Controller With Hysteresis Three-Stage Thermostat Microprocessor Controller Relief Valve Heat Exchanger Storage Tank Rock Bed

Heat Pump Absorption Air Conditioner Auxiliary Heater Liquid Collector - Storage Subsystem Air Collector - Storage Subsystem Domestic Hot Water Subsystem Energy/(degree-Hour) Space Heating or Cooling Load Wall Roof and Attic Transfer Function Model: Room and Basement -Cyclic Time-Dependent Function Generator Algebraic Operations Unit Quantity Intergrator Printer Using Plotter

Time and Frequency Distribution Plotter Line 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.

MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM DESIGN LIGHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL

TRNSYS 11.1 ·USA IEA SURVEY FORM FOR SECTION SOLAR RAD ENERGY DESIGN TOOLS & ANALYSIS MODELS INTENDED USE: INTENDED FOR USE EY: D ARCHITECT E ENGINEER TECHNICIAN TESEARCH ANALYST PRASE FOR WEIGE DESIGN TOOL WAS DEVELOPED (1 ONLY): SITE ANALYSIS ☐ SCHEMATICS DESIGN DEVEL. Dest-Design serv. **在** RESEARCH THASE(S) FOR WHICH DESIGN TOOL MAY BE USEFUL (ANY NO.): FRE-DESIGN SITE ANALYSIS ☐ SCHEMATICS E DESIGN DEVEL. POST-DESIGN SERV. E RESEARCH MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL: & COOLING . ☐ LIGHTING E LOADS

E SPACE TEMPS.

E EVAC SYSTEMS

IF PASSITY CLNG.

E SHADING

E SYSTEM DESIGN

E ECONOMICS

UNDERGROUND LOADS

F SLOPED GLAZING D LOADS
D FC (LUD) LEVELS
D SYSTEM DESIGN
DE ECONOMICS
DAYLIGHTING
FC (LUX) LEVELS
D ARTIFICIAL LING. E LOADS
E SPACE TEMPS.
E EVAC SYSTEMS
FASSIVE SOLAR E LOADS
E SOLAR ACTIVE
D SOLAR PASSIVE
E ECONOMICS D PUMPS
D MISC. ELECTRICAL
D ELEV. & ESCALATOR ACTIVE SOLAR
E SHADING
SYSTEM DESIGN SYSTEM DESIGN
ECONOMICS
UNDERGROUND
LOADS REDUCTION SLOP SLOPED GLAZING ME MASS INPUT DATA REQUIRED: DOES NOT MINIMUM RECOMMENDED POSSIELT INPUT PRE-DESIGN AND SITE ANALYSIS DATA LOCATION - ASSOCIATED WEATHER DATA BUILDING TYPE AND SCHEDULE OCCUPANCY RATES CONTRACT NAMES

EVILLING AREA

SPACE TEMPERATURES

LOCAL ENERGY COSTS

GENERIC EVILDING SHAFE DUE TO SITE RESTRICTIONS

LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)  $\overline{\Box}$ LIGHTING REQUIREMENTS SCHEMATIC DESIGN DATA BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING OPERATING SCHEDULES & PROFILES ARCHITECTURAL DESIGN DEVELOPMENT DATA BUILDING MATERIALS & ASSOCIATED DATA (R, c, ETC.) BUILDING MASS DATA SHADING O'EFFICIENTS & DAYLIGHT TRANSMISSION 100 INTERIOR SURFACE DATA ENGINEERING DESIGN DEVELOPMENT DATA

00000

ľ

Ē

TRNSYS 11.1

USA

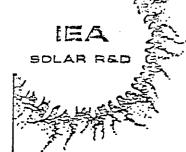


## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



				MODELO		
WEATHER D	ATA:					
TEMPERATURE DATA:	E BOURLY	CAPE   TYPICAL DEGREE DAYS   AVI	DAY D MONTH	LY DATA D ANNUAL . AND MAX. D AVE. H	DATA D MONTHLY ONTHLY TEMP. D	DEGREE DAYS
SOLAR DATA:	E HOURLY		•	□ HONTELL		
SOLAR ORIENS. CALC:				7. 4 HORIZ.	HORIZ. 4 4 CARDINA	ī
, DAYLIGHT CALC:	HOUR-BY-	HOUR TYPICA	L CLEAR & CLOI	HTMCH\YAG YGU	PYPICAL DAY/HONTE	
CALCULATIO	N PRO	DEDURES:	•			
LANGUAGE: E FORTR	an 🗖 bas	IC D HACHINE LA	NGUAGE 01	THER	GRAPES, CEARTS &	SIMPLE CALC.
USER TYPE: 🖸 I	NTERACTIVE	☐ INTERACTIVE	CRAPHIC	PREPARE FILE	☐ RAND CALCULAT	
UNITS OF CALCULATION	🗅 s	I UNITS	☐ ENGL	.1SH	B BOTH	
CHECK ALL APPROPRIAT	E BOXES:					
HEAT TRANSFER:		FINITE DIFFEREN	CE	麗 RESPONSE FACTOR	STEADY STA	IE .
SOLAR COMP. CALCU	LATED: '	■ DIFFUSE/DIRECT/	dețaicas-35	B DIFFUSE/DIRECT	TOTAL	
INTEGRATION:		C SIMPLE EULER		MINPLICIT	E OTHER	
SHADING:		ANY SOLAR DESTR		OVERHANG DECK	D NO SHADING	•
HOVABLE SHADING:	,*	M DAILY & SEASONA	L SWITCHING	plus wingwalls SEASONAL SWITCHING	D NOT CALCUL	ATED
MASS EFFECT IS CA	LCULATED:	TRANSIENT HEAT		TIME CONSTANT FACT		MASS AFFECT
ROOM TEMP. BASED	DN:	D SURFACE & AER		AIR ONLY	☐ NOT CALCUL	ATED
INSIDE TEMPERATURE	:	INPUT SCHEDULE	er user	D FIXED BY TOOL	WARLED BY	rool
U-VALUES:	-	To CHANGE W/WIND S	PEED	D REMAIN CONSTANT	MOVABLE IN	SULATION
INFILTRATION:		AIR CHANGE PER I	HOUR	CRACK METHOD	□ VARIES W/W	IND SPEED
INTERNAL LOADS INC	LUDE:	SENSIBLE & LATER	ST SEPARATE	☐ SENS. & LAT. TOTAL	D SENSIBLE OF	aly :
VERTILATION:		S SENSIELE		E LATENT	VARIES BY S	CHEDULE
DAYLIGHT COEFFICIE	NTS:	D SKY, REFL. & DIT	<b>್</b>	SKY & REFL.	D SKI ONTI	Ì
ZONES PER RUN:	•	<b>Б</b> > 25	<u>10 - 25</u>	D 2 - 10	□ 1 0N1	.ς
SYSTEM HODELING:		D SYSTEM EFFIC. IN	₹PUT	SYSTEM OPTIMIZING	B COMPONENT S	SENSITIVITY
ECONOMIC ANALYSIS:	•	D ANNAL COST		SIMPLE PAYBACK	Brite acre	COSTING
OUTPUT:		•				
LOAD DETERMINANTS:	COMPONENT	E ZONE	5	E BUILDING '		:
LOADS OUTFUT EY:	NOUR	<b>₽</b> DAY		MONTH	SEASON	Ø YEAR
TEMPERATURES:	M AIR	☐ SURFAC	. , <b>.</b>	GRAPHIC PLOT		į
FUEL USE EY:	E HINTHLY C E MONTHLY F C OTHER	מסנדפאנצאמ	🖺 ARVAL	CONSUMPTION PEAK DEMAND	SYSTEM COMPONENT ENERGY SYSTEMS TOTAL BUILDING	

TRNSYS 11.1



### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### 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.

IEA LAR RED

SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE					
COMPUTER TYPE:	■ IBH		M UNIVAC	E OTHER	<u> </u>
CORE REQUIRED:	□ > 500x	□ 100 <b>-</b> 50	00 K <b>E</b> 25	- 100 K	□ < 25 K
SUPPORT:	USER'S CUI	DE D	ATA HANUAL	OTMER	
EQUIPMENT:	E CRI	PRINTER	☐ TEXTRONIX	□ OTHER	
COSTS:	•			•	
ASSUMING PURCHASE	OF SOFTWARE FOR	USE ON PRESENT TIME	E-SHARING:		•
FIRST COST:					
IN-OFFICE EQUIP	KENT: 'C	RT	PRINTER		7
SOFTWARE PURCHA	SE: C	ARD DECK	tape <u>\$80</u>	0.00	LISTING Inc.
SUPPORT INFORMA	TION: U	ser's cuide Inc.	w/tape DATA HANDA	T	OTHER
TIME TO IMPUT A	NO DEBUG: _	] MAN-DAYS	HAN	-HOURS	
RUN COST/TIME:				•.•	
INPUT SET-UF TE	ME:	HAN-DAYS	2-4 HAN	-HOURS	
TYPICAL* RUN TI	kΣ: □ >	1 BR.	) 60 ж - 30 м -	<b>⊠</b> 30 H ~ 10 H	☐ < 10 H.
TYPICAL* CPU TI	kir 🗅 >	1000 SEC.	100 - 1000 SEC.	□ 5 - 100 SEC	. 🗆 < 5 SEC.
FOR THIS FORM, ASS SECTION 2.	UME "TYPICAL" TO	RE A SINGLE-ZONED	100 SQUARE METER RE	SIDENCE WITH ALL O	UTPUTS CHECKED (/) IN
ASSUMING USE OF SO	FTWARE ON PUELIC	TIME-SHARING NETW	DRXS:		
NAMES AND CONTA TRROUGH TREM).	CTS OF TIME-SHAR	ING SERVICES WEIGH	HAVE THIS PROGRAM A	OD IDAKE) BIBALIAV.	STS CAN BE OBTAINED
Control Da	ta Corp.	*	Jay_	Fang (Minnesota	)
Boeing Co	mputer Servio	<u> </u>	Geor	ge Van Fuchs (V	lashinoton)
McAuto			Mr	Dwidark (Missou	ri)
			-	- ·	

TRNSYS 11.1

USA



# SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### 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.





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

	Butler PA 16001
GENERAL:	USA
TOOL NAME: Environmental Systems Perfor	r- AVAILABLE THROUGH: _ Joe Clarke
DEVELOPED BY: Joe Clarke mance (ESP)	
ABACUS	
University of Strathclyde	
Dept. of Architecture, 131	PHONE NO.: 041-552-4400 Ext. 3021
Rotten Row - Glasgow G40NG	SUPPORTED BY: ABACUS
DATE DEVELOPED: 1977	
DATE OF LAST REVISION: September 1983	
· · · · · · · · · · · · · · · · · · ·	
	PHONE NO.: 041 552 4400 Ext. 3021
BRIEF DESCRIPTION: ESP is a large finite-d	ifference based program running on
a mainframe or mini computer pro	oviding a detailed simulation of
hourly heat flows in a multizon	e construction.
PLEASE ATTACH ANY VALIDATION OR TESTING REPORTS.	
TOOL HARDWARE & AVAILABLE FO	PRMS:
■ MAIN FRAME COMPUTER ☐ MICRO-COMPUTER ☐	HAND CALCULATOR GRAPHIC OR MANUAL
CARD DECK DISC TAPE TAPE TIME SHARING DISTING LISTING - HARD COPY RECALL ONLY MEMORY-	☐ HAGNETIC CARD ☐ TEMPLATES, CHARTS, TABLES ☐ LISTING ☐ BOOK ☐ RECALL ONLY HEMORY ☐ DEVICE ☐ INTEGRATED GIRCUIT
(COMPLETE SECTIONS 1, 2, 3) (COMPLETE SECTIONS 1, 2, 4)	(COMPLETE SECTIONS 1, 2, 6)





#### INTENDED USE:

INTENDED FOR USE BY:

- R ARCHITECT M ENGINEER
- TECHNICIAN
- RESEARCH ANALYST

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

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

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

- PRE-DESIGN
- B SITE ANALYSIS 配 SCHEMATICS

DHW

- M DESIGN DEVEL. POST-DESIGN SERV.
- RESEARCH

#### MAJOR & MINOR ENERGY COMPONENTS ADDRESSED BY TOOL: MEATING 🔼 COOLING LIGHTING

KI LOADS ELOADS
SPACE TEMPS.
HVAC SYSTEMS
PASSIVE SOLAR
ACTIVE SOLAR
SHADING
SYSTEM DESIGN
ECONOMICS
UNDERGROUND
LOADS

LOADS

LOADS
SPACE TEMPS.
D HVAC SYSTEMS
PASSIVE CLNG. SHADING
SYSTEM DESIGN
CONOMICS
UNDERGROUND LOADS

SLOPED GLAZING
MASS

- D LOADS
  OFC (LUX) LEVELS
  LOADS
  SOLAR ACTIVE
  SOLAR PASSIVE
  CONOMICS
- ☐ MISCELLANEOUS
  - FANS
    D PUMPS
    MISC. ELECTRICAL
    ELEV. & ESCALATOR

INPUT	DATA	REQU	IRED:

MINIMUM RECOMMENDED POSSIBLE DOES NOT ACCOMMODATE INPUT PRE-DESIGN AND SITE ANALYSIS DATA INPUT INPUT LOCATION - ASSOCIATED WEATHER DATA
BUILDING TYPE AND SCHEDULE
OCCUPANCY RATES
BUILDING AREA
SPACE TEMPERATURES
LOCAL ENERGY COSTS
CENERIC BUILDING SHAPE DUE TO SITE RESTRICTIONS
LOCAL CODE REQUIREMENTS (VENTIL., INSUL., ETC.)
LIGHTING REQUIREMENTS ō SCHEMATIC DESIGN DATA BUILDING SURFACE AREAS GLAZING AREAS & ORIENTATIONS ZONING OPERATING SCHEDULES & PROFILES ARCHITECTURAL DESIGN DEVELOPMENT DATA BUILDING MATERIALS & ASSOCIATED DATA (R,  $\alpha$ ,  $\epsilon$ , ETC.) BUILDING MASS DATA SHADING C'EFFICIENTS & DAYLIGHT TRANSMISSION INTERIOR SURFACE DATA ENGINEERING DESIGN DEVELOPMENT DATA MECHANICAL SYSTEM DESIGN MECHANICAL SYSTEM CONTROL ELECTRICAL SYSTEM DESIGN ELECTRICAL SYSTEM CONTROL LIGHTING SYSTEM CONTROL LIGHTING SYSTEM CONTROL 





<i>(.</i>	\$ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		GI DES				0
ANDA MINES		& A	NALYSIS	MOD	ELS	See Survey	SE
44000000000000000000000000000000000000	7. T		· · · · · · · · · · · · · · · · · · ·				1
WEATHER D	ATA:			· · · · · · · · · · · · · · · · · · ·			
TEMPERATURE DATA:	HOURLY T	APE TYPI EGREE DAYS	CAL DAY D MON	THLY DATA IN. AND MAX.	ANNUAL DATA	MONTHLY D	
SOLAR DATA:	HOURLY T	APE 🗆 2	YPICAL DAY PROFI	LE	MONTHLY AVE	. DAILY & TOTAL	
SOLAR ORIENS. CALC:	ANY ORIE	N. INCL. SLOPE		FRT. & MORTS.	ר עמאו	Z. & 4 CARDINAL	DIREC.
DAYLIGHT CALC:	HOUR-BY-	HOUR 1	YPICAL CLEAR & C	LOUDY DAY/HON	TH TYPIC	CAL DAY/HONTH	
CALCULATIO	N PROC	EDURES	<b>:</b> :	•	•		
LANGUAGE: A FORTR	AN ET RAS	IC D MACHI	TANGUACE 64	ATUER RATE	OR For	PHS, CHARTS & SI	
USER TYPE: R 1							
UNITS OF CALCULATION					_	HAND CALCULATION	
CHECK ALL APPROPRIATE						_ DOIN	
HEAT TRANSFER:		FINITE DIF	FERENCE	☐ RESPONSI	FACTOR	☐ STEADY STATE	
SOLAR COMP. CALCUI	ATED:	DIFFUSE/DI	RECT/RE-RADIATED	=		D TOTAL	
INTEGRATION: ,		SIMPLE EUL		☐ IMPLICIT		MOTHER	
SHADING:		ANY SOLAR	OBSTRUCTION		ONLY	□ NO SHADING	
MOVABLE SHADING:			ASONAL SWITCHING	<u>.</u>	. SWITCHING	□ NOT CALCULATI	ED
MASS EFFECT IS CAL	CULATED:	TRANSIENT				ASSUME NO MAS	
ROOM TEMP. BASED O	on:	SURFACE &	AIR	AIR ONLY		□ NOT CALCULATI	
INSIDE TEMPERATURE	:	M INPUT SCHE	DULE BY USER	☐ FIXED BY	٠,	O VARIED BY TO	
U-VALUES:		CHANGE W/W	IND SPEED		CONSTANT	MOVABLE INSU	
INFILTRATION:		•	PER HOUR	CRACK ME		VARIES W/WINT	
INTERNAL LOADS INC	LUDE:		LATENT SEPARATE		LAT. TOTAL	Sensible only	
VENTILATION:		SENSIBLE		□ LATENT	·	VARIES BY SCHOOL COMMAND	
DAYLIGHT COEFFICIE	NTS:	SKY, REFL.	& DIRECT	SKY & RE	FL.	SKY ONLY	
ZONES PER RUN:		D > 25	<u> </u>	25	2 - 10	☐ 1 ONLY	
SYSTEM HODELING:		SYSTEM EFF	C. INPUT	SYSTEM C	PTIMIZING	COMPONENT SEN	SITIVITY
ECONOMIC ANALYSIS:		□ ANNUAL COS			YAYBACK	LIFE CYCLE CO	STING
OUTPUT:					-		
LOAD DETERMINANTS:	☐ COMPONENT	<b>⊠</b> :	ONE	D BUILDING			
LOADS OUTPUT BY:	Nour	調り		MONTH		SEASON	⊠ YEAR
	▼ AIR		URFACE	GRAPHIC P		PLASUR	EJ ILAK
FUEL USE BY:	MONTHLY C HONTHLY P OTHER	ONSUMPTION	☐ ANNUA	L CONSUMPTION L PEAK DEMAND	0	SYSTEM COMPONENTS ENERGY SYSTEMS TOTAL BUILDING ON	

**ESP** 

UNITED KINGDOM



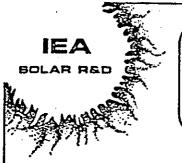
### SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### **COMMENTS:**

Finite difference integration method: Crank-Nicolson.

The choice of output period is under control of the user.





### FOR DESIGN TOOLS REQUIRING A MAIN FRAME COMPUTER

HARDWARE:		□ coc	₹ univac	. H	DEC 10, DE 1P3000, Ho 5060, SEL, VAX780, PR	neywell Burroughs
CORE REQUIRED:						IINTUACIIAO
		DATA	4.3			1
EQUIPMENT:						
COSTS: ASSUMING PURCHASE OF	,	:		· :		
FIRST COST:		3.0 3.1.0 31.0	•			
IN-OFFICE EQUIPME	NT: CRT	£ 3000	PRINTER			ŀ
SOFTWARE PURCHASE		DECK			LISTING	
SUPPORT INFORMATIO		's GUIDE Free			-	
TIME TO INPUT AND		MAN-DAYS			· · · · · · · · · · · · · · · · · · ·	
RUN COST/TIME:			<del></del>	•		.
INPUT SET-UP TIME	: <u> </u>	MAN-DAYS	2 MAN-H	ours .		
TYPICAL* RUN TIME:	: [] > 1	HR. 🗀 60	м - 30 м	■ 30 M ~	10 M	□ < 10 H
TYPICAL* CPU TIME:	: 🗀 > 10	00 SEC. 🔼 10	0 - 1000 SEC.	<b>5</b> - 100	SEC.	□ < 5 SEC.
*FOR THIS FORM, ASSUMI	E "TYPICAL" TO BE	A SINGLE-ZONED 100	SQUARE METER RESI	DENCE WITH A	LL OUTPUTS CHEC	CKED (,') IN
ASSUMING USE OF SOFT	ARE ON PUBLIC TI	HE-SHARING NETWORKS	<b>;</b> :			
NAMES AND CONTACTS THROUGH THEM).	S OF TIME-SHARING	SERVICES WRICH HAV	E THIS PROGRAM AVA	ILABLE (EXAC	T COSTS CAN BE	OBTAINED
				<del></del>		:

**ESP** 

UNITED KINGDOM



## SURVEY FORM FOR ENERGY DESIGN TOOLS & ANALYSIS MODELS



#### 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

Mr. D. Bloomfield

KINGDOM Building Research Established

Department of the Environment

Garston, Hertfordshire

USA

Mr. R. Judkoff

Solar Energy Research Institute

1617 Cole Boulevard Golden, CO 80401