OVERVIEW MANUAL 3379066

> GARD, INC. A SUBSIDIARY OF

GATX CORPORATION

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Scout

THE COMPUTER PROGRAM FOR FACILITY/HVAC DESIGN AND ENERGY ANALYSIS OVERVIEW MANUAL

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SCOUT OVERVIEW MANUAL

1. Purpose

SCOUT is a sophisticated building energy analysis program capable of performing design load calculations, annual energy use forecasts, and life cycle cost analyses. The overall organization of SCOUT is illustrated in Figure 1. A full package of documentation is available to the user including

- SCOUT User's Manual
- SCOUT Input Forms Manual
- SCOUT Sample Problem Manual
- SCOUT Access and Control Guide

The purpose of this SCOUT Overview Booklet is to introduce the potential user to SCOUT's input requirements and sample outputs. This booklet is organized into three sections:

I. Sample Problem Description

Describes a typical building and the type of input data required by SCOUT for analysis. A full description of this building is contained in the Sample Problem Manual.

II. Sample Input Forms

Presents selected filled-in input forms for the sample problem building. A complete set of these self-instructional input forms are contained within the Input Forms Manual.

III. Sample Output

Illustrates typical key output reports which are generated by various SCOUT subprograms. A full description and explanation of all types of reports generated by SCOUT can be found in the User's Manual.

The three SCOUT manuals referenced above will be made available to attendees of the SCOUT Technical Training Seminar.

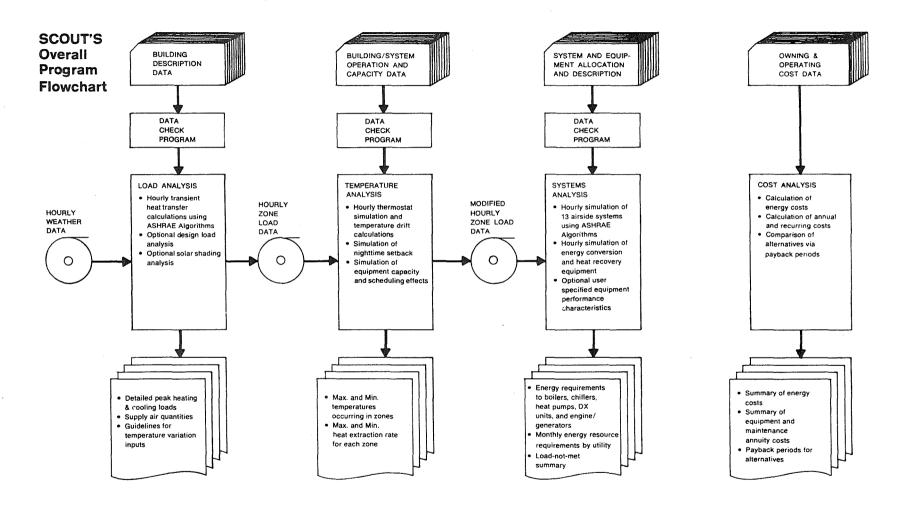


Figure 1

2. Sample Building Description

A multi-story office building with the following characteristics has been chosen as a sample building:

2.1 Architectural Data

SHAPE: Rectangular with north facade facing true north

(See Figure 2)

HEIGHT: 12 occupied typical floors and penthouse

AREAS: Building total of 225,500 sq. ft. excluding pent-

house for 12 typical floors at 18,790 sq. ft. each

TYPICAL 261 ft. long and 72 ft. wide, 13.5 ft. floor-to-

FLOOR: floor and 8.5 ft. ceiling heights. Include heat

flux through exterior wall sections above ceilings

as part of space load

WALLS: Glass face curtain wall with 4 inches insulation on

all walls (See Table 1)

INTERIOR Gypsum board on each side of slab-to-slab metal studs

PARTITIONS: (See Table 1) separating 10' exterior zone from core

FLOORS: Linoleum on 4 inch concrete slab (See Table 1)

CEILINGS: Suspended acoustical tile with lay-in flourscent

light fixtures on typical floors (See Table 1)

ROOF: Insulated built-up roof on 4-inch concrete slab

(See Table 1). Ignore penthouse when calculating

heat flux

WINDOWS: 50% of the typical wall facade is double glazing

mounted flush to outside wall face. Interior light

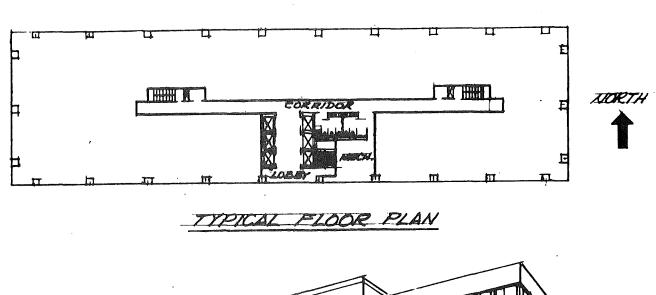
color venetain blinds (See Table II)

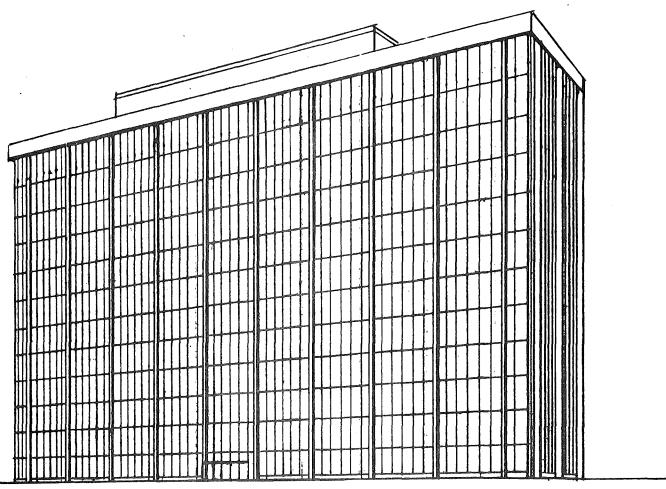
PENTHOUSE: Contains all mechanical equipment, electrical

equipment, and elevator machinery.

2.2 HVAC Systems and Equipment Data

INTERIOR SYSTEM: Variable air volume system with reheat. Insulated sheetmetal supply ducts extend to each floor for





SOUTH ELEVATION

Figure 1 SCHEMATIC OF SCOUT SAMPLE BUILDING

TABLE I CONSTRUCTION CHARACTERISTICS

Long Side Walls:	<u></u>	<u>K</u>	D	SH	<u>R</u>
1/4 inch ceramic coated glass4 inch insulation4 inch air space3/4 inch gypsum board	0.0208 0.3333 - 0.0625	0.590 0.025 - 0.420	172 2.0 - 100	0.20 0.20 - 0.20	- 0.91 -
Short Side Walls:					
Same as long side walls		See Al	oove		
Interior Partitions:					
3/4 inch gypsum board 4 inch air space 3/4 inch gypsum board	0.0625	0.420 0.420	100 - 100	0.20 - 0.20	0.91 -
Typical Floor:					
Linoleum 4 inch concrete Air space 3/4 inch accoustic tile ceiling	0.3333 0.0625	1.0 - 0.033	140 18	0.20 - 0.32	0.05 - 1.0 -
Roof:					
Built-up roofing 3 inch insulation 4 inch concrete slab Air space 3/4 inch accoustic tile ceiling	0.0313 0.2500 0.3333 - 0.0625	0.665 0.025 1.0 - 0.033	70 2.0 140 - 18	0.33 0.20 0.20 - 0.32	1.0
* Legend:					
<pre>L = Thickness, ft. k = Thermal conductivity, Btu/hr/ft/°F</pre>	SH =	Density, l Specific Thermal re	heat, B		t. °F/Btu

TABLE II GLASS CHARACTERISTICS

Double Glazing

SOLARGREY TWINDOW by PPG.	
1/4 inch Solargrey + 1/2 inch air space + 1/4 inch clear.	
Transmittance - Normal Incidence:	0.46 Solargrey
	0.77 Clear
U-Factor, Btu/Hr. ft. ² °F	0.54
Shade factor for glass and light color venetian blind:	0.36
ASHRAE shade coefficient for glass and blinds (.36/.92)	0.39

above ceiling ducted distribution to ceiling outlets. Minimum supply air to zone is 30%. Ducted return air, enthalpy controlled economizer cycle, fan inlet vanes for pressure control, and components arranged as shown in Figure 3(a).

PERIMETER SYSTEM: Dual duct system. Insulated sheetmetal supply ducts extend to each floor for above ceiling ducted distribution to ceiling outlets. Ducted return, enthalpy controlled economizer cycle, hot and cold deck temperature reset by hottest and coldest zone, and components arranged as shown in Figure 3(b).

SUPPLY AIR: Both systems supply air at 55°F at ceiling outlets at peak cooling; both systems operate with 4 inches of water total pressure.

RETURN AIR: Both systems operate at 1-1/2 inches of water total pressure.

EXHAUST AIR: 600 cfm toilet exhaust air at 1-1/2 inch of water total pressure from interior zones on each floor.

CHILLED One, sized at 60 ft. of head WATER PUMP:

CONDENSER One, sized at 60 ft. of head WATER PUMP:

HEATING One, sized at 80 ft. of head WATER PUMP:

CHILLERS: Two electric driven hermetic centrifugal chillers connected in parallel, loaded sequentially, and each sized for 50% of peak cooling load with fixed 45°F chilled water supply temperature.

BOILERS: Two natural gas-fired hot water boilers connected in parallel, loaded sequentially, and each sized for 2/3 of the peak heating load. Each boiler has electric auxilaries totalling 3/4 HP.

2.3 Internal + Miscellaneous Loads and Profiles

PEOPLE:

100 sq. ft. per person with metabolic rate of

450 BTU/hr.

LIGHTING:

Recessed fluorescent fixtures, 3.5 watts/sq. ft.

with 70% of light heat to occupied space

RECEPTACLES:

95 KW

ELEVATORS:

175 KW

DOMESTIC

Hot Water Heater 48 KW

WATER:

PROFILES:

For week day operation schedule internal and

miscellaneous loads using profiles in Figure 4.

Other days use zero loads, escept for lighting and

receptacle loads which are 5% continuous for

emergency lighting.

2.4 Design Criteria

LOCATION:

Chicago, Illinois

INSIDE

72°F DB Summer:

DESIGN:

Winter: 72°F DB, 30% R.H.

OUTSIDE

Summer

DESIGN:

92°F DB

76°F WB

20°F Range

5 mph

Winter

1°F DB

5°F Range

15 mph

VENTILATION:

5 CFM of outside air per person minimum when supply

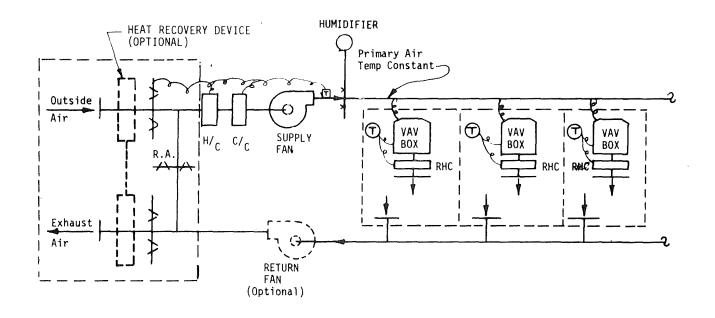
fans are on

INFILTRATION: 1/8 air change per hour for perimeter zones based on

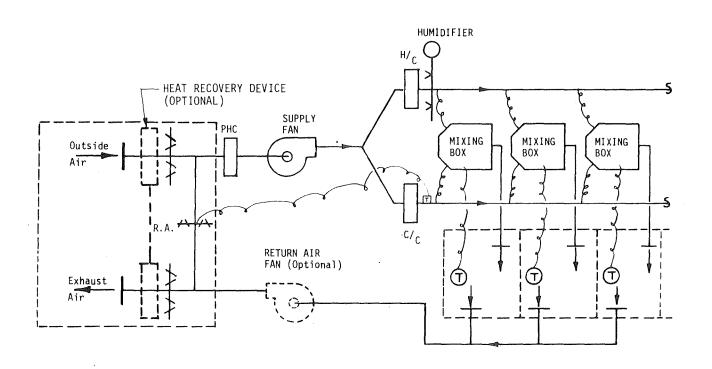
8.5 ft. ceiling height for typical floor

OPERATION:

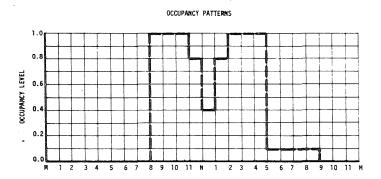
HVAC systems operate five days per week and are turned on at 7:00 AM (one hour before occupancy), and shut off at 5:00 PM. Nighttime setback minimum temperature is 50° F in winter, and no maximum in summer. Supply, return and exhaust fans are electrically interlocked. Thermostats have throttling range $\pm 1-1/2^{\circ}$ F

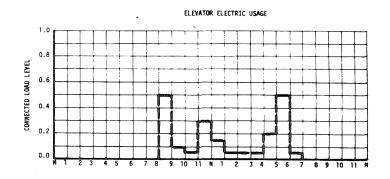


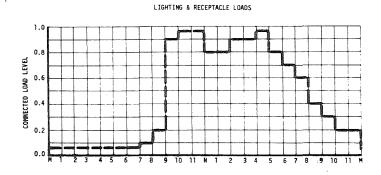
(a) INTERIOR SYSTEM - VARIABLE AIR VOLUME



(b) PERIMETER SYSTEM - DUAL DUCT Figure 2 - HVAC SYSTEM SCHEMATICS







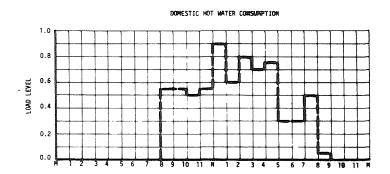


Figure 3 - INTERNAL LOAD PROFILES

3.1

SAMPLE LOAD ANALYSIS PROGRAM INPUT FORMS

jeb nemo	
date	PAGE _1 0F 26
<u> </u>	INPUT FORM LA-01

GENERAL NOTES

- Unless otherwise noted, all input data are real numbers requiring a decimal point. The program is designed to by-pass unneeded portions of input as indicated by notes.
- Input cards required to execute the program are noted by an "R" at their extreme right.

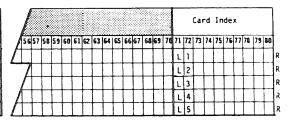
JOB IDENTIFICATION

(Alpha-numeric data may be entered on card types L1 through L5.)

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36

SCOUT SAMPLE BUILDING
CHICAGO, ILLINOIS
GARD, INC.

IDENTIFICATION OF ID TERMS
FACILITY NAME
FACILITY LOCATION
USER ID
PROJECT NUMBER
DATE

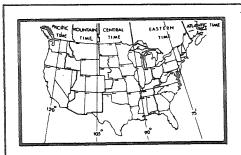


GEOGRAPHIC PARAMETERS

Latitude (DEG)	Longitude (DEG)	Time Zone Number	Clearness dumber (summer)	Clearness Number (winter)	Bldg. Azimuth Angle (DEG)		Card Index
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 26 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 60	61 62 63 64 65 66 67 68 69 78 71	72 73 74 75 76 77 78 79 80
42.	87.	6.	. 98	.98	<i>a.</i>		6 F

JOB CONTROL PARAMETERS

Job Processing Code(CODE)	Ventilation Air Rate (cfm/sq.ft.)	Estimated Total Fan Pressure (in.H ₂ 0)	Zone Cold Air Supply Temp Option 1 (F)	Zone Cold Air Supply Temp Option 2 (OF)	Zone Hot Air Supply Temp Option 1 (OF)	Zone Hot Air Supply Temp Option 2 (°F)	Card Index
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 60	61 62 63 64 65 66 67 68 69 78	71 72 73 74 75 76 77 78 79 88
2.	. 05	4.111111	5.5.	58	lilla.	130.	_ 7



TIME ZONES IN THE UNITED STATES

TIME ZONE NUMBERS IN U.S. FOR STANDARD TIME

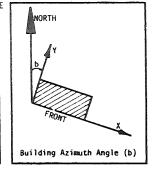
TIME ZONE	NUMBER
Atlantic	4.0
Eastern	5.0
Central	6.0
Mountain	7.0
Pacific	8.0

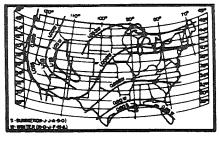
JOB PROCESSING CODE

1.0 - Design Load Analysis only

2.0 - Design Load & Hourly Load
. Analysis

3.0 - Hourly Load Analysis Only.





CLEARNESS NUMBERS OF NON-INDUSTRIAL ATMOSPHERE IN UNITED STATES



job same				
diste	PAGE	2	OF	26

INPUT FORM LA-02

DESIGN LOAD ANALYSIS PARAMETERS (IF CODE = 3, do not include cards type L8A, L8B and L8C.)

				•				
	Altitude Above Sea Level (FT)	DESIGN MONTHS	In Columns 11-20, er If all are left blan			n Design Load Analysis.		Card Index
	1 2 3 4 5 6 7 8 9 1		21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38	39 40 41 42 43 44 45 46 4	17 48 49 50 51 52 53 54 55 56 57 58	59 60 61 62 63 64 65 66 67 68 69 70	71 72 73 74 75 76 77 78 79 80
	600.							L 8 A
		VITTONS (5-1 1-1-74)		76		1		Fb
			ust weather conditions -		a by program for ot	ner cooling months.		
	Max. D.B Temperature (OF)	Daily D.B Temperature Range (^O F)	Dew Point Temperature (^O F)	Windspeed (MPH))			Card Index
	1 2 3 4 5 6 7 8 9 1	0 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38	39 40 41 42 43 44 45 46 4	17 48 49 50 51 52 53 54 55 56 57 58	59 60 61 62 63 64 65 66 67 68 69 70	71 72 73 74 75 76 77 78 79 80
	92.	26.	70.	5. 11111				L 8 B
		OITIONS (Enter December	 					ILIOID
		1	1					·
	Minimum D.B		Dew Point Temperature (^O F)	Windspeed (MPH))			Card Index
	Temperature (OF)	Range (^O F)		21/22/22/24/25/26/27/26/	laalaa uulaalaala			
	1 2 3 4 5 6 7 6 9 1				33 40 41 42 43 44 45 46 4	1/4849 50 51 52 53 54 55 56 5/ 58	59 60 61 62 63 64 65 66 67 68 69 70	71 72 73 74 75 76 77 78 79 80
]5].	-5.	115.				L 8 C
	HOURLY LOAD ANALYSIS F	PARAMETERS (IF CODE = 1.	, do not include card t	<u> </u>				*
	Weather Year	First Month Of	Length of Study	Estimated Initial Outside Surface				Card Index
	1	Analysis (1-12)	(Days; 1-365)	Temperature (OF)			
	1 2 3 4 5 6 7 8 9 1	0 11 12 13 14 15 16 17 18 19 2	0 21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38	39 40 41 42 43 44 45 46	47 48 49 50 51 52 53 54 55 56 57 5	59 60 61 62 63 64 65 66 67 68 69 76	0 71 72 73 74 75 76 77 78 79 80
	1972.		365.	0.				1 0
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	SCHEDOLED LKTWIOO12 (Hourty listing of Weath	ner and space load data)					8.
	Number of							Card Index
	Printouts (0-12)							
	1 2 3 4 5 6 7 8 9 1	10 11 12 13 14 15 16 17 18 19 2	20 21 22 23 24 25 26 27 28 29 3	31 32 33 34 35 36 37 38	39 40 41 42 43 44 45 46	47 48 49 50 51 52 53 54 55 56 57 5	8 59 60 61 62 63 64 65 66 67 68 69 7	0 71 72 73 74 75 76 77 78 79 80
	0.							L 1 0
		7	Report and 110% as		3432 33110	ill in all columns indica	tod	
	Start Date (Month/Day)	Stop Date (Month/Day)	Enter zeros if neces	many times as indic sary. NO DECIMAL POI	ated on card Liu. r NT REDUIRED	- III III ali Columbis Indica	Led.	Card Index
	,		\$20000000 idda0000000000000000000000000000	604000000000000000000000000000000000000	********************		8 5 9 60 61 62 63 64 65 66 67 68 69 7	70 71 179 73 174 75 76 77 79 178 99
운	1 2 3 4 5 6 7 8 9	10 11 12 13 14 15 16 17 18 19	2021 22 23 24 23 28 27 20 23 3	0 31 32 33 34 33 36 37 36	3340 41 42 43 44 43 40	47 46 49 30 31 32 33 34 33 36 37 3	2 22 20 21 27 22 24 23 22 21 20 21 20 22 1	
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3								
4	/ /	7 7						
5								
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10						+++++		
11								
12				1	1 1 1 1 1 1 1 1	3 1 1 1 1 1 1		

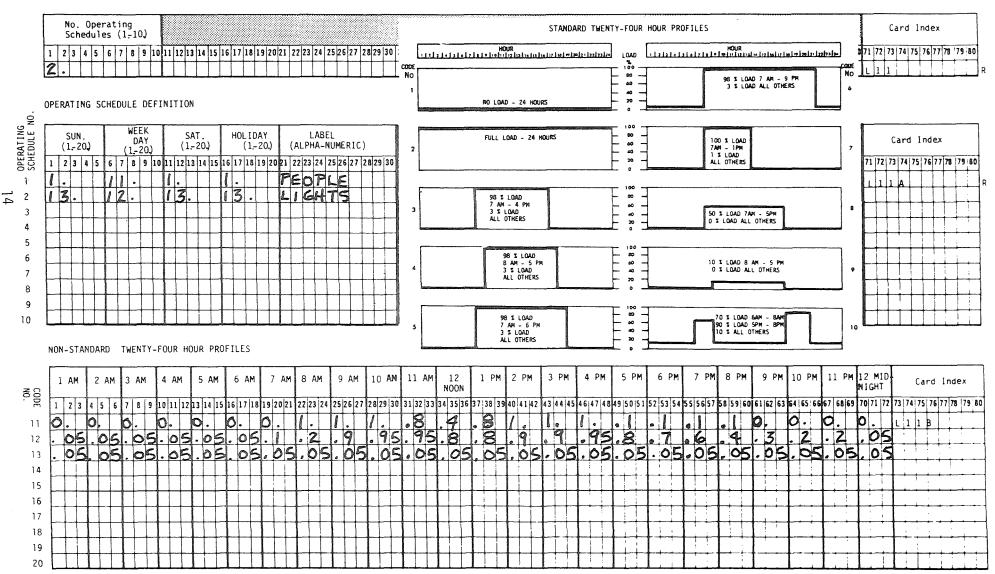
__



jeb name				
date	PAGE	3_	OF	26

INPUT FORM LA-03

SCHEDULES





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deta			_	

INPUT FORM LA-05

DELAYED SURFACES

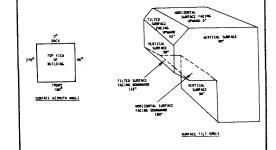
No. De Surfac	elayed ces																								`																		,																		Z.				Ca	ro	I	nde	ex				
1 2 3	4 5 6	7 8	9 10	11	12 1	3 14	15	16	17	18	9 2	0 2	1 2	2 2	3 24	25	26	Z	2	8 2	9 3	0	11	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	Q	63	64	65	66	67	68	69	76	11	7	ומ	74	75	76	77	78	79	80	
9.			\prod			$oxed{oxed}$				I				I	I	L		I		Ι	I																												1													T	L	ľ	•								R

NOTE: REPEAT CARD TYPE L14A FOR EACH DELAYED SURFACE.

Similar	SURF Surface	SIMILAR FACE PROPERTIES Surface Response	Ground			· .	
Surface Index	Absorp- tivity	Roughness Factor Index Code	Reflec- (SQ.FT.)	Azimuth Tilt Angle Angle(DEG) (DEG)	Coeff. (Alphanumeric)		Card Index
1 2 3 4 5	6 7 8 9 10	0 11 12 13 14 15 16 17 18 19 2	20 21 22 23 24 25 26 27 28 29 30 31 32 33 3	4 35 36 37 38 39 40 41 42 43 44 45	46 47 48 49 50 51 52 53 54 55 56 57 58 59 6	0 61 62 63 64 65 66 67 68 69 7	71 72 73 74 75 76 77 78 79 80
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1.			245.	270.90.	M. WALL	111111111	
				0. 90.	M. WALL		
2.				180. 80.	E. WALL		
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2.				270 - 80.	I WALL 1		
2 · 3 · 4 ·				b. Ro.		2	
4.	ШШ			90. 90.	E. WALL 1.	2	
	1.9	1. 27.	1.2 118790.	180. B.	ROOF		
	\Box						

NOTES:

- Similar surface feature can be used when a reference surface described previously has identical surface properties.
- When using similar surface feature
 if any surface parameters(except
 for Azimuth and Tilt angles) are
 left blank, values entered for
 reference surface will be used
 automatically.
- Azimuth and Tilt angles must always be entered.
- Infiltration flow coefficient required only when using crack infiltration.



	CODE FOR EXTER	TIOR SURFACE FIL	NISH
CODE	SURFACE FINISH	EXA!	MPLE T ROOF
1	Rough	• Stucco	• Wood Shingles • Built-up Roof with Stones
2		BrickPlaster	·
3	sing	Concrete Clear Pine	• Asphalt Shingle:
- 5	Increasing Smoothness	• Smooth Plaster • Metal	• Metal
6	Smooth	GlassPaint on Pine	



SCOUT

LOAD ANALYSIS PROGRAM

job name				
date	PAGE	11_	OF	26

SPACES						P	NPUT FORM LA -10
Number of Spaces							Card Index
16.	11 12 13 14 15 16 17 18 19 20 2		31 32 33 34 35 36 37 38 39 40 4	11 42 43 44 45 46 47 48 49 50 5	51 52 53 54 55 56 57 58 59 60 6	1 62 63 64 65 66 67 68 69 78	71 72 73 74 75 76 77 78 79 80 L 2 1
SPACE DESCRIPTION							
SPACE LABE	IST.FL-	3 .					
NOTE: REPEAT THE	S INPUT FORM FOR EACH	SPACE.					
Space Floor Area (FT ²)	Space Volume (FT ³)	Weight of Floor (LB/FT ²)		Include in Is space bldg load? a plenum?	Labo (Alphanu)		Card Index
2510.	11 12 13 14 15 16 17 18 19 20 2 1 3 3 5 .	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40 72.	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 60 FLOOR 1 -	51 62 63 64 65 66 67 68 69 78 500 7 H	71 72 73 74 75 76 77 78 79 80
No. People at Peak	People Activity Level (BTU/HR) (S+L)	Operating Schedule No.				· ·	Card Index
1 2 3 4 5 6 7 8 9 10	11 17 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 60	61 62 63 64 65 66 67 68 69 78	71 72 73 74 75 76 77 78 79 80
Type of Light Fixture (1, - 4.)	Fraction of Light Heat to Space	Lightin (WATTS/FT ²)	g Load (KW)	Operating Schedule	LIGHT FIXTURE 1. Not vente		Card Index
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30		41 42 43 44 45 46 47 48 49 50	2. Vented to 3. Vented to 4. Incandesc	sup. & ret. air	71 72 73 74 75 76 77 78 79 84
	Miscellaneous Electr	ical and thermal loads		Operating Schedule	Í		
(WATTS/FT2)	(KM)	(BTU/HR-Sensible)	(BTU/HR-Latent)	No.			Card Index
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	2.	51 52 53 54 55 56 57 58 59 60	61 62 63 64 65 6667 6869 76	L 2 1 D
Type of Infiltration Analysis (02.)	Infiltration Rate (No. of Air Changes)	Height above (-) or below Neutral Zone (FT)	Space Exhaust Air (CFM)	INFILTRATI 0. None	ION CODE		Card Index
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	1. Air ch	hange method (columns 1) method (columns 21–40)		71 72 73 74 75 76 77 78 79 8
	_1/25						L 2 1 E
No. Delayed Surfaces	No. Quick Surfaces	No. Glazed Surfaces	No. Internal Surfaces	No. Underground Walls	No. Underground Floors	No. Additional Identical Spaces	Card Index
1 2 3 4 5 6 7 8 9 1	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 60	61 62 63 64 65 66 67 68 69 7	╋╂┧╂╀╁┼┼┼
INDICES OF SPACE SURI	FACES		• Delayed	L21G	• Internal	L21J	L 2 1 F
	r each surface type.	Absa area dadan ana	• Quick	L21H	ø Underground Walls		Card Index
• It a surrace type	is not included, skip	that card index type.	• Glazed	L211	Underground Floor	s L21L	
1 2 3 4 5 6 7 8 9 1	0 11 12 13 14 15 16 17 18 19 2	0 21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 5	051525354555657585966	61 62 63 64 65 66 67 68 69 7	8 71 72 73 74 75 76 77 78 179 1
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3.2

SAMPLE TEMPERATURE ANALYSIS PROGRAM INPUT FORMS

SCOUT TEMPERATURE ANALYSIS PROGRAM

jab same			
date	PAGE	 OF	<u>31</u>

INPUT FORM TV-01

Card Index

GENERAL NOTES:

SPECIAL HOURLY PRINTOUT

- 1. Unless otherwise noted, all input data are real numbers, requiring a decimal point. The program is designed to by-pass unneeded portions of input as indicated by notes.
- 2. Input cards required to execute the program are noted by an "R" at their extreme right.

Job Description Data (Alphanumeric)	Card Index
2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 56 57 58 59 60 61 62 63 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7 64 65 7	72 73 74 75 76 77 70 79 80
COUT SAMPLE BUILDING - CHICAGO, ILLINOIS	1

Number of Zones Number of Print Periods (0-12) on input Tape 1 2 3 (5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 35 6 37 38 33 34 04 142 43 44 45 46 44 74 64 49 50 15 15 15 25 35 45 5 5 6 5 7 58 5 9 60 6 1 162 63 64 65 66 67 66 69 7 77 7 17 27 7 7 4 7 7 9 18 0

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NOTE: FILL IN ALL INDICATED COLUMNS, ENTER ZERO IF NECESSARY. NO DECIMAL POINT REQUIRED.

BOILER/CHILLER SCHEDULING

Boiler/Chiller Opera- tion Schedule Index						Card Index
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20	0 21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	0 41 42 43 44 45 46 47 48 49 50 51 52	53 54 55 56 57 58 59 60 61 62 63 64 65 66 67	68 69 70 71 72 73 74 75 76 77 78 79 80
	Card V5 is required.		continuously available			
	Jan 10, p. 0	3				
Boiler Shutdown Date (Nonth/Day)	Boiler Startup Date (Month/Day)	Chiller Startup Date (Month/Day)	Chiller Shutdown Date (Month/Day)		53 54 55 56 57 58 59 60 61 62 63 64 63 66 67	Card Index

NOTE: FILL IN ALL INDICATED COLUMNS, ENTER ZERO IF NECESSARY. NO DECIMAL POINT REQUIRED



SCOUT TEMPERATURE ANALYSIS PROGRAM

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date	PAGE	20 of	21

THERMOSTAT SCHEDULES

INPUT FORM TV-05

Number of Thermostat Schedules (1-5)							CARD INDEX
1 2 3 4 5 6 7 8 9 10	111 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 60	61 62 63 64 65 66 67 68 65 78	V 1 7
HERMOSTAT				l	·		
CHEDULE NO LA	BELTYPICAL	<u> </u>					
EEK DAY SCHEDULE							
Thermostat Type	High Limit of	Low Limit of	Thermostat Type	High Limit of Throttling Range (^O F)	Low Limit of Throttling Range (^O F)		CARD INDEX
(0,1,2)	Throttling Range (OF)	Throttling Range (^O F)	(0,1,2)			61 62 63 64 65 66 67 68 69 70	71 72 73 74 75 76 77 78 79 80
2.	200.	So.	2.		50.		V 18
	200.	50.	2.	200.	50.		V 1 8
	200.	50.	2.	200.	50.		V 18
	73.5	70.5		73.5	70.5		V 18
•	73.5	70.5	1 -		70.5		V 1 8
•	Z3.5	70.5		Z3. 5	70.5	▋┊┼┼┼┼┼	V 1 8
 	73.5	70.5		73.5	70.5 70.5	\blacksquare	V 1 8
	73.5 200	70.5 50.	2.	73.5	\$0:7		V 1 8 V 1 8
	200.	Sp.	2:	200.	50.		V 18
	200.	Ba:	2		50.		v 18
<u> </u>	200.	50.	12:111111	200.	Sø.		V 18
Thermostat Type (0,1,2)	High Limit of Throttling Range (^O F)	Low Limit of Throttling Range (^O F)	R .	1	Low Limit of Throttling Range (^O F)		INDEX CARD
		0 21 22 23 24 25 26 27 28 29 3				0 61 52 63 64 65 66 67 68 69 7	0 71 72 73 74 75 76 77 78 79 80
2 .	200.	50.	2-111111	200.	50.		V 1 8
	200.	<u> 50 </u>	2-	200.	50.	$lackbox{1}{\bullet}$	V 1 8
<u> </u>	200.		2.	200.	50.	 	V 1 8
	200.	50.	12	200.	50. 50:	$\blacksquare + + + + + + + + + + + + + + + + + + +$	V 1 8
	200.		2.	200:	BO:	 	V 1 8
<u> </u>	200.	50.	12.	200.	50. H	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	V 1 8
2.	200	50.	2.	200.	50:1111	1 *	V 1 8
2	200.	50.	2.	200.	Sa.		V 1 8
2 .	200.	50.	2.	200.	50.		V 1 8
2 .	200-	50.	2.	Ž pa.	50.		V 1 8
2.	200.	50.	12.	200.	50.		V 1 8
THERMOSTAT TYPES					NOTE: ALL CARD TYP	ES V18 INDICATED ABOVE	ARE REQUIRED INPUT DATA
0.0 No thermostat		101	inear or		2.0 High	1/1 0w 4	
in space, temperallowed to flo			roportional 0	ling Capacity	. or (m/Off	city
		(Control	Low Limit	Cont	crol q -Low Limit	
			0	High L	imit OF	0	• • • • • • • • • • • • • • • • • • •
				Heating Capacity			—High Limit

HOUR OF DAY 12 9

HOUR OF DAY



SCOUT TEMPERATURE ANALYSIS PROGRAM

jeh same				
date	PAGE	21	Œ	21

INPUT FORM TV -06

SPACE DESCRIPTION DATA

	REQUIRED FOR CONDITIONED S	PACE			REQ	UIRED FOR PLENUM SPACE		•
	Thermostat Schedule Index Heating Capacity	Cooling Capacity	Plenum	Space No.	Plenum	Weekday Fan Schedule	Weekend Fan Schedule	
			Space (O=NO.1=Yes	Relow	Airfin 1			CARD INDEX
pace No.	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 2 6 29 3 0	31 32 33 34 35	36 37 38 39 40 41	42 43 44 45 46 47 48 49 50 5	51 52 53 54 55 56 57 58 59 60	51 62 63 64 65 56 67 68 69 78	71 72 73 74 75 76 77 78 79 80
1	01010101 67794	74846.	d .					V 1 9
2	01010101 119035.	30308.	0.					
3	01010101171494.	59213.	a.					
4	01010101119431.	26484.	0.					
5	01010101126441.	123076.	lo					
6		77607.	b .					
7	0101010117423.	30990.	a ·					
8		61974.	G.					
9		27166.	0 .					
10	01019101126441.	136859.	c .					
11	01010101 57212.	74974.						
12	01010101116298.	29867.	0.					
13	01010101 60888.	60350.	a . 11					
14	010101011111111111111111111111111111111	262391	0.					
15	01010101 26441.	136859.	0.					
16	opopologi D.	0.	a.					
17								
18								
19								
20								
21								
2?								
23								
24								
25			1111					

[#] If space does not have any temperature control at all, then enter a "00" to simulate floating temperature conditions. Do not use decimal points. Fill in all columns indicated. Right justify by using zeros if necessary.

* Varies from 1 to 24.

3.3

SAMPLE SYSTEMS ANALYSIS PROGRAM INPUT FORMS

SCOUT SYSTEMS ANALYSIS PROGRAM

job com	
discha	PAGE OF

INPUT FORM SA - 01

Description of Run	(Alpha-Numeric)						Card Index
_ 		821 22 23 24 25 26 27 28 29 30 3G - CH CAS		41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 6	8 61 52 63 64 55 66 57 68 59 76	71 72 73 74 75 76 77 78 79 888 S 1
SCOUTT SAMP JOB CONTROL PARAMETERS	1 -1 -1 1 1 1 - 1 - 1 - 1	SG - CH! CAS	O, ILLIMOI				311
Begin Analysis	End Analysis	Number of Hourly	Number of	Number of	Number of Zones		
Month/Day	Month/Day	Print Periods	Reset Schedules	Operating Schedule Types	On Input Tape		Card Index
				41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 6	0 02 02 03 04 105 100 02 5 500 00 2	71 72 73 74 75 76 77 78 79 86 S 2
01/01	12/31	0.	10.	<u> </u>	110.		2 1 1 1 1 1 1 1 1 1
Number of Energy Distribution Systems	*	Number of DX and Heat Pump Types	Number of process Loads				Card Index
1 2 3 4 5 6 7 8 9 1	11 12 13 14 15 16 17 18 19 2	28 21 22 23 24 25 26 27 28 29 3		04142 43 44 45 46 47 48 49 5	51 52 53 54 55 56 57 58 59 6	60 61 62 63 64 65 66 67 68 69 78	*
2.		[a.]]]]	[2].]]]				5 3
HOURLY PRINT PERIODS	(If number of	hourly print periods=0.	, skip card type S-4)				
Begin Print Month/Day	Finish Print Month/Day	Print-1 (Weather & Hourly Loads) 0.=Off/1.=On	Print-2 (System Data) 0.=Off/1.=Om	Print-3 (Component Data) 0.=Off/1.=On			Card Index
1 2 3 4 5 6 7 8 9 1	0 11 12 13 14 15 16 17 18 19		10 31 32 33 34 35 36 37 38 39 4		951 52 53 54 55 56 57 58 59 6	18 61 GZ GZ 64 GS 66667 6869 71	71 72 73 74 75 76 77 78 79 80
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2 / /	//						
3 // 1	/ /						
TEMPERATURE RESET SCH	EDULES (If number o	f reset schedules=0.,sk	ip card type S-5)				
Low Outside Air Temp.(^O F) (TOALO	High Outside) Air Temp.(^O F) (TOAH	Low System I) Fluid Temp.(°F) (TL	High System O) Fluid Temp.(°F) (THI	Schedule Label (Alpha-Numeric)	SY:	ERATURE RESET SCHEDULE	Card Index
			30 31 32 33 34 35 36 37 38 39	i			71 72 73 74 75 76 77 78 79 86
					T [=		S 5
					8 1		
					AMBIENT	AIR TEMPERATURE	
	+++++++					ALO TOAHI	
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					1 1 1 1 1 1 1 1



SCOUT

SYSTEMS ANALYSIS PROGRAM

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date	PAGE 5 0F 9
DERIMETER	SYSTEM

INPUT FORM SA-03

ENERGY DISTRIBUTION SYSTEM DATA

SYSTEM NO:

.3 SYSTEM TYPE: DDS

	Type of Distribution System	No. Zones on System	Relative Humidity Set Point (R.H)	Fixed or Min. Outside Air (SCFM)	Mixed Air Option	Variable Volume Fan Control Type	Card I nde x
Ì	1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	D 5 2 5 3 5 4 5 5 5 6 5 7 5 2 5 3 6 4 5 5 6 6 6 7 6 8 6 9 7 6	71 72 73 74 75 76 77 78 79 80
	3.	12.	30.	3760.	2.		S 7 A

TEMPERATURE CONTR	ROL MODES		TOTAL FAN PRESSURES (IN	v H2O)	Variable Holume		
Hot Deck or ANN Discharge	Cold Deck	Supply	Return	Exhaust	Reheat Coil Option	Variable volume Box Ain. Air (%)	Card Index
1 2 3 4 5 6 7 8 9 10 11 12	13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 31	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	5 1 5 2 SQLEA B-05 6 07 150 15 SQL	61 62 63 64 65 6567 6069 70	71 72 73 74 75 76 77 78 79 80
6. 2.		4.	1.5	1.0			S 7 B R

FIXED AIR TEMPERATURES (OF)	TEMPERATURE RESE	2CHEDOLE INDICES	Induction Unit
Hot Deck or Cold Deck	Hot Deck Schedule or Cold Deck	Baseboard Two-Pipe W.W	Induced/Primary Card Index
AHU Discharge	ANU Discharge Schedule Schedule	Radiation Schedule Schedule	Air Retic
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	9 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39	40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 58 60	[1] [2] [2] [64] [45] [65] [26] [45] [26] [7] [72] [73] [74] [75] [76] [77] [79] [80]
			S 7 C
2-Pipe ind chang	* Two.nine System Floor Heating Panel	Floor Heeting Panel Exposed Perimeter	
Two-pips Fem-Coil		1 1 1001 mm strid switch Proposed Les Indicates	Cand Indov

Changeover Temp. (f) shutoff temp. (OF)	Water Volume (GALS) Location Area Covered (FT2) (tin.FT.)	Card Index
1 22 4 8 6 7 8 9 10 11 12 13 14 15 16 17 18 19 2	20 21 22 23 24 25 25 27 23 29 38 33 32 33 32 33 32 35 36 35 32 38 38 40 40 41 42 43 44 45 44 45 44 45 46 45 50 50 50 50 50 50 50 50 50 50 50 50 50	71 72 73 74 75 76 77 78 79 80
		S 7 D R

-	Fan Syste	em l	Ventila				HEAT	RECOV	ERY D	EVIC	CE EF	FICIE	NCY				(or														1	Car	d In	day		ļ
	Shut-off Co		Оре	rating I	No.	Se	ensibl	le Hea	t		La	tent	Heat] 3	timp	Inde	x No													1	Car	u in	uex		
	1 2 3 4 5 6	7 8 9 10	11 12 13 14	15 16 17	18 19 20	21 22	23 24 2	25 26 27	28 29	30 3	1 32 3	3 34 3	5 36 37	38 39	40 41	42 43	44 45	46 47	7 48 49	5051	52 53	54 5	5 5 6 5	7 58	9 60	61 62	63 64	65 66	67 68	69 7	71 7	2 73 74	1 75 7	6 77 78	75 8	0
	2.																														s ;	' E				٦,

DISTRIBUTION SYSTEM TYPES

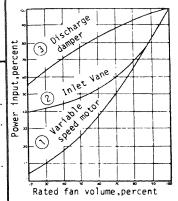
- 1. Single Zone Fan System With Face And By-Pass Dampers. 2.Multi-Zone Fan System.
- 3.Dual Duct Fan System.
- 4. Single Zone Fan System With Sub-Zone Reheat.
- 5.Unit Ventilator.
- 6.Unit Heater.
- 7.Floor Panel Heating.
- 8.Two-Pipe Fancoil System. 9. Four-Pipe Fancoil System.
- 10.Two-Pipe Induction Unit Fan System.
- 11.Four-Pipe Induction Unit Fan System.
- 12. Variable Volume Fan System With Optional Reheat.
- 13.Constant Volume Reheat Fan System.

MIXED AIR OPTION CODE

1.Fixed Percent Outside Air. Enth. Temp. Econo. Control. 3. Temp. Econo. Control.

TEMPERATURE CONTROL MODES

- 1.= Predefined constant temp. 2. Determined by zone with coldest supply air reqmt.
- 3.= Reset as per reset schedule
- 6. Determined by zone with warmest supply air regmt.



VARIABLE VOLUME FAN CONTROL CODE

VARIABLE VOLUME REHEAT COIL OPTION CODE

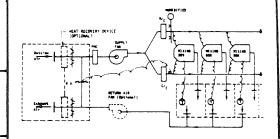
- 0.= No coil after vav box.
- 1.= Reheat coil after vav box.

FLOOR HEATING PANEL LOCATION CODE

- 1 = Slab on grade 2 = Intermediate floor slab.
- FAN SYSTEM SHUT-OFF CODE
- 0.= Fan always runs
- 1.= Fan may be shutoff/baseboard heating may be on. 2. Fan and baseboard heating may be

shut-off.

3.= Fan always shut off, baseboard heating may be on.



GATX	
GARD, INC.	

SPACE DATA

SYSTE

SCOUT	job name				
EMS ANALYSIS PROGRAM	date	PAGE	6	Of _	1_
EMS ANALTSIS FROOKAM	0-0	~			
VAVS	PERIMETE	14	<u>>72</u>		1

INPUT FORM SA - 04

S y s t e m

SZFB
SYSTEM NO: 2 SYSTEM NAME: DDS

SZRH 2PIU 4PIII

RHFS

	Sp	ad P	Num	ber		- 1	•	F	Fact	or		tio		(50							E	Exh	aus	nt t a	ir	(SC	FM)		Hea Con	t Ou	tpu ons	t a	t s1	td. R-FT	,*		tive	Le	-	ı(Li		•		Spa	ce t	No.	Pleni	ŀ		St	pace	ndex Lat	bel	
	2 3	4 5	5 6	7	8 9	101	1 12	13	14 15	16	17 1	8 19	202	1 27	2 23	24	25 2	6 27	28	29 3	0 31	1 32	33	34 3	5 3 6	37	38 3				444	5 46	474	8 49	505) 52) .	53 5	4 55	565	7 58	59 60	61 6	2 63	64	55 66	67	68 69							
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4	•	++	\perp	++	_	1	<u> </u>	\vdash	+	+-	\sqcup	-	\sqcup	+	╀-	\vdash		-	H	\dashv	+	+	\vdash	+	+	\dashv	+		0			+-	H	+	C		-	+	+	+1	+	H	+	+	+	\forall		\vdash	5 g	Ή,		17		
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* Standard Conditions: 65^{0} F entering air temperature and 215^{0} F average water temperature.



SCOUT SYSTEMS ANALYSIS PROGRAM

jeb name			
date	PAGE	<u></u>	* <u>9</u>

INPUT FORM SA -05

PRIMARY EQUIPMENT DESCRIPTION (REPEAT CARD TYPE S9 FOR EACH PRIMARY EQUIPMENT COMBINATION.)

	COOLING E	QUIPMENT	HEATING E	QUIPMENT	ON-SITE POW	ER GENERATION	
System Identification (Alpha-Numeric)	Chiller Type	Source of Chiller Energy	Source of General Heating Energy	Source of Reheat Coil Energy	Number of Engine/ Generator Sets	Type of Engine/ Generator Set	Card Index
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 60	61 62 63 64 65 66 67 68 69 76	71 72 73 74 75 76 77 78 79 80
CONV. 573. 1	2 .	4.	1.	0.	0.	<u> </u>	S 9 R

BOILERS

Number of Boilers	Size of each Boiler (MBH)	Seasonal Heating Start-up Month/Day *	Seasonal Heating Shut-down Month/Day *	Heating Value Heating Oil(BTU/GAL)	Boiler Performance Type	Boiler Peak Efficiency (%)	Card Index
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20 3500.	21 22 23 24 25 26 27 28 29 30 0 1 / 0 1	31 32 33 34 35 36 37 38 39 40 1 2 / 3 1	41 42 43 44 45 46 47 48 49 50		61 62 63 64 65 66 67 68 69 70 BO.	71 72 73 74 75 76 77 78 79 80 S 1 0 R

* Applies to Boilers and Heat pump heating

CHILLERS

Number of Chillers	Size of each Chiller(TONS)	Seasonal Cooling Start-up Month/Day **	Seasonal Cooling Shut-down Month/Day **	Min. Part Load Chiller Cut-off(%)	Cooling Tower Water Low Limit Temp.(^O F)	Card Index
1 2 3 4 5 6 7 8 9 10 2.	11 12 13 14 15 16 17 18 19 20 2 7 5 .	21 22 23 24 25 26 27 28 29 30 O I / O I	31 32 33 34 35 36 37 38 39 40 1 2 / 3 J	41 42 43 44 45 46 47 48 49 50 20 ·	61 62 63 64 65 66 67 68 69 70	71 72 73 74 75 76 77 72 79 50 S 1 1

** Applies to Chillers, DX, and Heat pump cooling.

PUMP HEADS

Total Boiler Water Pump Head(FT)	Total Chilled Water Pump Head (FT)	Total Condenser Water Pump Head(FT)				79	. Card Index
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39	40 41 42 43 44 45 46 47 48 4	49 50 51 52 53 54 55 56 57 58 59	60 61 62 63 64 65 66 67 68 69 70	71 72 73 74 75 76 77 78 79 80
80.	60.	60.					S 1 2 R

ENGINE/GENERATOR SET TYPES CODE GENERAL HEATING CHILLER ENERGY CODE NOTES: CHILLER TYPE CODE ENERGY CODE 0. = None 1. If number of E/G sets =0., it will be 1. = Gas O. = From Steam Boiler 1. = Diesel 1. = Reciprocating calculated by the program. 3. = Purchased Steam 2. = Heating Oil 2. = Hermetic Centrifugal 2. = Gas 2. Boiler seasonal start-up and shut-down 4. = Electricity 3. = Purchased Steam 3. = Open Centrifugal schedule applies to heat pump operation, 4. = Electric BOILER PERFORMANCE TYPE also. 4. = Steam Absorption 5. = Centrifugal/Steam 3. Chiller seasonal start-up and shut-down Turbine schedule applies to DX and heat pump Eff. cooling operation, also. Eff. REHEAT COIL ENERGY CODE % Load % Load O. = Same as Boiler 4. = Electric 1.= Constant 2.= Ohio State curve

3.4

SAMPLE COST ANALYSIS PROGRAM

INPUT FORMS



SCOUT COST ANALYSIS PROGRAM

job name	
date	PAGEOF

INPUT FORM CA-01

GENERAL NOTES

- Unless otherwise noted, all input data are real numbers, requiring a decimal point. The program is designed to by-pass unneeded portions of input as indicated by notes.
- Input cards required to execute the program are noted by an "R" at their extreme right.

JOB IDENTIFICATION

(A1	ph	a-r	um	er	ic	dā	ta	m	аy	be	: €	ent	er	ed	on	С	ar	d 1	ур	es	C.	1 1	thr	ou	gh	C5	5.)								1
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IDENTIFICATION	
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USER ID	
PROJECT NUMBER	
DATE	

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BUILDING LIFE AND COST ESCALATION FACTORS

Building Life (Yrs.)(1-60)	Annual Interest Rate (%)	Annual Increase Of Labor Cost (%)		Annual Increase Of Floor Space Cost(%)	Annual Increase Of Energy Cost (%)		Card Index
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20 2	21 22 23 24 25 26 27 28 29 30	31 32 33 34 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55 56 57 58 59 60	61 62 63 64 65 66 67 58 69 70	71 72 73 74 75 76 77 78 79 30
40.	12.	8.	15.	10.	10.		C16

CASE STUDIES

No. Cases Analyzed (To Be (1-5)																																											Ca	rd I	ndex			
1 2 3 4 5	5 6 7	8 9	10 11	12 13	14 15	16	7 18	19 2	0 21	22 2	3 24	25 2	26 27	28	29 30	31	32 3	3 34	35	36 3	7 38	39 4	0 41	42	43 44	45	46 4	7 48	49 5	51	52 5	3 54	55 5	5 57	58 59	60	61 62	63	64 65	66 6	7 68	69 7	0 71	72 7	3 74	75 76	77 78	79 8	1
2.										Ц											<u> </u>								į											! !			C	7				l i	J R

NOTE: REPEAT CARD TYPES C8 THROUGH CIOB FOR EACH CASE TO BE ANALYZED.



SCOUT COST ANALYSIS PROGRAM

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date	PAGE	OF	

CASE NO. LABEL_									INF	OUT FORM CA = 02	
Case Description D	ata (Alphanumeric)									Card Index	
1 2 3 4 5 6 7 8 9 10	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25	26 27 28 29 30 31 32 33 3	4 35 36 37 38 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55.	56 57 58 59 60,1	1 62 63 64 65	66 67 58 69 ,70	71 72 73 74 75 76 77 78 79 80	
EXAMPLE BU	ILDING - A	S BUI	47							C 8	
•	•										
No. Energy Catagories(1-10)	No. Equipment Catagories(1-12)									Card Index	
	11 12 13 14 15 16 17 18 19 20	21 22 23 24 25	26 27 28 29 30 31 32 33 3	34 35 35 37 32 39 40	41 42 43 44 45 46 47 48 49 50	51 52 53 54 55	56 57 58 59[60]	61 62 63 64 65	66,67:68,69 70	71 72 73 74:75.76 77 78 79 80	
2.	3.							1 1 1 1		q 9i	
ENERGY CATAGORY NO. (Repeat card ty	LABEL pes C9A through C9G for	each елегду	catagory.)								
Energy Type		Consumption	Deman		No. Of Rate Schedules (1-2)	No. Of App				Card Index	
(Alphanumeric)	11 12 13 14 15 16 17 18 19 20	Units	Unit	1 (4.44.4.4.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.	, .	,	· .	1 62 62 64 66	CC C7' C0 C0 : 70		
1 . 2 3 4 3 0 7 3 3 10	111121314131017101320	21,22,23,24,23	20/27/20/29/30/31/32/33/3	14 33 30 31 30 33 40	41 42 43 44 43 46 47 46 49 30	31.32,33,34.33	30 37 30 33 30	31 62 63 64 63		 	
										C 9 A	
RATE SCHEDULE NO. Note: 1.See inp. 2.Omit ca	LABEL ELE. CON ut form CA-03 for illus rd types C9C and C9D if	tration of u	tility rate breakpo	oints and types							
Rate No. Cons(1 No Break- or	Breakpoint l		Breakpo	int 2	Breakpoint 3			reakpoint 4	1	Card Index	
PointsDem(2)	Quantity	\$/Unit	Quantity	\$/Unit	Quantity	\$/Unit		Quantity \$/Unit Card 3 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74			
		 						61 62 63 64 65			
10. 17. 11.	110.	1. 09	500.	. 032	2500.	.029	6000	1 1 1 1	.01B	Cl9 B	
	Breakpoint 5	T	Breakpo		_ Breakpoint 7 Quantity			akpoint 8	\$/Unit	Card Index	
1 7 7 4 5 6 7 9 9 1	Quantity 0 11 12 13 14 15 16 17 18 19 2	\$/Unit	Quantity 26127 2829 30 31:32:33	\$/Unit		1				71 72 73 74 75 75 77 78 79 89	
1,23,43,07,031	30000.	.014	} 	.010	500000.	.008			1	C 9 C	
	Breakpoint			akpoint 10	1	1.000					
	Quantity	\$/Unit	Quantity	\$/Unit						Card Index	
1 2 3 4 5 6 7 8 9 1	0 11 12 13 14 15 16 17 18 19 2				41 42 43 44 45 45 47 48 49 5	0 51 52 53 54 5	5,56 57 58 59 60	61 62,63,64 6	5 56 67 68 69 70	71 72.73,74,75.76'77 78.79.8	
							1 : 1			Cl 9i D	
RATE SCHEDULE NO. 2	LABEL ELE. DE	: ১4						<u> </u>			
	TABLE SOL	<u> </u>	1								
Rate No. Cons(1 Break or No. Pointsnew(2)	Breakpoint 1	T	Breakpoint		Breakpoint 3	T	1	eakpoint 4	1	Card Index	
Den L	Quantity 0 11 12 13 14 15 16 17 18 19 2	\$/Unit	Quantity	\$/Unit	Quantity	\$/Unit	Quant		\$/Unit	i	
2. 6. 2.	25.	0. D	200.	2.0	\	1.8	3500.	01.87.03.04.0	+		
			Breakpoi			1/ .0		1 1 1	11.65	C 9 ₁ B	
	Breakpoint	\$/Unit	Quantity	\$/Unit	Quantity Quantity	\$/Unit	Quan	reakpoint 8	\$/Unit	Card index	
1 2 3 4 5 6 7 8 9 17	Quantity 0 11 12 13 14 15 15 17 18 19 2				1 ' '	1	1	•		71 77 73 74 75 76 77 79 77 8	
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1 2 3 4 5 6 7 8 9 7	Quantit, 0 11 12 13 14 15 16 17 18 19 2	0 21 22 23 24 25	26 27 28 29 30 31 32 33	34:35 36 37 38 39 4	0 41 42 43 44 45 46 47 48 49 5	0 51 52 53 54 5	5 56 57 58 59 67	61 62 63 64 6	5 66 67 68 69 7	0 71 72 73 74 75 76 77 78 79 8	



SCOUT COST ANALYSIS PROGRAM

job name	
date	PAGE OF

INPUT FORM CA -04

CASE NO CONTINUED					1141	
EQUIPMENT CATAGORIES NOTE: REPEAT CARD TYPES CLOA AND CLOB FO	DR EACH EQUIPMENT CATA	GORY SPECIFIED ON CARD	TYPE C9.			
EQUIPMENT CATAGORY NO						
Equipment Label (Alphanumeric)	Installed Cost (\$)	Expected Life (Yrs.)	Salvage Value? (O.=No, l.=Yes)	Major Overhaul Period (Yrs.)	Card Index	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 2				51 52 53 54 55 56 57 58 59 60		71 72 73 74 75 76 77 78 79 80
COOLING SIDE EQUIP.		90000.	90.	e e e e e e e e e e e e e e e e e e e	10.	C 1 0 A
ANNUAL MAINTENANCE	MAJOR O	/ERHAUL	Occupied Floor Space			
Labor (\$) Material(\$)	Labor(\$)	Material(\$)	Cost(\$)			Card Index
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 2				51 52 53 54 55 56 57 58 59 6	0 61 62 63 64 65 66 67 68 69 70	
1,8000. 9000.	700.	225.	8000.			C 1 ;0 B
EQUIPMENT CATAGORY NO. 2						
Equipment Label (Alphanumeri	•	Installed Cost (\$)	Expected Life (Yrs.)	Salvage Value? (O.=No, l.=Yes)	Major Overhaul Period (Yrs.)	Card Index
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 2				51 52 53 54 55 56 57 58 59 6	0 61 62 63 64 65 66 67 68 69 70	
HEATING SIDE EQUIP.		20000.	90.		10.	C 1 0 A
ANNUAL MAINTENANCE	MAJOR O	VERHAUL	Occupied Floor Space			C1 T1
Labor (\$) Material(\$)	Labor(\$)	Material(\$)	Cost(\$)			Card Index
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 2		9 1 1 1 1 1 1 1 1 1		51 52 53 54 55 56 57 58 59 6	0 61 62 63 64 65 66 67 68 69 70	71 72 73 74 75 76 77 78 79 80
1000. 1000. 2	200.	50.	2000.			C 1 0 B
EQUIPMENT CATAGORY NO. 3						
		Installed Cost	Expected Life	Salvage Value?	Major Overhaul	Card Index
Equipment Label (Alphanumeric)		(\$)	(Yrs.)	(0.=No., 1.=Yes)	Period (Yrs.)	I I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 2	21 22 23 24 25 26 27 28 29 30			0 51 52 53 54 55 56'57 58 59 6		
AIR SIDE EQUIP.		200000.	90.		10.	C 1 0 A
ANNUAL MAINTENANCE	MAJOR O	VERHAUL	Occupied Floor Space			
Labor (\$) Material(\$)	Labor(\$)	Material(\$)	Cost (\$)			Card Index
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20			_1	0 51 52 53 54 55 56 57 58 59 6	60 61 62 63 64 65 66 67 68 69 7	
10000. 10000.	2000.	500.	10000.			C 1 0 B
EQUIPMENT CATAGORY NO						
Equipment Label (Alphanumeric)	Installed Cost	Expected Life (Yrs.)	Salvage Value? (0.=No.,1.=Yes)	Major Overhaul Perio	d Card Index	
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 7	(\$)	1 '	1 ' ' ' '	(Yrs.)		
1 2 3 4 3 0 7 0 7 0 111121314 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 13 14 14 14 14 14 14 14 14 14 14 13 14 14 14 14 14 14 14 14 14 14 14 14 14	22 22 23 27 23 20 27 20 27 30				3 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	C 110 A
ANNUAL MAINTENANCE	MAJOR O	VERHAUL	Occupied Floor Space			
Labor (\$) Material (\$)	Labor (\$)	Material(\$)	Cost (\$)			Card Index
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	21 22 23 24 25 26 27 28 29 3	0 31 32 33 34 35 36 37 38 39 4	0 41 42 43 44 45 46 47 48 49 5	0 51 52 53 54 55 56 57 58 59	60 61 62 63 64 65 66 67 68 69 7	
						C 1 0 B

4.1

SELECTED OUTPUT FROM

LOAD ANALYSIS PROGRAM/DESIGN LOAD RUN

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(FLOOR 12 - ROOF
SPACE 16 OF
                       16 TOTAL SPACES
         18790.0 SO FT FLOOR ARFA
0.0 CH FT VOLUME
24.0 LRS/SQ FT FLOOR WEIGHT
72.0 F TEMPERATURE
                   O BUTI DING LOAD SUMMATION OPTION.
                1.0 SPACE/PLENUM INDICATOR
         PEOPLE
                0.0 PERSONS
0.0 RTU/HR ACTIVITY LEVEL
1.0 SCHEDULE INDEX
               1.0
         LIGHTING
             GHTING
1.00 TYPE OF LIGHTING FIXTURE
0.00 FRACTION OF LIGHT HEAT TO SPACF
0.00 WATTS/SO FT
0.00 KW
2.00 KW
2.00 SCHEDULE INDEX
         EQUIPMENT
                        WATTS/SO FT
KU
BTU/HR SENSIBLF
              0.00
                        RTU/HR LATENT
SCHEDULE INDEX
              2.00
         INFILTRATION
             TELTRATION
0.00 THEFLITRATION CODE
0.00 THEFLITRATION RATE
0.00 HEFIGHT FROM NEUTRAL ZONE
0.00 FXHAUST AIR FLOW
         SPACE ENVELOPE INCLUDES
                        DELAYED H.T.S.
OHICK H.T.S.
WINDOW H.T.S.
                        THITERNAL H.T.S.
HNDERGROUND WALLS
HNDERGROUND FLOORS
                        ADDITIONAL IDENTICAL SPACES
         INDICES OF DELAYED SURFACE
                                    6
                               5
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INDICES OF INTERNAL H.T. SHRFACES
13 14 15 16 1

SHMMARY BY MONTH OF DESIGN DAY WEATHER GENERATED FOR USE IN HEATING AND COMING CALCULATIONS

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SUMMER DAY I JPUT PARAMETERS

1. MOMTH ASSUMED TO BE JULY OR AUGUST

2. MAXIMUM DRY-PULB TEMPERATURE = 92.

3. DAILY SWING OF DRY-BULB TEMPERATURE = 20.

4. AVERAGE DEM-POINT TEMPERATURE = 70.

5. AVERAGE WILD SPEED = 5.
                                                                                                                                                    WITTER DAY IMPHIT PARAMETERS

1. MONTH ASSUMED TO BE DECEMBER

2. MINIMUM DRY-RULE TEMPERATURE

3. DAILY SWING OF DRY-BULB TEMPERATURE

4. AVERAGE OFM-POINT TEMPERATURE

5. AVERAGE WIND SPEED

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NOTE - TEMPERATURE CORRECTION FACTORS BASED ON CARRIER SYSTEM DESIGN MANUAL PGS, 1-18.19. WHI IS SET AT LEAST 3 DEG. F RELOW DBT. BUILDING LOAD SUMMARY FOR SCOUT SAMPLE BUILDING CHICAGO: ILLINOIS

1 THRU 16 SPACE NOS. 225480. TOTAL FLOOR AREA (SQ.FT.) TOTAL VOLUME (CU.FT.) 1916580. SUMMER COOLING PEAK
DBT/WBT/HR OF DAY/DATE 91 / 75 / 16 / JULY 5 WINTER HEATING PEAK
DBT/WBT/HR OF DAY/DATE 1 / -1 / 7 / DEC. 5 ***** SUMMER LOAD **** WINTER SENSIBLE (BTUH) 134732. 70758. LOAD (RTUH) -249442. -119486. LATENT (BTUH) 0. 0. 0. WALLS CEILINGS WINDOW CONDUCTANCE WINDOW SOLAR 374283. 905837. -1640863. 41378. WINDOW SOLAR
OUICK SURFACES
INTERNAL SURFACES
INDERGROUND WALLS
INDERGROUND FLOORS
OCCUPANTS
LIGHT TO SPACE
TOUTHENT TO SPACE
TOUTHENT TO SPACE
TOUTHENT TO SPACE 905837. 0. -20669. 1569140. 283005. 9408. 0. 0. -48854. 338584. 0 • 36646 • 0. 6282. -128217. 14806. 9408. 353390. -2092557. SUBTOTAL RETURN AIR 67248A. 388094. 212003. 15705. 388094. 0. FAN HEAT VENTILATION AIR 320706. 674096. -963073. TOTAL 5208284. TOTAL BUILDING COOLING 5882384. BTUH -2651830. BTUH 490.2 TONS 2651.8 MBH ******* CONSTANT VOLUME SYSTEM ******
241713. CFM 1.07 CFM/SQ.FT. CONST.
293509. CFM 1.30 CFM/SQ.FT. CONST.
45651. CFM .20 CFM/SQ.FT. CONST.
29909. CFM .13 CFM/SQ.FT. CONST. ****** VARIABLE VOLHME & TSTEM *******
233917. CFM 1.04 CFM/70.FT. MAX.
284042. CFM 1.26 CFM/70.FT. MAX.
45444. CFM .20 CFM/70.FT. MAX.
29800. CFM .13 CFM/70.FT. MAX. SUPPLY AIR AT 55 F AT DIFFUSER SUPPLY AIR AT 110 F AT DIFFUSER SUPPLY AIR AT 110 F AT DIFFUSER SUPPLY AIR AT 130 F AT DIFFUSER

SUMMARY OF RECOMMENDED HEATING AND COOLING EXTRACTION RATES TO BE USED AS IMPUT TO VARIABLE TEMPERATURE PROGRAM

SPACE VO.	HEATING EXTRACTION RATE (BTU/HR)	CODITING EXTRACTION RATE (BTU/HR)
1	-67794.	74846.
5	-19035.	30308.
3	-71495.	59213.
4	-19431.	26484.
5	-26441.	123077.
6	-61268.	77607.
7	-17423.	30990.
8	-64969.	61974.
9	-17819.	27166.
10	0.	136860.
11	-57212.	74914.
12	-16298.	29867.
13	-60888.	60350.
14	-16693.	26239.
15	0.	136860.
16	-130170.	78734.

4.2

SELECTED OUTPUT FROM

LOAD ANALYSIS PROGRAM/HOURLY LOAD RUN

```
1
SPACE REPETITION FACTOR
ARFA (SQ,FT.)
                                                                                2510.
                                                                              21335.
VOLUME (CU.FT.)
SUMMER COOLING PEAK
ONTOWNEY/DATE
                                                   89 / 72 / 14 / AUG. 29
-13 / -13 / 7 / JAN. 15
                                                ***** SUMMER LOAD *****
                                                                                                      WINTER
                                                 SENSIBLE
                                                                         LATENT
                                                                                                        LOAD
                                                    (BTUH)
5628.
                                                                         (BTUH)
                                                                                                       (BTUH)
        MALLS
       WALLS
CFILINGS
WINDOW CONDUCTANCE
WINDOW SOLAR
CUICK SURFACES
INTERNAL SURFACES
HNDERGROUND WALLS
HNDERGROUND FLOORS
                                                   0.
10540.
                                                                                0.
                                                                                                      - 43439 .
                                                                                0.
                                                                                                            0 •
                                                                                                             0.
                                                                                0.
                                                    -200A.
        OCCUPANTS
LIGHT TO SPACE
FOULPMENT TO SPACE
INFILTRATION
                                                     5307.
                                                                           3018.
                                                                                                        121 .
                                                   14403.
                                                                                                       5469
                                                                      600.
                                                      525.
        TOTAL
                                                   92896.
                                                                           3617.
                                                                                                     -A0892.
TOTAL SPACE COOLING
                                            96514. BTUH
                                           -80892. BTUH
SUPPLY AIR AT 55 F AT DIFFUSER SUPPLY AIR AT 10 F AT DIFFUSER SUPPLY AIR AT 110 F AT DIFFUSER SUPPLY AIR AT 130 F AT DIFFUSER
                                                               5558. CFM
6749. CFM
1658. CFM
1086. CFM
                                                                                              2.21 CFM/SQ.FT.
2.69 CFM/SQ.FT.
.66 CFM/SQ.FT.
.43 CFM/SQ.FT.
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HOURLY LOAD ANALYSIS RESULTS FOR SCOUT SAMPLE RUILDING CHICAGO: ILLIMOIS

SPACE MO.
SPACE REPETITION FACTOR

AREA (SQ.FT.) 620.
VOLUME (CU.FT.) 5270.

SUMMER COOLING PEAK

ORT/W8T/HR OF DAY/DATE 95 / 81 / 17 / JULY 21

WINTER HEATING PEAK

OHIT/WBT/HR OF DAY/DATE -15 / -15 / 10 / JAN. 15

***** SUMMER LOAD **** SINTER SENSIBLE (BTUH) 1554. LATENT (BTUH) LOAD (BTUH) -2692 HALLS 0. HALLS
CFILINGS
WINDOW CONDUCTANCE
WINDOW SOLAR
DUICK SUFFACES
INTERNAL SURFACES
INDERGROUND WALLS 0. -18079. 0. 4410. 0. A11. 15877. 0. 0. Ω. 0. -1922. INDERGROUND FLOORS -682. 0. OCCUPANTS LIGHT TO SPACE FQUIPMENT TO SPACE INFILTRATION 162°. 4315. 778. 905. 0. 60. -1506. 172. 363. 28054. 1268. TOTAL

TOTAL SPACE COOLING 29322, BTUH
TOTAL SPACE HEATING -23014, BTUH

 SUPPLY AIR AT 55 F AT DIFFUSER
 1678. CFM
 2.71 CFM/SQ.FT.

 SUPPLY AIR AT 58 F AT DIFFUSER
 2038. CFM
 3.29 GFM/SQ.FT.

 SUPPLY AIR AT 110 F AT DIFFUSER
 472. CFM
 .76 CFM/SQ.FT.

 SUPPLY AIR AT 130 F AT DIFFUSER
 309. CFM
 .76 GFM/SQ.FT.

PAGE 2

2

BUILDING LOAD SUMMARY FOR SCOUT SAMPLE BUILDING CHICAGO, ILLINOIS

> 1 THRU 16 SPACE NOS. TOTAL FLOOR AREA (SQ.FT.) 225480. 1916580. TOTAL VOLUME (CU.FT.) SUMMER COOLING PEAK
> DBT/WBT/HR OF DAY/DATE 95 / 81 / 17 / JULY 21 WINTER HEATING PEAK
> DBT/WBT/HR OF DAY/DATE -13 / -13 / 7 / JAN. 15 WINTER ***** SUMMER LOAD ***** LOAD (BTUH) -290329. +132287. -1942131. SENSIALE (BTUH) 113312. LATENT (BTUH) WALLS
> CEILINGS
> WIGHOW CONDUCTANCE
> WINDOW SOLAR
> QUICK SURFACES
> INTERNAL SURFACES
> INDERGROUND WALLS
> INDERGROUND FLOORS 0. 6006A. 489893. 757806. 41006. 0. 0. 0. 0. -20669. 609209. 0. 0. -48249. 4196. 72407. 338584. OCCUPANTS
> LIGHT TO SPACE
> FOUIPMENT TO SPACE
> INFILTRATION 1569140. 283005. 20871. 0. 0. 43993. 10156. -163688. -2488919. 3882634. 382577. SUBTOTAL RETURN AIR FAN HEAT VENTILATION AIR %1032. 4n4925. 672488. 404925. 0. -12:0400. 254934. 531301. 5214981. 913878. - 3243362. TOTAL TOTAL RUILDING COOLING TOTAL BUILDING HEATING 6128859. BTUH -3253362. BTUH 510.7 TOMS 3253.4 MRH ******* CONSTANT VOLUME SYSTEM *******
> 252195. CFM 1.12 CFM/SQ.FT. CONST.
> 306237. CFM 1.36 CFM/SQ.FT. CONST.
> 51451. CFM .23 CFM/SQ.FT. CONST.
> 33709. CFM .15 CFM/SQ.FT. CONST. SUPPLY AIR AT 55 F AT DIFFUSER SUPPLY AIR AT 130 F AT DIFFUSER SUPPLY AIR AT 130 F AT DIFFUSER

SUMMARY OF RECOMMENDED HEATING AND COOLING EXTRACTION RATES TO BE USED AS FURDET TO VARIABLE TEMPERATURE PROGRAM

SPACE VO.	HEATING EXTRACTION RATE (BTU/HR)	CODITING EXTRACTION PATE (BTU/HR)
1	-80892.	92896.
2 ·	-23014.	28054.
3	+85293 ₊	59630.
4	-22765.	23725.
5	-36465.	126836,
5	~73111.	94904.
7	-21092.	28736.
8	-77512.	62391.
9	-20843.	24407.
10	0.	136860.
îi	-68383.	92090.
12	-19746.	27959.
13	-72635.	60821.
14	-19532.	23672.
15	0.	136860.
16	-156020.	69571.

4.3

SELECTED OUTPUT FROM
TEMPERATURE ANALYSIS PROGRAM

		* * *			T E	MPER	A T U	R E O	CCUR	RAN	C E E	ANDS	. (F) *	* * * *	* * * *	* * *
SPACE NO.	BELOW 50	50- 54	55≁ 59	60 - 64	65~ 69	70 - 74	75 - 79	80- 84	85 - 89	90- 94	95- 99	100- 104	105- 109	110- 114	115+ 119	120 - 124	ABOVE 124
1	0	138	326	916	1295	3902	1650	502	51	4	0	0	0	0	0	0	0
2	D	401	678	938	1106	3352	1174	880	230	23	2	L,	0	0	0	0	0
3	0	443	783	1054	1321	3700	1344	139	n	0	. 0	n	0	0	0	0	0
4	0	416	700	1020	1184	3480	1342	475	142	25	0	n	0	0	0	0	0
5	0	0	0	443	1118	5026	2197	0	0	n	0	n	0	0	0	0	0
6	0	44	111	403	1187	4247	2018	665	103	6	0	n	0	0	0	0	0
7	0	206	315	822	1256	3517	1267	1065	275	56	5	0	0	0	0	0	0
А	0	223	307	991	1445	3868	1679	264	7	n	0	n	0	0	0	0	0
9	0	217	330	894	1330	3670	1495	578	210	60	n	n	0	0	0	0	n
10	n	0	0	0	127	4062	4595	0	0	0	0	n	0	0	0	0	0
11	Ü	43	135	505	1383	4188	1945	538	47	a	n	0	0	0	0	0	0
12	n	172	284	943	1355	3516	1361	958	176	19	0	0	0	0	0	0	n
13	0	186	314	1081	1515	3816	1667	205	n	0	0	n	0	0	0	0	0
14	U	166	313	991	1431	3653	1548	524	141	17	0	n	0	0	0	0	0
15	0	0	O	84	764	4943	2993	0	n	0	n	n	0	0	0	0	0
16	0	25	250	1414	2808	2347	1905	35	n	c	n	0	0	0	0	0	0

NOTE - ACTUAL SPACE TEMPERATURES ARE ROUNDED TO NEAREST WHOLF DEGREE REFORE BEING PLACED 1'1TO PROPER TEMPERATURE OCCURRANCE BAND.

SUMMARY OF VAMIABLE TEMPERATURE LOAD CALULATIONS

		BUILDING - CHICAG ATING*******		OLING******	***L0 !FST	SPACE TEMP. ***	***HIGHEST	SPACE TEMP.***
SPACF 10.	MAX. HEAT ADDITION (BTU/HR)	HOUR/DAY/MO	MAX. HEAT EXTRACTED (BTU/HR)	HOUR/DAY/MO	TE *P'. (F)	HOUR/DAY/MO	TEMP.	HOUR/DAY/MO
1	-67794.	7/ 3/ 1	74846.	13/21/ 7	50.0	7/15/ 1	91.0	14/17/ 9
5	-19035.	7/ 3/ 1	27409.	16/21/ 7	50.0	4/15/ 1	95.4	17/22/ 7
3	-71494.	7/ 3/ 1	57864.	14/21/ 7	50.0	4/15/ 1	83.8	17/22/ 7
4	-19431,	7/ 3/ 1	26484.	7/11/ 7	50.0	6/ 5/ 1	92.5	13/22/ 7
5	-26441.	7/ 3/ 1	120033.	16/18/ 8	61.1	6/7/2	78.4	20/18/ B
6	-61268.	7/ 3/ 1	77607.	7/21/ 7	50.0	6/16/ 1	91.9	15/17/ 9
7	-17423.	7/ 3/ 1	30990.	7/21/ 7	50.0	7/15/ 1	95,9	17/22/ 7
в	-64969.	7/ 3/ 1	61974.	7/11/ 7	50.0	9/15/ 1	85.4	17/22/ 7
9	-17819.	7/ 3/ 1	27166.	7/22/ 5	50.0	7/15/ 1	93,8	11/23/ 7
10	-26441.	7/17/ 1	136859.	7/13/ 4	67.0	6/17/ 1	78.4	23/18/ 8
11	-57212.	7/3/1	74914,	13/20/ 7	50.0	7/16/ 1	88.7	14/17/ 9
12	-16296.	7/ 3/ 1	28259.	16/21/ 7	50.0	9/15/ 1	93,5	17/22/ 7
13	-60888.	7/ 3/ 1	60350,	7/11/ 7	50.0	12/15/ 1	84.4	17/22/ 7
14	-16693.	7/ 3/ 1	26239.	7/11/ 7	50.0	16/15/ 1	91.2	11/23/ 7
15	-26441.	7/ 3/ 1	136859,	7/19/-5	61 · ^p	6/17/ 1	78.9	23/21/ 7
16	0.	1/ 1/ 1	0,	1/ 1/ 1	53.7	18/16/ 1	80.4	17/23/ 7

TOTAL BUILDING SENSIBLE HEAT EXTRACTIONS AND ADDITIONS FOR VARIABLE TEMPERATURE ANALYSIS HEATING = +873237694.

COOLING = 5103200283.

NOTE - THE ABOVE HEAT EXTRACTIONS AND ADDITIONS DO NOT INCLUDE THE EFFECTS OF OUTSIDE VENTILATION AIR.

4.4

SELECTED OUTPUT FROM

SYSTEMS ANALYSIS PROGRAM

SCOUT SAMPLE BUILDING SYSTEM SIMULATION AND ENERGY AGALYSIS

SHMMARY OF FHERGY DISTRIBUTION SYSTEM CHARACTERISTICS.

SYSTEM	TYPE	****** TO	TAL FAN HP - RETURN - E'		iin. OF Zolies	**TOTAL SUPPLY	SYSTEM AIR FI	OMS (CEW) **	PER-CENT MIN.O.A.
1 2	VAVS	64.3 93.1	22.1 34.9	1.3	3 12	A6727. 1255A3.	7515. 3760.	7200. 0.	A.7 3.0

SCOUT SAMPLE BUTTOTIES SYSTEM SYMULATION AND EMERGY ANALYSIS CHICAGO, ILLINOIS

15 MAY 1977

1234

SHRMARY OF ZOUE AIR FLOWS

FAN SYSTEM	ZOHE HUMBER	LOAD SPACE HUMBER	MULT FACTOR	SUPPLY CEM	EXHAUST CF™	SET POINT TEMP.
1	1	5	1	6404.	690.	72.
1	2	10	10	7302.	600.	72.
1	.5	15	1	7302.	enn.	72.
2	1	1	1	3993.	0.	72.
2	د	2	1	1462.	0.	72,
2	5	3	1	3087	ο,	72.
2	4	4	1	1413.	0.	72.
. 2	5	6	1.0	4141.	0.	72,
2	ь	7	10	1653.	0.	72.
2	1	В	10	3307.	n.	72,
2	ŧŧ.	9	10	1449.	0.	72.
2	9	11	1	3997	n.	72.
>	10	12	1	1508.	ρ.	72.
2	11	1.3	1	3220.	0.	72.
2	12	14	1	1400.	0.	72.

ALIG ALIG ALIG ALIG ALIG ALIG ALIG ALIG	2 1 2 2 3 4 4 2 5 5 6 2 10 11 1 2 1 1 2 1 1 2 1 1 2 1 1 1 1 1	1 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0				
No.V OFC OFC OFC OFC OFC OFC OFC OFC OFC OFC	CONTUENS AND 1	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			-155A. n.	-911. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0	200000000000000000000000000000000000000
Anti Arm	1 1 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1 10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	0. 0. 0. 0. 0. 1. 1.30. 403. 700. 16. 10. 34. 63.	0 0 0 0 0 0 6 6 7 13 4 6 6 13 0	0. 0. 0. 0. 0. 0. 0. 0. 0. 0.		0 0 0 0 0 0 0 0 0 0 0

SCOUT SAMPLE BUILDING SYSTEM SIMULATION AND ENERGY ANALYSIS CHICAGO. HLINOIS 15 MAY 1977 1234 SUMMARY OF EQUIPMENT SIZES TYPE OF CHILLER NO. OF CHILLERS SIZE OF CHILLERS HERMETIC CENTRIFUGAL 275.0 TONS TYPE OF HOILER NO. OF HOILERS SIZE OF BOILERS GAS 2 3500.0 MATU TOTAL HEATING CAPACITY 7000.0 MRTH 550.0 TONS IF USED. TERMINAL PEHEAT EMERGY SAME SOURCE AS BOTLER. COOLING TOWER FAN PROMIREMENT 165000. CFM 1.0 IM. c.p. 30.6 HP HOILER AUXILIARY HOUSEPONER REQUIREMENT (FAM. BLOVER. PUMP) 1.5 HP TOTAL FAI PEAUL HORSEPOWER FOR BUILDING 215.A HP SUMMARY OF PUMP SIZES

> TOTAL HEAD (FT) 60.n 60.n 80.n

TOTAL HP 39.2 49.0 27.7

LOCATION
THILLED WATER
COURTESER STIFF
DEATING WATER

TOTAL 6P4 1320. 1650. 700.

***** MONTHLY AND ANNUAL ENERGY AND UTILITY USE SUMMARY *****

	FACTI IT' CTTY USER	- (nATE PROJE SYS.	
			FNI	RGY CONSUMBTION		
		FER.	MARCH	\Pq11	MAY	JUNE
HEATING LOADS BIDG.HIG FROM CENTHAL	PLANT (THE	ATD CYSTEMS.	BASERD.HTG	AND CTP HIMTOTE	TERRI	
				-11591.3		-4091.2
CONS. (MBT())	-652233.0	-511672.6	-468411.8	-295394.5	-142401.2	-55974.2
MET CENTRAL PLANT HEATT	OG LOAD (BING.)	IT + TND. PROC	A CHIER HT -	F/G.HT.1		
DEMAND (MBH)	-7000.0	-7000.0	-7000.0	-7000-0	-4794.5	-4091.2
DEMAND (MRH) CONS. (MBTH)	-649971.7	-511439.0	-467370.2	-288642.3	-142401.2	-55974.2
COOLING LOADS						
BLOG. CLG FROM CENTRA	AL CHILLER					
DEMAND (MBH)	0 • n	n.0	1460.6	2430.2	3092.4 297496.3	3447.1
CONS. (MOTH)	0 • 6	n.0	9762.2	55 ² 5a.0	297496.3	441889.4
ELECTRICITY						
LIGHTS AND BUTTOING FOL	IPMFNT					
INTERNAL				_		
				927.7		
CONS. (KWH)	214783.2		232107.3		223445.3	222384.6
HEAT LINCE . CENT.PLT.						
DEMAND(RW)	21 • R	21.7 15162.4	21.8	21.8	21.8	21.8
COLS. (KWH)					16208.1	15685.3
FOR (INCL. CHILLERS.)						
DEMAND (KH)	48.6		146.0		240.9	284 . 8
COUS. (KWH)	65899.1	61647.5	66281.1	65451.7	79284.8	85595.2
FAMS						
DEMAND(KW)			160.9		160.9	160.9
COURT (KMH)	35851.1	28409,4	30474.4	252nn. A	27862.8	28021.4
PROCESS ELECTRICITY						
DEMAND(KA)	113.9	113.9	113.9			113.9
COLS. (KVH)	14423.9	14110.0	16235.7	1411a.p	15529.4	15529.A
TCTAL						
DEMAND(KW)	1155.0		1206,2		1303.9	1345.8
COUS. (KWH)	747565,4	323337.2	361306.6	325 ⁴ 24.2	362332.8	367216.3

*****	MONTH! Y	AND	ANNUAL	EMFRGY	AHD	UTILITY	USE	SHHMARY	****

	FACILITY CITY USER	- CHICAGO, TELINOIS			PROJE	nATE - 15 MAY 1977 PROJECT - 1234 SYS. LABEL - CONV.SYS.1	
	July	Alic.	FNFR	от помечения чети он поть	Nov.	DEC •	TOTAL
HEATING LOADS							
31 DG. HTG FROM CENT	GAL DUART CINCL	ATE CYSTEMS. 1	MASERD UYE A	OD CTM HOUSE	Trpei		
	-3130.5					-8116.4	
		-19141.0			-338227.5	-522417.1	-3297382.4
THE CENTRAL PLANT UFA					>	-582427(2	-2.77077244
DEMAILD (MRH)	-3130.5	-1226.2	-1.724.5	-4541.3	-7000.0	-7000.0	
DEMAND (MBH) CONS. (MBTU)	-13641.4	-19141.0	-41565.8	-236 100.4	~33666°.4	-519990.9	-3283107.4
				•		-	
COOLING UDADS							
3LDG. (LG FRn≥ CEN	TRAL CHILLER						
DEMARKS (MRR)	3746.9		3396.7	2720.7		0.0	
COMS. (MBTU)	524351.3	586990.5	415006.0	108334.6	826.3	0.0	2440514.6
ELLCTRICITY							
LIGHTS AND MUTERING :	EGHIPALOT						
	639.7	£39.7	P39.7	130.7	P 30.7	839.7	
	206121.2		205060.5	223445.3	213722.6	205060.5	25A7298.2
HEAT GINGL CENTIPL							
DEMANDIKA)	21.0	21.8	21.6	21.0	21.6	21.8	
CONS. (KWH)	16208.1	16204.1	15685,3	16200.1	15685.3	16204.1	191360.1
COOL LINCL. CHILLERS	. VATER PUMPS, CO		MI DX - AND HEA	(TPHMPS)			
DESAMBLEWI	313.5	303.5	284.3	229.5	125.6	88.6	
COUS. (KUH)	93576.9	97085.0	04719.2	70705.2	63810.3	65899,1	900357.2
FAIIS							
DEMAND(KW)	160.9	160.9	160.9	160.0	160.9	160.9	
(OHS. (KWH)	25538.7	29407.2	25468.5	27767.7	26354.2	31499,9	341864.1
PROCESS ELECTRICITY							
DEMAND(KW)	113.9	113.9	113.9	117,0	113.9	113.9	
CONS. (KWH)	14110.0	16235.7	14118.0	15529.4	14823.9	14118.0	179298.6
TOTAL							
DEMAND(KW)	1375.1	136A.1	1345.3	1285,3	1155,8	.1155.1	
COUS. (KWH)	355563+0	391043.3	345051.4	353656.1	334396.3	332785.6	4200178.3

 MONTH Y	ADD	AMMILLA	EMERGY	AND	HITTI TTY	115F	SUMMARY	****

	FACTLETY FITY USER	- SCOUT - CHT - GARD+ INC.			DATE PROJECT SYS. LA		
			ENFRGY	CONTRAM SHOT			
	.1411.	F[A.	MARCH	ΛPo TI	MAY	JUNE	
GAS HEAT							
DEMAND (THERMS/HR)	47.5	87.5	87.5	A7.5	61.7	53.6	
COMS. (THERMS)	8671.2	6767.9	6292.4	4051.1	2060.1	85A.3	
TOTAL		.,,,,,,					
DEMAND (THERMS/HE)	87.5	87.5	87.5	87.5	61.7	53.6	
COMS. (THERMS)	4671.2	6767.9	6292.4	4057.1	2060.1	A5A.3	
PHREHASEN STEAM							
DIE							
CITY WATER							
DEMAND (K-GALS/HR)	. 1	. *5	.6	1.2	. 6	,5	
COUNT (K-GALC)	16.4	11.6	13.0	14.6	52.3	71.7	

***** MONTHLY AND ANNUAL ENERGY AND UTTLITY USE SUMMARY *****

		- SCOUT - CHY - GARTH INC.	CAGO, TELTPOTS		DATE PROJECT SYS. LA	- 15 MAY - 1234 BEL - CONV.SY	
				COUR INDITION			
	Jol Y		SEPT.	, oi.	Nov.	ncc.	TOTAL
SAS							
HEAT							
DEMAND (THERMS)HE)	19.4	19.2	23.4	E G . G	87.5	87.5	
CONS.(THEPHS)	203.5	346.1	715.9	3'194.6	4730.2	7027.5	45227.8
TOTAL							
DE AND (THEPHS/JP)	.19 . 4	10.2	23.4	59.9	A7.5	87.5	
COUS. (THERES)	203.5	346.1	715.9	3494.6	4739.2	7027,5	45227.8
PHIRCHARED STEAM							
DTE							
CITY WATER							
DEMAND (H-GALS/HR)	. 6	.6	.5	. 4	.6	,7	
COUS. (K-GALS)	92.5	91.9	65.0	21.1	6,5	12.8	463.8

4.5

SELECTED OUTPUT FROM

COST ANALYSIS PROGRAM

SAMPLE PROBLEM NO. 4

	CONSUMPTION	DEMAND	TOTAL COST	ANNUIT
	(\$)	(\$)	(\$)	(5)
ELECTRICITY				
BASE POWER + HEATING + COOLING	16376.	7779.	24155.	82771
		GRAND TOTALS	24155.	82771

ANNUAL MAINTENANCE FLOOR SPACE ANNUITY * INITIAL ANTICIPATED SALVAGE MAJOR OVERHAUL MATERIAL COST COST LIFE CONSID. PERIOD LABOR MATERIAL LABOR 8000. 131655. * * COOLING SIDE EQUIP. 80000. 90 0. 16000. 8000. YES 50 0. * HEATING SIDE EQUIP. 60000. 90 YES 10 600. 150. 3000. 3000. 2000. 36505. * * AIR SIDE EQUIP. 200000. YES 10 2000. 500. 10000. 10000. 10000. 133105. * TOTAL SYSTEMS AND EQUIPMENT ANNUITY 301263. *

TOTAL SYSTEMS AND EQUIPMENT PRESENT WORTH 2483550.

NOTE -- ANNUITY IS CONSTRUED TO MEAN THE UNIFORM ANNUAL COST, CONSIDERING ALL THE LISTED COSTS, TO THE OWNER DURING THE LIFE TIME OF THE BUILDING.

BASE SYSTEM (NO. 1)
SAMPLE PROBLEM NO. 3

COMPARED SYSTEM (NO. 2) SAMPLE PROBLEM NO. 4

	BASE System	CASH FLOW ****** COMPARED SYSTEM	NE DIFFERENCE	CUMULATIVE DIFFERENCE	
	(\$)	(\$)	(\$)	(\$)	
0	-310000.	-340000.	-30000.	-30000.	
1	-108972.	-104040.	4932.	-25067.	
5	-120393.	-115025.	5367.	-19700.	
3	-133079.	-127240.	5838.	-13861,	
4	-147177.	-140831.	6346.	"7515 .	
5	-162854.	-155961.	6893.	-622,	
5.0					***BREAKEVEN POINT***
6	-180299.	-172817.	7482.	6859,	
7	-199722,	-191607.	8114.	14974.	
8	~221360 ,	-212567,	8793.	23767,	
9	-245481.	-235962.	9519.	33286.	
10	-282216.	-270335.	11880.	45167.	
11	_302420,	-291298.	11122.	56290.	
12	_335962,	.323960.	12002.	68292.	
13	-373448.	-360513.	12935,	81227.	
14	4 15369.	-401448.	13920.	95148.	
15	-462278.	-447319.	14959.	110107.	
16	-514803.	498755 .	16048.	126155.	
17	-573654.	~ 556468.	17185.	143341.	
18	-639634.	-621269,	18365.	161706.	
19	-713656.	-694072.	19583.	181290.	
20	<u>.823883.</u>	-798677.	25206,	206496.	
21	-890088.	-867993.	22094.	228591.	
22	.994999.	-971636.	23363.	251954.	
23	-1112990.	-10°88373,	24617.	276571.	
24	-1245776.	-1219941.	25834.	302405.	
25	-1395300.	-1368314.	26986.	329391.	
56	-1563777.	-1535739.	28038.	357430.	
27	-1753722.	-1724772.	28949.	386380.	
28	-1967997,	-1938329.	29667.	416048.	
29	-2209858.	-2179727.	30131.	446179.	
30	-2565524.	-2521951.	43573.	489753,	
31	-2791693.	-2761711.	29981.	519734.	
32	-3140702.	-3111530.	29172.	548906,	
33	~3535530·	-3507819.	27710.	576617,	
34	-3982431.	-3956984.	25446.	602064.	
35	~4488539.	.4466338.	22200.	624264.	
36	-5061993.	-5044231.	17761.	642026,	
37	-5712083.	-5700203.	11879.	653906.	
38	-6449413.	-6445152.	4261.	658167.	
39	-7286095.	-7291536 .	-5440.	652727.	
40	-8510903,	-8484189.	26713.	679441.	

NOTE... BREAKEVEN POINTS ARE INDICATORS OF PAYBACK OF INVESTED CAPITAL. HOWEVER, COSTS OF CAPITAL AND TAX EFFECTS ARE NOT INCLUDED.