

Scout

OVERVIEW MANUAL

3379066

GARD, INC.

A SUBSIDIARY OF
GATX CORPORATION

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.

SCOUT'S Overall Program Flowchart

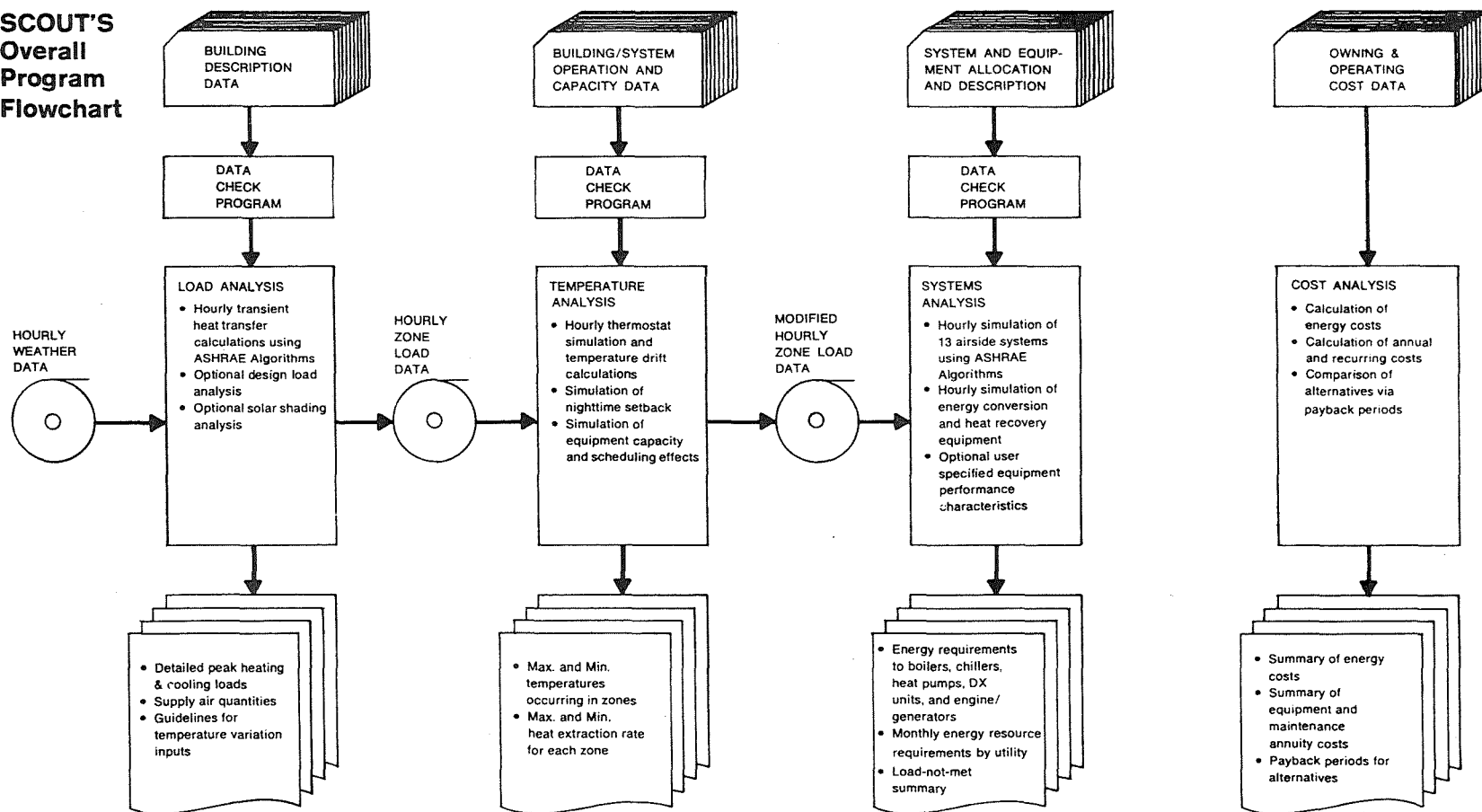


Figure 1

2. Sample Building Description

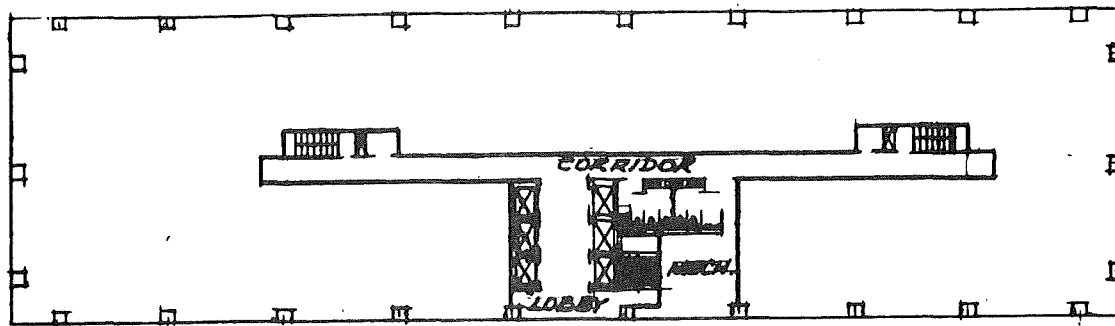
A multi-story office building with the following characteristics has been chosen as a sample building:

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 penthouse for 12 typical floors at 18,790 sq. ft. each
TYPICAL FLOOR:	261 ft. long and 72 ft. wide, 13.5 ft. floor-to-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 PARTITIONS:	Gypsum board on each side of slab-to-slab metal studs (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 fluorescent 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 venetian blinds (See Table II)
PENTHOUSE:	Contains all mechanical equipment, electrical equipment, and elevator machinery.

2.2 HVAC Systems and Equipment Data

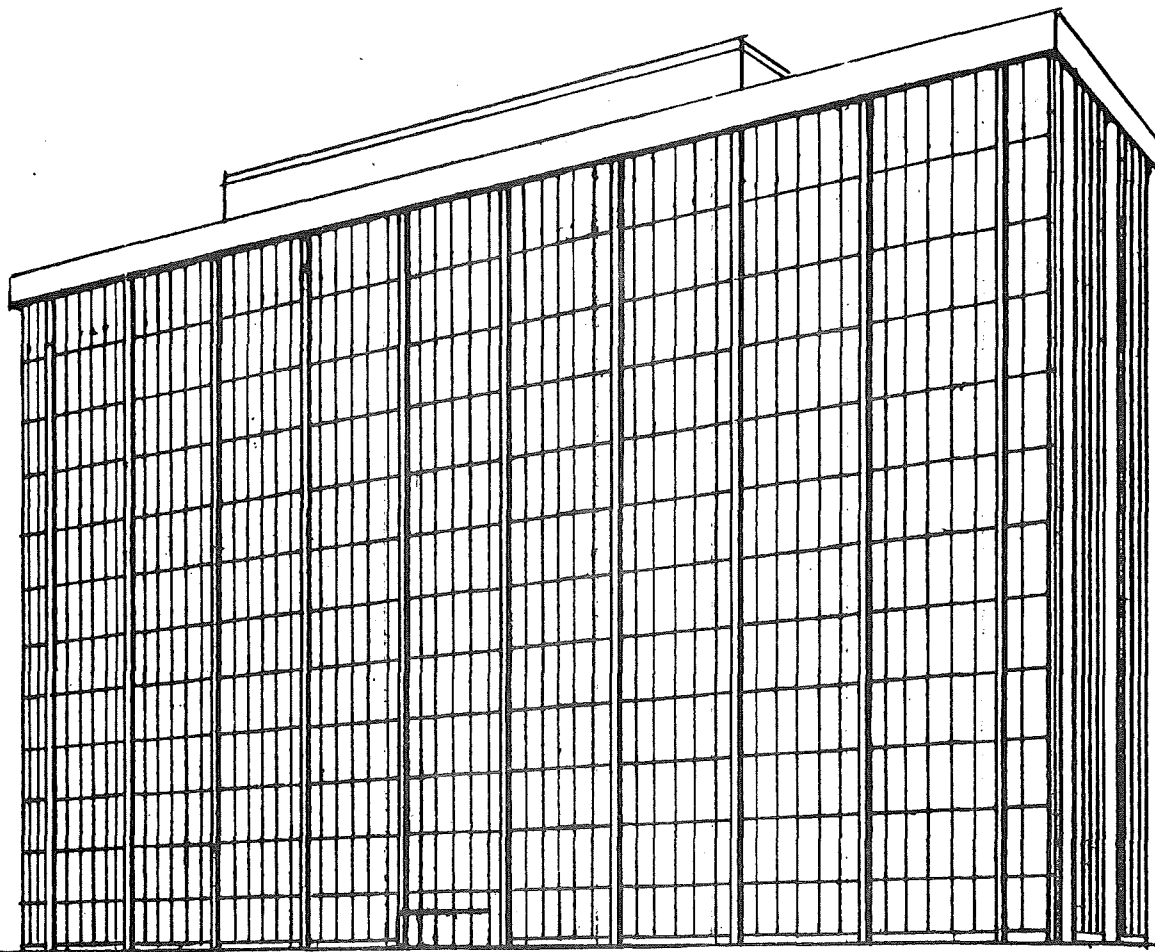
INTERIOR SYSTEM: Variable air volume system with reheat. Insulated sheetmetal supply ducts extend to each floor for



NORTH



TYPICAL FLOOR PLAN



SOUTH ELEVATION

Figure 1 SCHEMATIC OF SCOUT SAMPLE BUILDING

TABLE I
CONSTRUCTION CHARACTERISTICS

<u>Long Side Walls:</u>	<u>L*</u>	<u>K</u>	<u>D</u>	<u>SH</u>	<u>R</u>
1/4 inch ceramic coated glass	0.0208	0.590	172	0.20	-
4 inch insulation	0.3333	0.025	2.0	0.20	-
4 inch air space	-	-	-	-	0.91
3/4 inch gypsum board	0.0625	0.420	100	0.20	-
<u>Short Side Walls:</u>					
Same as long side walls	See Above				
<u>Interior Partitions:</u>					
3/4 inch gypsum board	0.0625	0.420	100	0.20	-
4 inch air space	-	-	-	-	0.91
3/4 inch gypsum board	0.0625	0.420	100	0.20	-
<u>Typical Floor:</u>					
Linoleum	-	-	-	-	0.05
4 inch concrete	0.3333	1.0	140	0.20	-
Air space	-	-	-	-	1.0
3/4 inch accoustic tile ceiling	0.0625	0.033	18	0.32	-
<u>Roof:</u>					
Built-up roofing	0.0313	0.665	70	0.33	-
3 inch insulation	0.2500	0.025	2.0	0.20	-
4 inch concrete slab	0.3333	1.0	140	0.20	-
Air space	-	-	-	-	1.0
3/4 inch accoustic tile ceiling	0.0625	0.033	18	0.32	-

* Legend:

L = Thickness, ft.

k = Thermal conductivity, Btu/hr/ft/°F

D = Density, lb/ft³

SH = Specific heat, Btu/lb/°F

R = Thermal resistance, hr. ft. °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
WATER PUMP: One, sized at 60 ft. of head

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

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

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 auxiliaries 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 WATER: Hot Water Heater 48 KW

PROFILES: For week day operation schedule internal and miscellaneous loads using profiles in Figure 4. Other days use zero loads, except for lighting and receptacle loads which are 5% continuous for emergency lighting.

2.4 Design Criteria

LOCATION: Chicago, Illinois

INSIDE DESIGN: Summer: 72°F DB
Winter: 72°F DB, 30% R.H.

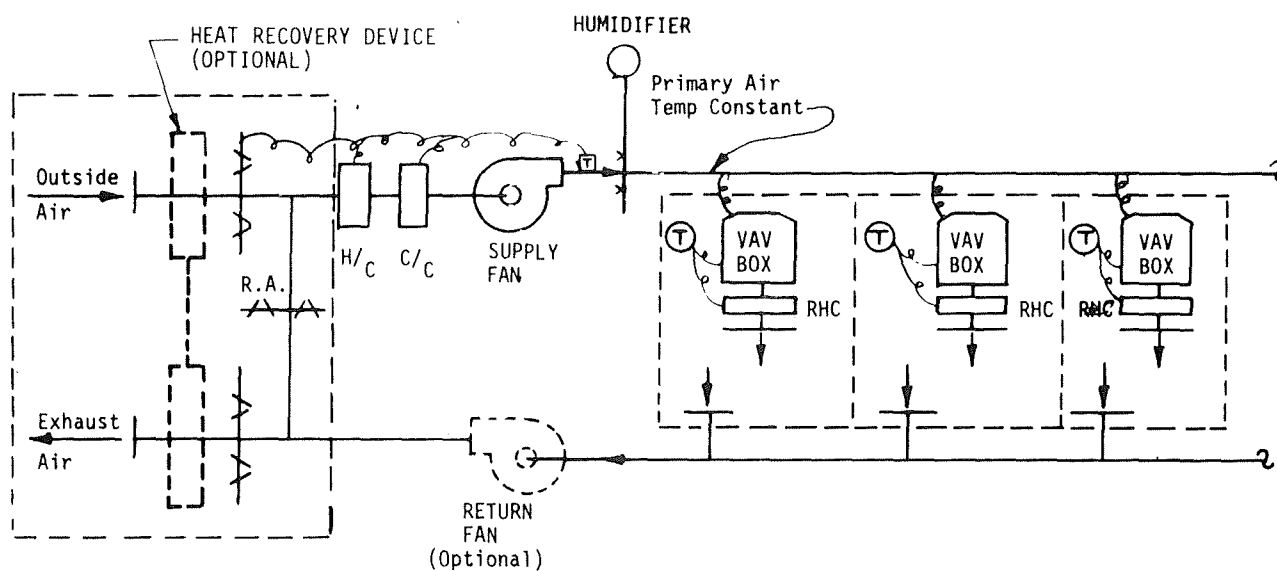
OUTSIDE DESIGN: Summer
92°F DB
76°F WB
20°F Range
5 mph

Winter
1°F DB
5°F Range
15 mph

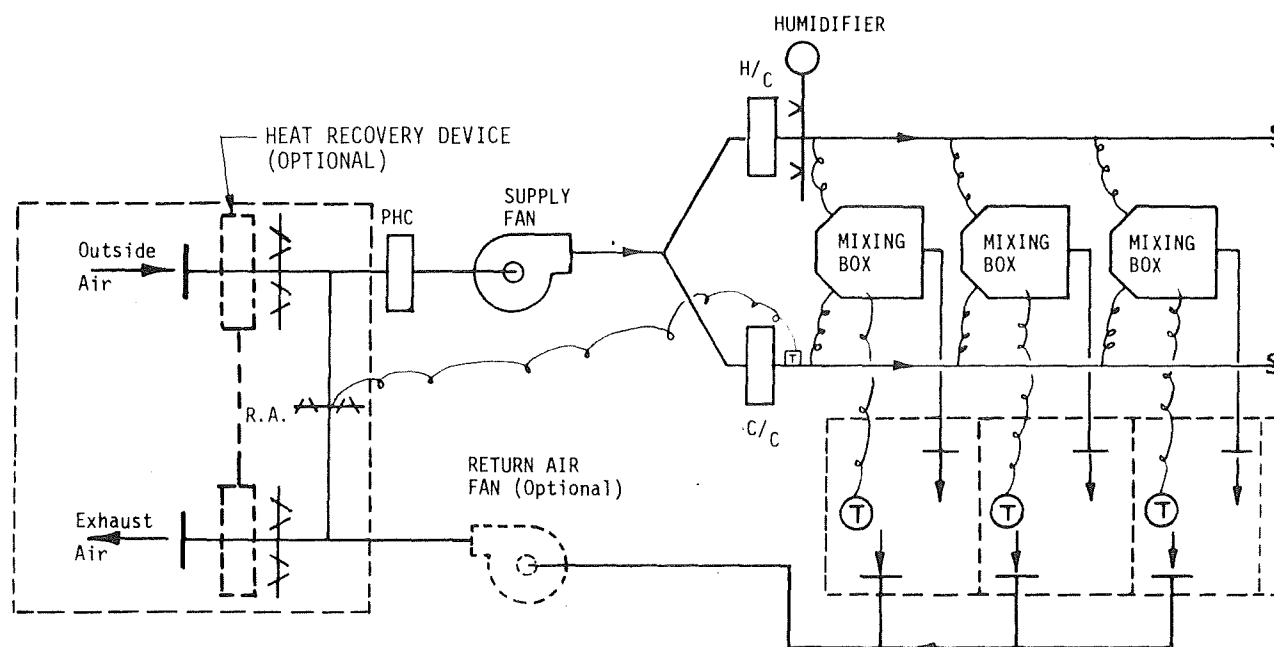
VENTILATION: 5 CFM of outside air per person minimum when supply fans are on

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 $\pm 1\text{-}1/2^\circ\text{F}$



(a) INTERIOR SYSTEM - VARIABLE AIR VOLUME



(b) PERIMETER SYSTEM - DUAL DUCT

Figure 2 - HVAC SYSTEM SCHEMATICS

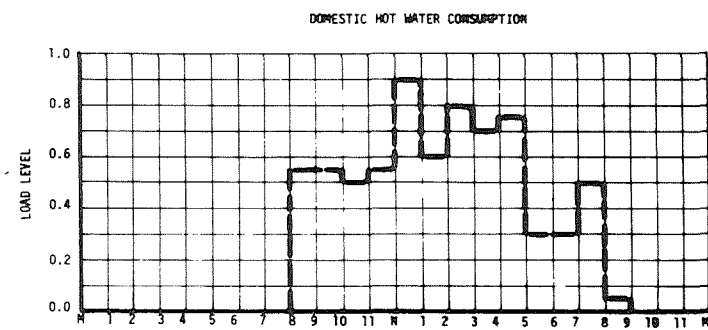
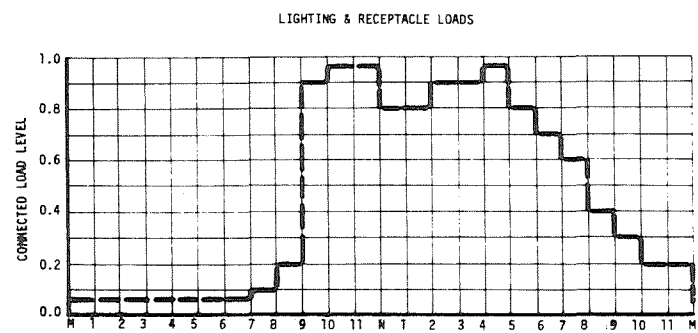
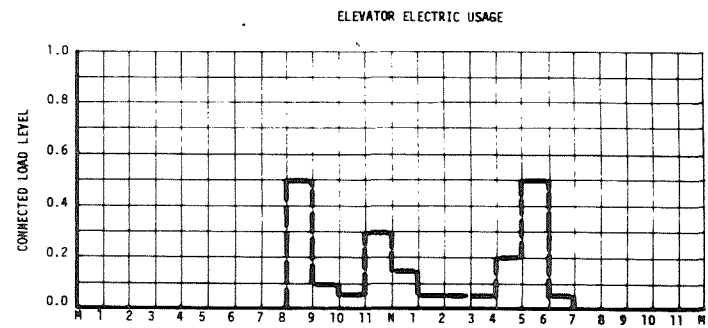
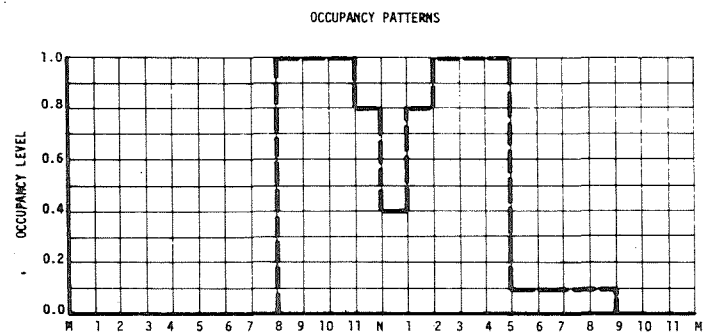


Figure 3 - INTERNAL LOAD PROFILES

3.1

SAMPLE LOAD ANALYSIS PROGRAM

INPUT FORMS

SCOUT

LOAD ANALYSIS PROGRAM

job name	
date	PAGE <u>1</u> of <u>26</u>

INPUT FORM LA-01

GENERAL NOTES

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 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.																																			
1234																																			
15 MAY 1977																																			

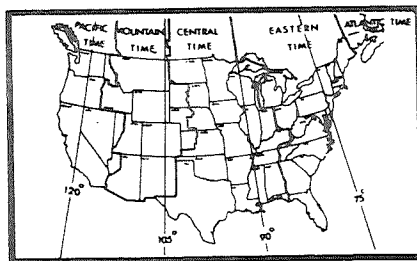
IDENTIFICATION OF ID TERMS		Card Index
FACILITY NAME		L 1
FACILITY LOCATION		L 2
USER ID		L 3
PROJECT NUMBER		L 4
DATE		L 5

GEOGRAPHIC PARAMETERS

Latitude (DEG)										Longitude (DEG)										Time Zone Number										Clearness Number (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	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	70	71	72	73	74	75	76	77	78	79	80
42.										87.										6.										.98										.98										0.										L 6																			

JOB CONTROL PARAMETERS

Job Processing Code(CODE)										Ventilation Air Rate (cfm/sq.ft.)										Estimated Total Fan Pressure (in.H ₂ O)										Zone Cold Air Supply Temp. - Option 1 (°F)										Zone Cold Air Supply Temp. - Option 2 (°F)										Zone Hot Air Supply Temp. - Option 1 (°F)										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	70	71	72	73	74	75	76	77	78	79	80
2.										.05										4.										55.										58.										110.										130.										L 7									



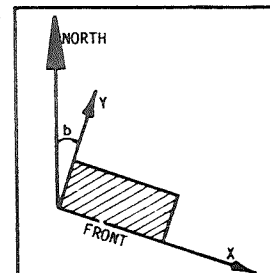
TIME ZONES IN THE UNITED STATES

TIME ZONE NUMBERS IN U.S. FOR STANDARD TIME

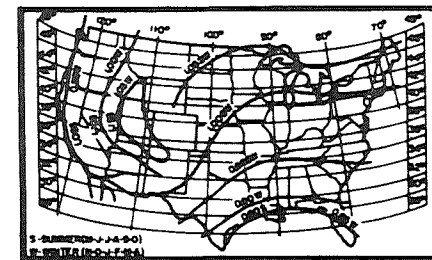
TIME ZONE	NUMBER
Atlantic	4.0
Eastern	5.0
Central	6.0
Mountain	7.0
Pacific	8.0

JOB PROCESSING CODE

- 1.0 - Design Load Analysis only
- 2.0 - Design Load & Hourly Load Analysis
- 3.0 - Hourly Load Analysis Only.



Building Azimuth Angle (b)



CLEARNESS NUMBERS OF NON-INDUSTRIAL ATMOSPHERE IN UNITED STATES

[illegible]

[illegible]

INPUT FORM LA-05

DELAYED SURFACES

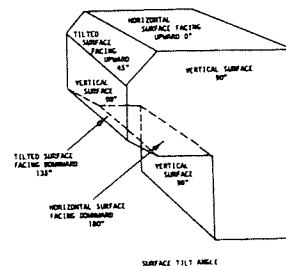
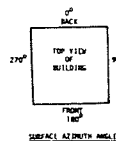
[illegible]

NOTE: REPEAT CARD TYPE L14A FOR EACH DELAYED SURFACE.

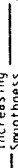
[illegible]

NOTES:

1. Similar surface feature can be used when a reference surface described previously has identical surface properties.
2. 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.
3. Azimuth and Tilt angles must always be entered.
4. Infiltration flow coefficient required only when using crack infiltration.



CODE FOR EXTERIOR SURFACE FINISH

CODE	SURFACE FINISH	EXAMPLE	
		WALL	ROOF
1	Rough	• Stucco	• Wood Shingles • Built-up Roof with Stones
2	 Increasing Smoothness	• Brick	
3		• Plaster	
4		• Concrete	• Asphalt Shingles
5		• Clear Pine	
6		• Smooth Plaster • Metal	• Metal
6	Smooth	• Glass • Paint on Pine	

SCOUT

LOAD ANALYSIS PROGRAM

job name	
date	PAGE <u>11</u> OF <u>26</u>

SPACES

INPUT FORM LA -10

Number of Spaces										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	70	71	72	73	74	75	76	77	78	79	80										
16.										L 2 1																																																																															

NOTE: CARD TYPE L21 SHOULD APPEAR ONLY ONCE.

SPACE DESCRIPTION

SPACE NO. 1 LABEL 1ST.FL-S.

NOTE: REPEAT THIS INPUT FORM FOR EACH SPACE.

Space Floor Area (FT ²)										Space Volume (FT ³)										Weight of Floor (LB/FT ²)										Space Temperature (°F)										Include in bldg load? a plenum? (0=NO 1=YES)										Label (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	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	70	71	72	73	74	75	76	77	78	79	80
2510.										21335.										47.										72.										1.										0.										FLOOR 1 - SOUTH										L 2 1 A									

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	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	70	71	72	73	74	75	76	77	78	79	80
25.										450.										1.										L 2 1 B																																																	

Type of Light Fixture (1. - 4.)										Fraction of Light Heat to Space										Lighting Load (WATTS/FT ²) (KW)										Operating Schedule No.										LIGHT FIXTURE CODE 1. Not vented 2. Vented to ret. air 3. Vented to sup. & ret. air 4. Incandescent										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	70	71	72	73	74	75	76	77	78	79	80
1.										.7										3.5										2.										L 2 1 C																																							

Miscellaneous Electrical and thermal loads (WATTS/FT ²) (KW)										(BTU/HR-Sensible) (BTU/HR-Latent)										Operating Schedule 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	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
.42																				2.										L 2 1 D																																																	

Type of Infiltration Analysis (0.-2.)										Infiltration Rate (No. of Air Changes)										Height above (-) or below Neutral Zone (FT)										Space Exhaust Air (CFM)										INFILTRATION CODE 0. None 1. Air change method (columns 11-20 req'd) 2. Crack method (columns 21-40 req'd)										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	70	71	72	73	74	75	76	77	78	79	80
1.										.125																														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	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	70	71	72	73	74	75	76	77	78	79	80
2.										1.										1.										1.										1.										L 2 1 F																													

INDICES OF SPACE SURFACES										<ul style="list-style-type: none"> • Delayed _____ L21G • Quick _____ L21H • Glazed _____ L21I 										<ul style="list-style-type: none"> • Internal _____ L21J • Underground Walls _____ L21K • Underground Floors _____ L21L 										Card Index																																																											
<ul style="list-style-type: none"> • Begin new card for each surface type. • If a surface type is not included, skip that card index type. 																																																																																									

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	70	71	72	73	74	75	76	77	78	79	80																				
1.										1.																																																																																									
1.																																																																																																			
1.																																																																																																			

16

3.2

SAMPLE TEMPERATURE ANALYSIS PROGRAM

INPUT FORMS

THERMOSTAT SCHEDULES

NOTE: REPEAT THIS FORM FOR EACH THERMOSTAT SCHEDULE. CARD V17 REQUIRED ONLY ONCE.

INPUT FORM TV-05

[illegible]

THERMOSTAT
SCHEDULE NO. 1 LABEL TYPICAL

WEEK DAY SCHEDULE

[illegible]



WEEKEND AND HOLIDAY SCHEDULE

NOTE: ALL CARD TYPES V18 INDICATED ABOVE ARE REQUIRED INPUT DATA.

[illegible]

THERMOSTAT TYPES

NOTE: ALL CARD TYPES V18 INDICATED ABOVE ARE REQUIRED INPUT DATA

<p>0.0 No thermostat in space, temperature allowed to float.</p>	<p>1.0 Linear or Proportional Control</p> 	<p>2.0 High/Low or On/Off Control</p> 
--	--	---



INPUT FORM TV -06

[illegible]

* Varies from 1 to 24.

3.3

SAMPLE SYSTEMS ANALYSIS PROGRAM

INPUT FORMS

SCOUT

SYSTEMS ANALYSIS PROGRAM

job name	
date	PAGE <u>5</u> OF <u>9</u>
PERIMETER 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 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 70 71 72 73 74 75 76 77 78 79 80						
3.	12.	30.	3760.	2.		S 7 A

TEMPERATURE CONTROL MODES		TOTAL FAN PRESSURES (IN. H ₂ O)			Variable Volume Reheat Coil Option	Variable Volume Box Min. Air (%)	Card Index
Hot Deck or AMU Discharge	Cold Deck	Supply	Return	Exhaust			
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 70 71 72 73 74 75 76 77 78 79 80							
6.	2.	4.	1.5	1.0			S 7 B

FIXED AIR TEMPERATURES (°F)		TEMPERATURE RESET SCHEDULE INDICES			Two-Pipe N.W. Schedule	Induction Unit Induced/Primary Air Ratio	Card Index
Hot Deck or AMU Discharge	Cold Deck	Hot Deck Schedule or AMU Discharge Schedule	Cold Deck Schedule	Baseboard Radiation Schedule			
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 70 71 72 73 74 75 76 77 78 79 80							
							S 7 C

Two-pipe Fan-Coil Changeover Temp. (°F)	2-Pipe ind. change-over or Fir. panel shutoff temp. (°F)	Two-pipe System Water Volume (GALS)	Floor Heating Panel Location	Floor Heating Panel Area Covered (FT ²)	Exposed Perimeter (Lin. FT.)	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 70 71 72 73 74 75 76 77 78 79 80						
						S 7 D

Fan System Shut-off Code	Ventilation Schedule Operating No.	HEAT RECOVERY DEVICE EFFICIENCY		DX or Heat Pump Index No.	Card Index
		Sensible Heat	Latent Heat		
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 70 71 72 73 74 75 76 77 78 79 80					
2.					S 7 E

DISTRIBUTION SYSTEM TYPES

- Single Zone Fan System With Face And By-Pass Dampers.
- Multi-Zone Fan System.
- Dual Duct Fan System.
- Single Zone Fan System With Sub-Zone Reheat.
- Unit Ventilator.
- Unit Heater.
- Floor Panel Heating.
- Two-Pipe Fancoil System.
- Four-Pipe Fancoil System.
- Two-Pipe Induction Unit Fan System.
- Four-Pipe Induction Unit Fan System.
- Variable Volume Fan System With Optional Reheat.
- Constant Volume Reheat Fan System.

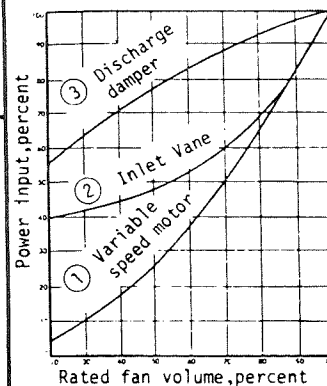
MIXED AIR OPTION CODE

- Fixed Percent Outside Air.
- Enth.Temp.Econo.Control.
- Temp.Econo.Control.

TEMPERATURE CONTROL MODES

- Predefined constant temp.
- Determined by zone with coldest supply air reqmt.
- Reset as per reset schedule
- Determined by zone with warmest supply air reqmt.

VARIABLE VOLUME FAN CONTROL CODE



VARIABLE VOLUME REHEAT COIL OPTION CODE

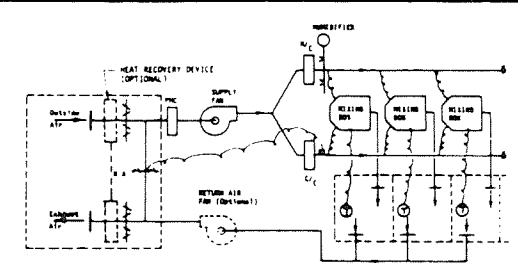
- No coil after vav box.
- Reheat coil after vav box.



FLOOR HEATING PANEL LOCATION CODE

- Slab on grade
- Intermediate floor slab.

FAN SYSTEM SHUT-OFF CODE

- Fan always runs
- Fan may be shut-off/baseboard heating may be on.
- Fan and baseboard heating may be shut-off.
- Fan always shut off, baseboard heating may be on.



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

3.4

SAMPLE COST ANALYSIS PROGRAM

INPUT FORMS

SCOUT

COST ANALYSIS PROGRAM

job name _____	
date _____	PAGE ____ OF ____

INPUT FORM CA-01

GENERAL NOTES

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 IDENTIFICATION

(Alpha-numeric data may be entered on card types C1 through C5.)

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	
E	X	A	M	P	L	E	B	U	I	L	D	I	N	G																						
C	H	I	C	A	G	O	,	I	L	L	.																									
G	A	R	D	,	I	N	C	.																												
8	7	1	9	-	7	0	0	0																												
N	D	V	1	6	1	9	7	6																												

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

	Card Index
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
	C 1
	C 2
	C 3
	C 4
	C 5

BUILDING LIFE AND COST ESCALATION FACTORS

Building Life (Yrs.)(1-60)	Annual Interest Rate (%)	Annual Increase Of Labor Cost (%)	Annual Increase Of Material 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 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 70	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 70	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 70	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 70	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 70	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 70	71 72 73 74 75 76 77 78 79 80
40.	12.	8.	15.	10.	10.	C 6

CASE STUDIES

No. Cases To Be Analyzed (1-5)	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 70	71 72 73 74 75 76 77 78 79 80
2.	C 7

NOTE: REPEAT CARD TYPES C8 THROUGH C10B FOR EACH CASE TO BE ANALYZED.

[illegible]

SCOUT
COST ANALYSIS PROGRAM

job name	
date	PAGE ____ OF ____

INPUT FORM CA -04

CASE NO. 1 CONTINUED

EQUIPMENT CATEGORIES

NOTE: REPEAT CARD TYPES C10A AND C10B FOR EACH EQUIPMENT CATEGORY SPECIFIED ON CARD TYPE C9.

EQUIPMENT CATEGORY NO. 1

Equipment Label (Alphanumeric)																														Installed Cost (\$)										Expected Life (Yrs.)										Salvage Value? (0.=No, 1.=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	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	70	71	72	73	74	75	76	77	78	79	80										
COOLING SIDE EQUIP.																														90000.										90.										1.										10.										C10A																			
ANNUAL MAINTENANCE																														MAJOR OVERHAUL										Occupied Floor Space Cost (\$)																				Card Index																													
Labor (\$)															Material (\$)															Labor (\$)															Material (\$)																																			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	70	71	72	73	74	75	76	77	78	79	80										
18000.															9000.															900.															225.															8000.																				C10B									

EQUIPMENT CATEGORY NO. 2

Equipment Label (Alphanumeric)																														Installed Cost (\$)										Expected Life (Yrs.)										Salvage Value? (0.=No, 1.=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	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	70	71	72	73	74	75	76	77	78	79	80										
HEATING SIDE EQUIP.																														20000.										90.										1.										10.										C10A																			
ANNUAL MAINTENANCE																														MAJOR OVERHAUL										Occupied Floor Space Cost (\$)																				Card Index																													
Labor (\$)															Material (\$)															Labor (\$)															Material (\$)																																			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	70	71	72	73	74	75	76	77	78	79	80										
1000.															1000.															200.															50.															2000.																				C10B									

EQUIPMENT CATEGORY NO. 3

Equipment Label (Alphanumeric)																														Installed Cost (\$)										Expected Life (Yrs.)										Salvage Value? (0.=No., 1.=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	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	70	71	72	73	74	75	76	77	78	79	80										
AIR SIDE EQUIP.																														200000.										90.										1.										10.										C10A																			
ANNUAL MAINTENANCE																														MAJOR OVERHAUL										Occupied Floor Space Cost (\$)																				Card Index																													
Labor (\$)															Material (\$)															Labor (\$)															Material (\$)																																			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	70	71	72	73	74	75	76	77	78	79	80										
10000.															10000.															2000.															500.															10000.																				C10B									

EQUIPMENT CATEGORY NO. _____

Equipment Label (Alphanumeric)																														Installed Cost (\$)										Expected Life (Yrs.)										Salvage Value? (0.=No., 1.=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	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	70	71	72	73	74	75	76	77	78	79	80										
																																																																						C10A																			
ANNUAL MAINTENANCE																														MAJOR OVERHAUL										Occupied Floor Space Cost (\$)																				Card Index																													
Labor (\$)															Material (\$)															Labor (\$)															Material (\$)																																			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	70	71	72	73	74	75	76	77	78	79	80										
																																																																	C10B																								

4.1

SELECTED OUTPUT FROM
LOAD ANALYSIS PROGRAM/DESIGN LOAD RUN

18790.0 SQ FT FLOOR AREA
 0.0 CU FT VOLUME
 24.0 LBS/SQ FT FLOOR WEIGHT
 72.0 F TEMPERATURE
 1.0 BUILDING LOAD SUMMATION OPTION
 1.0 SPACE/PLENUM INDICATOR

PEOPLE
 0.0 PERSONS
 0.0 RTU/HR ACTIVITY LEVEL
 1.0 SCHEDULE INDEX

LIGHTING
 1.00 TYPE OF LIGHTING FIXTURE
 0.00 FRACTION OF LIGHT HEAT TO SPACF
 0.00 WATTS/SQ FT
 0.00 KW
 2.00 SCHEDULE INDEX

EQUIPMENT
 0.00 WATTS/SQ FT
 0.00 KW
 0.00 RTU/HR SENSIBLE
 0.00 RTU/HR LATENT
 2.00 SCHEDULE INDEX

INFILTRATION
 0.00 INFILTRATION CODE
 0.00 INFILTRATION RATE
 0.00 WEIGHT FROM NEUTRAL ZONE
 0.00 EXHAUST AIR FLOW

SPACE ENVELOPE INCLUDES
 5 DELAYED H.T.S.
 0 QUICK H.T.S.
 0 WINDOW H.T.S.
 5 INTERNAL H.T.S.
 0 UNDERGROUND WALLS
 0 UNDERGROUND FLOORS
 0 ADDITIONAL IDENTICAL SPACES

INDICES OF DELAYED SURFACE
 5 6 7 8 9

INDICES OF INTERNAL H.T. SURFACES
 13 14 15 16 17

SUMMARY BY MONTH OF DESIGN DAY WEATHER GENERATED FOR USE IN HEATING AND COOLING CALCULATIONS

SUMMER DAY INPUT PARAMETERS

1. MONTH ASSUMED TO BE JULY OR AUGUST
 2. MAXIMUM DRY-BULB TEMPERATURE = 92.
 3. DAILY SWING OF DRY-BULB TEMPERATURE = 20.
 4. AVERAGE DEW-POINT TEMPERATURE = 70.
 5. AVERAGE WIND SPEED = 5.

WINTER DAY INPUT PARAMETERS

1. MONTH ASSUMED TO BE DECEMBER
 2. MINIMUM DRY-BULB TEMPERATURE = 1.
 3. DAILY SWING OF DRY-BULB TEMPERATURE = 5.
 4. AVERAGE DEW-POINT TEMPERATURE = -5.
 5. AVERAGE WIND SPEED = 15.

		1	2	3	4	5	A.M.	6	7	8	9	10	11	12		1	2	3	4	5	P.M.	6	7	8	9	10	11	12
MARCH																												
	DBT	45.	44.	43.	43.	43.	45.	47.	49.	51.	53.	55.	58.	60.	62.	63.	62.	61.	60.	58.	56.	54.	52.	49.	47.			
	WBT	42.	41.	40.	40.	40.	42.	44.	46.	48.	50.	52.	55.	57.	59.	60.	59.	58.	57.	55.	53.	51.	49.	46.	44.			
APRIL																												
	DBT	55.	54.	53.	53.	53.	55.	57.	59.	61.	63.	65.	68.	70.	72.	73.	72.	71.	70.	68.	66.	64.	62.	59.	57.			
	WBT	52.	51.	50.	50.	50.	52.	54.	56.	58.	60.	62.	64.	66.	68.	66.	65.	65.	64.	63.	61.	59.	56.	54.				
MAY																												
	DBT	64.	63.	62.	62.	62.	64.	66.	68.	70.	72.	74.	77.	79.	81.	82.	81.	80.	79.	77.	75.	73.	71.	68.	66.			
	WBT	61.	60.	59.	59.	59.	61.	63.	65.	67.	68.	69.	70.	70.	70.	70.	70.	70.	70.	69.	69.	68.	67.	65.	63.			
JUNE																												
	DBT	71.	70.	69.	69.	69.	71.	73.	75.	77.	79.	81.	84.	86.	88.	89.	88.	87.	86.	84.	82.	80.	78.	75.	73.			
	WBT	69.	67.	66.	66.	66.	68.	69.	70.	70.	71.	71.	72.	73.	74.	75.	74.	73.	73.	72.	72.	71.	71.	70.	69.			
JULY																												
	DBT	74.	73.	72.	72.	72.	74.	76.	78.	80.	82.	84.	87.	89.	91.	92.	91.	90.	89.	87.	85.	83.	81.	78.	76.			
	WBT	71.	70.	69.	69.	69.	71.	71.	72.	72.	73.	73.	74.	75.	76.	76.	75.	75.	75.	74.	74.	73.	73.	72.	71.			
AUGUST																												
	DBT	74.	73.	72.	72.	72.	74.	76.	78.	80.	82.	84.	87.	89.	91.	92.	91.	90.	89.	87.	85.	83.	81.	78.	76.			
	WBT	71.	70.	69.	69.	69.	71.	71.	72.	72.	73.	73.	74.	75.	76.	76.	75.	75.	75.	74.	74.	73.	73.	72.	71.			
SEPTEMBER																												
	DBT	69.	67.	66.	66.	66.	68.	70.	72.	74.	76.	78.	81.	83.	85.	86.	85.	84.	83.	81.	79.	77.	75.	72.	70.			
	WBT	65.	64.	63.	63.	63.	65.	67.	69.	70.	70.	71.	71.	72.	73.	73.	72.	72.	72.	71.	70.	70.	69.	67.	65.			
OCTOBER																												
	DBT	59.	57.	56.	56.	56.	58.	60.	62.	64.	66.	68.	71.	73.	75.	76.	75.	74.	73.	71.	69.	67.	65.	62.	60.			
	WBT	55.	54.	53.	53.	53.	55.	57.	59.	61.	63.	65.	66.	67.	67.	68.	67.	67.	67.	66.	65.	64.	62.	59.	57.			
NOVEMBER																												
	DBT	49.	47.	46.	46.	46.	48.	50.	52.	54.	56.	58.	61.	63.	65.	66.	65.	64.	63.	61.	59.	57.	55.	52.	50.			
	WBT	45.	44.	43.	43.	43.	45.	47.	49.	51.	53.	55.	58.	60.	61.	62.	61.	61.	60.	58.	56.	54.	52.	49.	47.			
DECEMBER																												
	DBT	2.	2.	1.	1.	1.	1.	1.	2.	3.	4.	4.	5.	6.	6.	6.	6.	6.	5.	5.	4.	4.	4.	3.	3.			
	WBT	-1.	-1.	-2.	-2.	-2.	-2.	-2.	-1.	-0.	1.	1.	2.	3.	3.	3.	3.	2.	2.	1.	1.	1.	0.	-0.				

NOTE - TEMPERATURE CORRECTION FACTORS BASED ON
 CARRIER SYSTEM DESIGN MANUAL PGS. 1-18, 19.
 WBT IS SET AT LEAST 3 DEG. F BELOW DBT.

SPACE NOS. 1 THRU 16
TOTAL FLOOR AREA (SQ.FT.) 225480.
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 LOAD
	SENSIBLE (BTUH)	LATENT (BTUH)
WALLS	134732.	0.
CEILINGS	70758.	0.
WINDOW CONDUCTANCE	374283.	0.
WINDOW SOLAR	905837.	0.
QUICK SURFACES	0.	0.
INTERNAL SURFACES	0.	0.
UNDERGROUND WALLS	0.	0.
UNDERGROUND FLOORS	-20669.	0.
OCCUPANTS	609209.	338584.
LIGHT TO SPACE	1569140.	0.
EQUIPMENT TO SPACE	283005.	0.
INFILTRATION	9408.	14806.
SUBTOTAL	3935702.	353390.
RETURN AIR	672484.	0.
FAN HEAT	388094.	0.
VENTILATION AIR	212003.	320706.
TOTAL	5208288.	674096.

TOTAL BUILDING COOLING 5882384. BTUH 490.2 TONS
TOTAL BUILDING HEATING -2651830. BTUH 2651.8 MAH

	***** VARIABLE VOLUME SYSTEM *****	***** CONSTANT VOLUME SYSTEM *****
SUPPLY AIR AT 55 F AT DIFFUSER	233917. CFM 1.04 CFM/SQ.FT. MAX.	241713. CFM 1.07 CFM/SQ.FT. CONST.
SUPPLY AIR AT 58 F AT DIFFUSER	204042. CFM 1.26 CFM/SQ.FT. MAX.	293509. CFM 1.30 CFM/SQ.FT. CONST.
SUPPLY AIR AT 110 F AT DIFFUSER	45484. CFM .20 CFM/SQ.FT. MAX.	45651. CFM .20 CFM/SQ.FT. CONST.
SUPPLY AIR AT 130 F AT DIFFUSER	29880. CFM .13 CFM/SQ.FT. MAX.	29909. CFM .13 CFM/SQ.FT. CONST.

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

SPACE NO.	HEATING EXTRACTION RATE (BTU/HR)	COOLING EXTRACTION RATE (BTU/HR)
1	-67794.	76846.
2	-19035.	30308.
3	-71495.	59213.
4	-19431.	26484.
5	-26441.	123077.
6	-61268.	77687.
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

SPACE NO.	1		
SPACE REPETITION FACTOR	1		
AREA (SQ.FT.)	2510.		
VOLUME (CU.FT.)	21335.		
SUMMER COOLING PEAK DBT/WBT/HR OF DAY/DATE	89 / 72 / 14 / AUG. 29		
WINTER HEATING PEAK DBT/WBT/HR OF DAY/DATE	-13 / -13 / 7 / JAN. 15		
***** SUMMER LOAD *****			
	SENSIBLE (BTUH)	LATENT (BTUH)	WINTER LOAD (BTUH)
WALLS	5628.	0.	-9455.
CEILINGS	0.	0.	0.
WINDOW CONDUCTANCE	10540.	0.	-43439.
WINDOW SOLAR	55881.	0.	2768.
QUICK SURFACES	0.	0.	0.
INTERNAL SURFACES	0.	0.	0.
UNDERGROUND WALLS	0.	0.	0.
UNDERGROUND FLOORS	-2008.	0.	-7781.
OCCUPANTS	5307.	3018.	121.
LIGHT TO SPACE	14403.	0.	2074.
EQUIPMENT TO SPACE	2620.	0.	291.
INFILTRATION	525.	600.	-5469.
	-----	-----	-----
TOTAL	92896.	3617.	-A0892.
TOTAL SPACE COOLING	96514. BTUH		
TOTAL SPACE HEATING	-A0892. BTUH		
SUPPLY AIR AT 55 F AT DIFFUSER	5558. CFM		2.21 CFM/SQ.FT.
SUPPLY AIR AT 58 F AT DIFFUSER	6749. CFM		2.69 CFM/SQ.FT.
SUPPLY AIR AT 110 F AT DIFFUSER	1658. CFM		.66 CFM/SQ.FT.
SUPPLY AIR AT 130 F AT DIFFUSER	1086. CFM		.43 CFM/SQ.FT.

SPACE NO.	2		
SPACE REPETITION FACTOR	1		
AREA (SQ.FT.)	620.		
VOLUME (CU.FT.)	5270.		
SUMMER COOLING PEAK DBT/WBT/HR OF DAY/DATE	95 / 81 / 17 / JULY 21		
WINTER HEATING PEAK DBT/WBT/HR OF DAY/DATE	-15 / -15 / 10 / JAN. 15		
***** SUMMER LOAD *****			
	SENSIBLE (BTUH)	LATENT (BTUH)	WINTER LOAD (BTUH)
WALLS	1554.	0.	-2692.
CEILINGS	0.	0.	0.
WINDOW CONDUCTANCE	4410.	0.	-18079.
WINDOW SOLAR	15877.	0.	811.
QUICK SURFACES	0.	0.	0.
INTERNAL SURFACES	0.	0.	0.
UNDERGROUND WALLS	0.	0.	0.
UNDERGROUND FLOORS	-682.	0.	-1922.
OCCUPANTS	1629.	905.	16.
LIGHT TO SPACE	4315.	0.	399.
EQUIPMENT TO SPACE	778.	0.	60.
INFILTRATION	172.	363.	-1606.
	-----	-----	-----
TOTAL	28054.	1268.	-23014.
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 CFM/SQ.FT.
SUPPLY AIR AT 110 F AT DIFFUSER	472. CFM		.76 CFM/SQ.FT.
SUPPLY AIR AT 130 F AT DIFFUSER	309. CFM		.50 CFM/SQ.FT.

SPACE NOS. 1 THRU 16
TOTAL FLOOR AREA (SQ.FT.) 225480.
TOTAL VOLUME (CU.FT.) 1916580.
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

	***** SUMMER LOAD *****		WINTER
	SENSIBLE (BTUH)	LATENT (BTUH)	LOAD (BTUH)
WALLS	113312.	0.	-290329.
CEILINGS	60068.	0.	-112287.
WINDOW CONDUCTANCE	489893.	0.	-1442131.
WINDOW SOLAR	757806.	0.	41006.
GLASS SURFACES	0.	0.	0.
INTERNAL SURFACES	0.	0.	0.
UNDERGROUND WALLS	0.	0.	0.
UNDERGROUND FLOORS	-20669.	0.	-48249.
OCCUPANTS	609209.	338584.	4196.
LIGHT TO SPACE	1569140.	0.	72407.
EQUIPMENT TO SPACE	283005.	0.	10156.
INFILTRATION	20871.	43993.	-143688.
	-----	-----	-----
SUBTOTAL	3882634.	382577.	-2448919.
RETURN AIR	672488.	0.	1032.
FAN HEAT	404925.	0.	404925.
VENTILATION AIR	254934.	531301.	-1210400.
	-----	-----	-----
TOTAL	5214981.	913878.	-3243362.

TOTAL BUILDING COOLING 6128859. BTUH 510.7 TONS
TOTAL BUILDING HEATING -3253362. BTUH 3253.4 MBH

	***** VARIABLE VOLUME SYSTEM *****		***** CONSTANT VOLUME SYSTEM *****	
SUPPLY AIR AT 55 F AT DIFFUSER	232304. CFM	1.03 CFM/SQ.FT. MAX.	252195. CFM	1.12 CFM/SQ.FT. CONST.
SUPPLY AIR AT 58 F AT DIFFUSER	282083. CFM	1.25 CFM/SQ.FT. MAX.	306237. CFM	1.36 CFM/SQ.FT. CONST.
SUPPLY AIR AT 110 F AT DIFFUSER	50398. CFM	.22 CFM/SQ.FT. MAX.	51451. CFM	.23 CFM/SQ.FT. CONST.
SUPPLY AIR AT 130 F AT DIFFUSER	33019. CFM	.15 CFM/SQ.FT. MAX.	33709. CFM	.15 CFM/SQ.FT. CONST.

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

SPACE NO.	HEATING EXTRACTION RATE (BTU/HR)	COOLING EXTRACTION RATE (BTU/HR)
1	-80892.	92896.
2	-23014.	28054.
3	-85293.	59630.
4	-22765.	23725.
5	-36465.	126836.
6	-73111.	94904.
7	-21092.	28736.
8	-77512.	62391.
9	-20843.	24407.
10	0.	136860.
11	-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

SPACE TEMPERATURE FREQUENCY DISTRIBUTION SUMMARY

	T E M P E R A T U R E O C C U R R E N C E B A N D S (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	0	401	678	938	1106	3352	1174	880	230	23	2	0	0	0	0	0	0
3	0	443	783	1054	1321	3700	1344	139	0	0	0	0	0	0	0	0	0
4	0	416	700	1020	1184	3480	1342	475	142	25	0	0	0	0	0	0	0
5	0	0	0	443	1118	5026	2197	0	0	0	0	0	0	0	0	0	0
6	0	44	111	403	1187	4247	2018	665	103	6	0	0	0	0	0	0	0
7	0	206	315	822	1256	3517	1267	1065	275	56	5	0	0	0	0	0	0
8	0	223	307	991	1445	3868	1679	264	7	0	0	0	0	0	0	0	0
9	0	217	330	894	1330	3670	1495	578	210	60	0	0	0	0	0	0	0
10	0	0	0	0	127	4062	4595	0	0	0	0	0	0	0	0	0	0
11	0	43	135	505	1383	4188	1945	538	47	3	0	0	0	0	0	0	0
12	0	172	284	943	1355	3516	1361	958	176	19	0	0	0	0	0	0	0
13	0	186	314	1081	1515	3816	1667	205	0	0	0	0	0	0	0	0	0
14	0	166	313	991	1431	3653	1548	524	141	17	0	0	0	0	0	0	0
15	0	0	0	84	764	4943	2993	0	0	0	0	0	0	0	0	0	0
16	0	25	250	1414	2808	2347	1905	35	0	0	0	0	0	0	0	0	0

NOTE - ACTUAL SPACE TEMPERATURES ARE ROUNDED
TO NEAREST WHOLE DEGREE BEFORE BEING
PLACED INTO PROPER TEMPERATURE OCCURRENCE
BAND.

SUMMARY OF VARIABLE TEMPERATURE LOAD CALCULATIONS

SCOUT SAMPLE BUILDING - CHICAGO, ILLINOIS										
SPACE NO.	*****HEATING*****			*****COOLING*****			***LOWEST SPACE TEMP.***		***HIGHEST SPACE TEMP.***	
	MAX. HEAT ADDITION (BTU/HR)	HOUR/DAY/MO		MAX. HEAT EXTRACTED (BTU/HR)	HOUR/DAY/MO		TEMP. (F)	HOUR/DAY/MO	TEMP. (F)	HOUR/DAY/MO
1	-67794.	7/ 3/ 1		74846.	13/21/ 7		50.0	7/15/ 1	91.0	14/17/ 9
2	-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/ 8
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
8	-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		61.1	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

SUMMARY OF ENERGY DISTRIBUTION SYSTEM CHARACTERISTICS.

SYSTEM NO.	TYPE	***** TOTAL SUPPLY	FAN HP RETURN	***** EXHAUST	NO. OF ZONES	**TOTAL SUPPLY	SYSTEM AIR FLOWS (CFM)** MIN.O.A.	EXH. SYSTEM	PER-CENT MIN.O.A.
1	VAVS	64.3	22.1	1.3	3	86727.	7515.	7200.	8.7
2	ONS	93.1	34.9	0.0	12	125583.	3760.	0.	3.0

SUMMARY OF ZONE AIR FLOWS

FAN SYSTEM	ZONE NUMBER	LOAD SPACE NUMBER	MULTI FACTOR	SUPPLY CFM	EXHAUST CFM	SET POINT TEMP.
1	1	5	1	6404.	600.	72.
1	2	10	10	7302.	600.	72.
1	3	15	1	7302.	600.	72.
2	1	1	1	3993.	0.	72.
2	2	2	1	1462.	0.	72.
2	3	3	1	3087.	0.	72.
2	4	4	1	1413.	0.	72.
2	5	6	10	4141.	0.	72.
2	6	7	10	1653.	0.	72.
2	7	6	10	3307.	0.	72.
2	8	9	10	1449.	0.	72.
2	9	11	1	3997.	0.	72.
2	10	12	1	1508.	0.	72.
2	11	13	1	3220.	0.	72.
2	12	14	1	1400.	0.	72.

AUG	2	1	1	0.	0.	0	0.	0.	0
AUG	2	2	1	0.	0.	0	0.	0.	0
AUG	2	3	1	0.	0.	0	0.	0.	0
AUG	2	4	1	0.	0.	0	0.	0.	0
AUG	2	5	10	0.	0.	0	0.	0.	0
AUG	2	6	10	0.	0.	0	0.	0.	0
AUG	2	7	10	0.	0.	0	0.	0.	0
AUG	2	8	10	0.	0.	0	0.	0.	0
AUG	2	9	1	0.	0.	0	0.	0.	0
AUG	2	10	1	0.	0.	0	0.	0.	0
AUG	2	11	1	0.	0.	0	0.	0.	0
AUG	2	12	1	0.	0.	0	0.	0.	0
AUG	2	CHILLERS AND BOILERS		0.	0.	0	0.	0.	0
SEPT	1	1	1	0.	0.	0	0.	0.	0
SEPT	1	2	10	0.	0.	0	0.	0.	0
SEPT	1	3	1	0.	0.	0	0.	0.	0
SEPT	2	1	1	0.	0.	0	0.	0.	0
SEPT	2	2	1	0.	0.	0	0.	0.	0
SEPT	2	3	1	0.	0.	0	0.	0.	0
SEPT	2	4	1	0.	0.	0	0.	0.	0
SEPT	2	5	10	0.	0.	0	0.	0.	0
SEPT	2	6	10	0.	0.	0	0.	0.	0
SEPT	2	7	10	0.	0.	0	0.	0.	0
SEPT	2	8	10	0.	0.	0	0.	0.	0
SEPT	2	9	1	0.	0.	0	0.	0.	0
SEPT	2	10	1	0.	0.	0	0.	0.	0
SEPT	2	11	1	0.	0.	0	0.	0.	0
SEPT	2	12	1	0.	0.	0	0.	0.	0
SEPT	2	CHILLERS AND BOILERS		0.	0.	0	0.	0.	0
OCT	1	1	1	0.	0.	0	0.	0.	0
OCT	1	2	10	0.	0.	0	0.	0.	0
OCT	1	3	1	0.	0.	0	0.	0.	0
OCT	2	1	1	0.	0.	0	0.	0.	0
OCT	2	2	1	0.	0.	0	0.	0.	0
OCT	2	3	1	0.	0.	0	0.	0.	0
OCT	2	4	1	0.	0.	0	0.	0.	0
OCT	2	5	10	0.	0.	0	0.	0.	0
OCT	2	6	10	0.	0.	0	0.	0.	0
OCT	2	7	10	0.	0.	0	0.	0.	0
OCT	2	8	10	0.	0.	0	0.	0.	0
OCT	2	9	1	0.	0.	0	0.	0.	0
OCT	2	10	1	0.	0.	0	0.	0.	0
OCT	2	11	1	0.	0.	0	0.	0.	0
OCT	2	12	1	0.	0.	0	0.	0.	0
OCT	2	CHILLERS AND BOILERS		0.	0.	0	0.	0.	0
NOV	1	1	1	0.	0.	0	0.	0.	0
NOV	1	2	10	0.	0.	0	0.	0.	0
NOV	1	3	1	0.	0.	0	0.	0.	0
NOV	2	1	1	0.	0.	0	0.	0.	0
NOV	2	2	1	0.	0.	0	0.	0.	0
NOV	2	3	1	0.	0.	0	0.	0.	0
NOV	2	4	1	0.	0.	0	0.	0.	0
NOV	2	5	10	0.	0.	0	0.	0.	0
NOV	2	6	10	0.	0.	0	0.	0.	0
NOV	2	7	10	0.	0.	0	0.	0.	0
NOV	2	8	10	0.	0.	0	0.	0.	0
NOV	2	9	1	0.	0.	0	0.	0.	0
NOV	2	10	1	0.	0.	0	0.	0.	0
NOV	2	11	1	0.	0.	0	0.	0.	0
NOV	2	12	1	0.	0.	0	0.	0.	0

NOV	CHILLERS AND BOILERS			0.	0.	0	-155A.	-931.	2
DEC	1	1	1	0.	0.	0	0.	0.	0
DEC	1	2	10	0.	0.	0	0.	0.	0
DEC	1	3	1	0.	0.	0	0.	0.	0
DEC	2	1	1	0.	0.	0	0.	0.	0
DEC	2	2	1	0.	0.	0	0.	0.	0
DEC	2	3	1	0.	0.	0	0.	0.	0
DEC	2	4	1	0.	0.	0	0.	0.	0
DEC	2	5	10	0.	0.	0	0.	0.	0
DEC	2	6	10	0.	0.	0	0.	0.	0
DEC	2	7	10	0.	0.	0	0.	0.	0
DEC	2	8	10	0.	0.	0	0.	0.	0
DEC	2	9	1	0.	0.	0	0.	0.	0
DEC	2	10	1	0.	0.	0	0.	0.	0
DEC	2	11	1	0.	0.	0	0.	0.	0
DEC	2	12	1	0.	0.	0	0.	0.	0
DEC	2	CHILLERS AND BOILERS		0.	0.	0	-2426.	-1118.	3

APR	1	1	1	0.	0.	0	0.	0.	0
APR	1	2	10	0.	0.	0	0.	0.	0
APR	1	3	1	0.	0.	0	0.	0.	0
APR	2	1	1	0.	0.	0	0.	0.	0
APR	2	2	1	0.	0.	0	0.	0.	0
APR	2	3	1	0.	0.	0	0.	0.	0
APR	2	4	1	13.	6	0.	0.	0.	0
APR	2	5	10	184.	6	0.	0.	0.	0
APR	2	6	10	130.	6	0.	0.	0.	0
APR	2	7	10	403.	7	0.	0.	0.	0
APR	2	8	10	700.	13	0.	0.	0.	0
APR	2	9	1	16.	4	0.	0.	0.	0
APR	2	10	1	10.	6	0.	0.	0.	0
APR	2	11	1	34.	6	0.	0.	0.	0
APR	2	12	1	63.	13	0.	0.	0.	0
APR	2	CHILLERS AND BOILERS		0.	0	-14275.		10	

SUMMARY OF EQUIPMENT SIZES

TYPE OF CHILLER = HERMETIC CENTRIFUGAL
NO. OF CHILLERS = 2
SIZE OF CHILLERS = 275.0 TONS

TYPE OF BOILER = GAS
NO. OF BOILERS = 2
SIZE OF BOILERS = 3500.0 MBTU

TOTAL HEATING CAPACITY = 7000.0 MBTU
TOTAL COOLING CAPACITY = 540.0 TONS

IF USED, TERMINAL REHEAT ENERGY SAME SOURCE AS BOILER.

COOLING TOWER FAN REQUIREMENT 165000 CFM 1.0 IN. S.P. 30.6 HP

BOILER AUXILIARY HORSEPOWER REQUIREMENT (FAN, BLOWER, PUMP) 1.5 HP

TOTAL FAN PLANT HORSEPOWER FOR BUILDING 215.8 HP

SUMMARY OF FLOW SIZES

LOCATION	TOTAL GPM	TOTAL HEAD (FT)	TOTAL HP
CHILLED WATER	1320.	60.0	39.2
CONDENSER WATER	1650.	60.0	49.0
HEATING WATER	700.	80.0	27.7

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

FACILITY - SCOUT SAMPLER BUILDING		DATE - 15 MAY 1977			
CITY - CHICAGO, ILLINOIS		PROJECT - 1234			
USER - GARD, INC.		SYS. LABEL - CONV.SYS.1			
ENERGY CONSUMPTION					
JAN.	FEB.	MARCH	APRIL	MAY	JUNE
HEATING LOADS					
Bldg. HTG. - FROM CENTRAL PLANT (INCL. AIR SYSTEMS, BASEFDR.HTG., AND STM. HUMIDIFIERS)					
DEMAND (MMH)	-9261.3	-7233.6	-8041.6	-11591.3	-4794.5
CONS. (MBTU)	-652233.0	-511672.6	-468411.8	-295392.5	-142401.2
NET CENTRAL PLANT HEATING LOAD (BLDG.HT + IND.PROC + CHLLR.HT - E/G.HT.)					
DEMAND (MMH)	-7000.0	-7000.0	-7000.0	-7000.0	-4794.5
CONS. (MBTU)	-649971.7	-511439.0	-467370.2	-288649.3	-142401.2
COOLING LOADS					
Bldg. CLG. - FROM CENTRAL CHILLER					
DEMAND (MMH)	0.0	0.0	1460.6	2440.2	3042.4
CONS. (MBTU)	0.0	0.0	9762.2	55248.0	297496.3
ELECTRICITY					
LIGHTS AND BUILDING EQUIPMENT					
INTERNAL					
DEMAND (KW)	839.7	839.7	839.7	839.7	839.7
CONS. (KWH)	214783.2	203999.9	232107.3	205060.5	223445.3
HEAT (INCL. CENT.PLNT.HTG. LOAD, AIR.AUXIL., HOT WATER PUMPS, AND HEATPUMPS)					
DEMAND (KW)	21.8	21.8	21.8	21.8	21.8
CONS. (KWH)	16208.1	15162.4	16208.1	15685.3	16208.1
COOL (INCL. CHILLERS, WATER PUMPS, COOLING TOWER FAN, DX, AND HEATPUMPS)					
DEMAND (KW)	88.6	88.6	146.0	194.6	248.9
CONS. (KWH)	65899.1	61647.5	66281.1	65041.7	79286.8
FANS					
DEMAND (KW)	160.9	160.9	160.9	160.9	160.9
CONS. (KWH)	35851.1	28409.4	30474.4	25288.8	27662.8
PROCESS ELECTRICITY					
DEMAND (KW)	113.9	113.9	113.9	113.9	113.9
CONS. (KWH)	14823.9	14110.0	16235.7	14110.0	15529.4
TOTAL					
DEMAND (KW)	1155.0	1155.1	1206.2	1255.0	1303.9
CONS. (KWH)	347565.4	323337.2	361306.6	325204.2	362332.8

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

FACILITY - SCOUT SAMPLER BUILDING		DATE - 15 MAY 1977				
CITY - CHICAGO, ILLINOIS		PROJECT - 1234				
USER - GARD, INC.		SYS. LABEL - CONV.SYS.1				
ENERGY CONSUMPTION						
JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
HEATING LOADS						
BLDG. HTG. - FROM CENTRAL PLANT (INCL. AIR SYSTEMS, BASEFDR.HTG., AND STM. HUMIDIFIERS)						
DEMAND (MMH)	-1330.8	-1226.2	-1724.5	-4541.3	-7930.9	-8118.4
CONS. (MBTU)	-13641.4	-19141.0	-41565.8	-236380.4	-336297.5	-522417.1
NET CENTRAL PLANT HEATING LOAD (BLDG.HT + IND.PROC + CHLLR.HT - E/G.HT.)						
DEMAND (MMH)	-3130.5	-1226.2	-1724.5	-4541.3	-7000.0	-7000.0
CONS. (MBTU)	-13641.4	-19141.0	-41565.8	-236380.4	-336660.4	-519990.9
COOLING LOADS						
BLDG. CLG. - FROM CENTRAL CHILLER						
DEMAND (MMH)	3746.9	3651.7	3396.7	2700.7	826.3	0.0
CONS. (KBTU)	524351.3	506990.5	415006.0	108130.6	826.3	0.0
ELECTRICITY						
LIGHTS AND BUILDING EQUIPMENT						
INTERNAL						
DEMAND (KW)	839.7	839.7	839.7	839.7	839.7	839.7
CONS. (KWH)	206121.2	232107.3	205060.5	223445.3	213722.6	205060.5
HEAT (INCL. CENT.PLNT.HTG. LOAD, AIR.AUXIL., HOT WATER PUMPS, AND HEATPUMPS)						
DEMAND (KW)	21.8	21.8	21.8	21.8	21.8	21.8
CONS. (KWH)	16208.1	16208.1	15685.3	16208.1	15685.3	16208.1
COOL (INCL. CHILLERS, WATER PUMPS, COOLING TOWER FAN, DX, AND HEATPUMPS)						
DEMAND (KW)	313.5	303.5	284.3	228.6	126.6	88.6
CONS. (KWH)	23576.9	97095.0	84719.2	70706.2	63810.3	65899.1
FANS						
DEMAND (KW)	160.9	160.9	160.9	160.9	160.9	160.9
CONS. (KWH)	25530.7	29407.2	25468.5	27767.7	26354.2	31499.9
PROCESS ELECTRICITY						
DEMAND (KW)	113.9	113.9	113.9	113.9	113.9	113.9
CONS. (KWH)	14110.0	16235.7	14110.0	15529.4	14823.9	14110.0
TOTAL						
DEMAND (KW)	1375.1	1368.1	1345.3	1255.0	1155.1	1155.1
CONS. (KWH)	355563.0	391043.3	345051.4	353652.1	334396.3	332785.6

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

FACILITY - SCOUT SAMPLE BUILDING		DATE - 15 MAY 1977				
CITY - CHICAGO, ILLINOIS		PROJECT - 1234				
USER - GARD, INC.		SYS. LABEL - CONV.SYS.1				
		ENERGY CONSUMPTION				
JAN.	FEB.	MARCH	APRIL	MAY	JUNE	
GAS						
HEAT DEMAND (THERMS/HR)	87.5	87.5	87.5	87.5	61.7	53.6
CONS.(THERMS)	8671.2	6767.9	6292.4	4051.1	2060.1	858.3
TOTAL						
HEAT DEMAND (THERMS/HR)	87.5	87.5	87.5	87.5	61.7	53.6
CONS.(THERMS)	8671.2	6767.9	6292.4	4051.1	2060.1	858.3
PURCHASED STEAM						
OIL						
CITY WATER						
DEMAND (K-GALS/HR)	.8	.5	.6	1.2	.6	.5
CONS. (K-GALS)	16.8	11.6	13.0	18.6	52.3	71.7

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

FACILITY - SCOUT SAMPLE BUILDING		DATE - 15 MAY 1977				
CITY - CHICAGO, ILLINOIS		PROJECT - 1234				
USER - GARD, INC.		SYS. LABEL - CONV.SYS.1				
ENERGY CONSUMPTION						
JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
GAS						
HEAT DEMAND (THERMS/HR)	89.4	18.2	23.4	50.9	87.5	87.5
CONS. (THERMS)	203.5	346.1	715.9	3494.6	4730.2	7027.5
TOTAL						
HEAT DEMAND (THERMS/HR)	89.4	18.2	23.4	50.9	87.5	87.5
CONS. (THERMS)	203.5	346.1	715.9	3494.6	4730.2	7027.5
PURCHASED STEAM						
OIL						
CITY WATER						
DEMAND (K-GAL S/HR)	.6	.6	.5	.4	.6	.7
CONS. (K-GALS)	22.5	91.9	65.0	21.1	6.5	12.8
						463.8

4.5

SELECTED OUTPUT FROM
COST ANALYSIS PROGRAM

SAMPLE PROBLEM NO. 4

***** OPERATING COST SUMMARY *****				
	CONSUMPTION	DEMAND	TOTAL COST	ANNUITY
	(\$)	(\$)	(\$)	(\$)
ELECTRICITY				
BASE POWER + HEATING + COOLING	16376.	7779.	24155.	82771.
			-----	-----
		GRAND TOTALS	24155.	82771.

TOTAL ENERGY PRESENT WORTH 682347.

***** OWNING AND MAINTENANCE COST SUMMARY *****										
	INITIAL	ANTICIPATED	SALVAGE	MAJOR OVERHAUL	ANNUAL MAINTENANCE	FLOOR SPACE	ANNUITY			
	COST	LIFE	CONSID.	PERIOD	LABOR MATERIAL	LABOR MATERIAL	COST			
* COOLING SIDE EQUIP.	80000.	90	YES	20	0. 0.	16000. 8000.	8000.	131653.		
* HEATING SIDE EQUIP.	60000.	90	YES	10	600. 150.	3000. 3000.	2000.	36505.		
* AIR SIDE EQUIP.	200000.	90	YES	10	2000. 500.	10000. 10000.	10000.	133105.		

									TOTAL SYSTEMS AND EQUIPMENT ANNUITY	301263.

TOTAL SYSTEMS AND EQUIPMENT PRESENT WORTH 2483550.

 *TOTAL OWNING AND OPERATING ANNUITY 384034. DOLLARS *

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.

C A S H F L O W A N A L Y S I S
COMPARISON NO. 1

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

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

	***** ANNUAL CASH FLOW *****			
	BASE SYSTEM (\$)	COMPARED SYSTEM (\$)	NET DIFFERENCE (\$)	CUMULATIVE DIFFERENCE (\$)
0	-310000.	-340000.	-30000.	-30000.
1	-108972.	-104040.	4932.	-25067.
2	-120393.	-115025.	5367.	-19700.
3	-133079.	-127240.	5838.	-13861.
4	-147177.	-140831.	6346.	-7515.
5	-162854.	-155961.	6893.	-622.
5.0				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	-415369.	-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	-823883.	-798677.	25206.	206496.
21	-890088.	-867993.	22094.	228591.
22	-994999.	-971636.	23363.	251954.
23	-1112990.	-1088373.	24617.	276571.
24	-1245776.	-1219941.	25834.	302405.
25	-1395300.	-1368314.	26986.	329391.
26	-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.