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NASA Contractor Report 168342

THERMTRAJ: A Fortran Program to Compute the Trajectory and Gas Film Temperatures of Zero Pressure Balloons

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NASA

National Aeronautics and
Space Administration

Goddard Space Flight Center
Wallops Flight Facility
Wallops Island, Virginia 23337

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Compute the Trajectory and Gas Film
Temperatures of Zero Pressure Balloons**

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Prepared Under Contract No. NAS6-3072



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TABLE OF CONTENTS

	Page
SUMMARY	1
INTRODUCTION	1
PROBLEM DESCRIPTION	2
PROGRAM USAGE	8
REFERENCE	32
APPENDIX A - PROGRAM LISTING	33
APPENDIX B - SAMPLE CASE	51

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THERMTRAJ: A FORTRAN PROGRAM TO COMPUTE THE
TRAJECTORY AND GAS AND FILM TEMPERATURES
OF ZERO PRESSURE BALLOONS

By

Walter J. Horn
and
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SUMMARY

A FORTRAN computer program called THERMTRAJ is presented which can be used to compute the trajectory of high altitude scientific zero pressure balloons from launch through all subsequent phases of the balloon flight. In addition, balloon gas and film temperatures can be computed at every point of the flight. The program has the ability to account for ballasting, changes in cloud cover, variable atmospheric temperature profiles, and both unconditional valving and scheduled valving of the balloon gas. The program has been verified for an extensive range of balloon sizes (from 0.5-41.47 million cubic feet). Instructions on program usage, listing of the program source deck, input data deck and printed and plotted output for a verification case are included.

INTRODUCTION

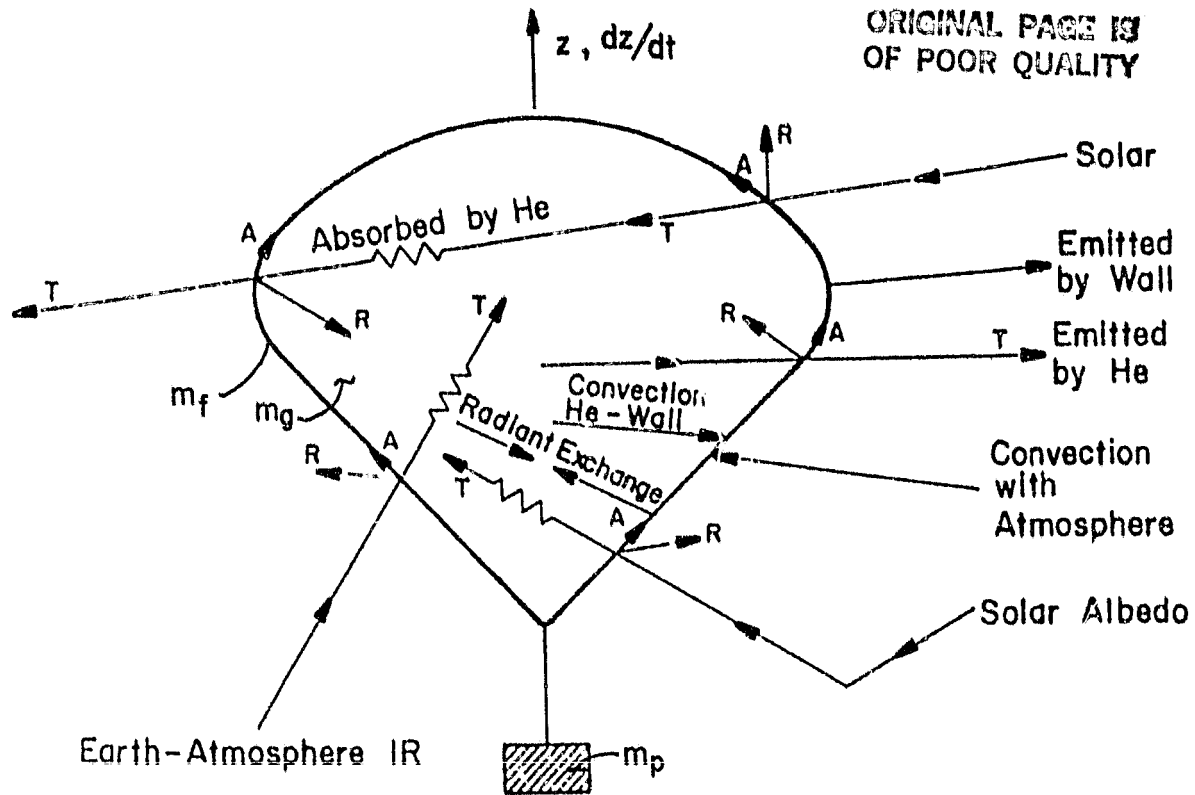
The program described in this report was developed under NASA Contract NAS6-3072 to accurately compute the trajectory of high altitude scientific zero pressure balloons, and to compute the balloon film and gas temperature. A set of five ordinary differential equations based

upon the dynamics and thermodynamics of the balloon system have been formulated. These equations are solved using a fourth order Runge-Kutta solution scheme with a variable time step. The program allows the user to specify a ballast schedule, to select from five atmospheric models (or supply his own) to adjust for changes in cloud cover and to account for balloon gas valving.

The background analysis for the computer program is contained in the reference, "A Unified Thermal and Trajectory Model for the Prediction of High Altitude Balloon Performance." The purpose of this report is to detail the use of the computer program. The following section is a presentation of the governing ordinary differential equations and the details of the options available to the user of the program. Subsequent sections will deal with the input data requirements and formats, the output format (both printed and plotted), a program listing, and the results of a verification study conducted during the development of the program.

PROBLEM DESCRIPTION

The trajectory of a balloon system is dependent upon the dynamics of the system and the thermal contributions from its atmospheric environment. Figure 1 contains a schematic of a typical zero-pressure balloon system indicating the source of thermal loading on the system. The results of the analyses are reported in the Reference. They show that the vertical motion of the balloon is governed by the following set of five ordinary differential equations:



Symbols: T = Energy transmitted
R = Energy reflected
A = Energy absorbed
 m_p = Mass of payload plus ballast
 m_f = Mass of balloon film
 m_g = Mass of balloon gas

Figure 1. Schematic of typical balloon system
with the thermal inputs to the balloon.

$$\frac{dv}{dt} = \frac{g(\rho_a V_g - m_f - m_g - m_p) - (\rho_a C_D v^2 \bar{A})/2}{m_g + m_f + m_p + 1/2 \rho_a V_g} \quad (1)$$

$$\frac{dz}{dt} = v \quad (2)$$

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$$\frac{dm_g}{dt} = \frac{p_g M_g}{RT_g} \dot{e}_g - \dot{e}_v \quad (3)$$

$$\frac{dT_f}{dt} = \frac{Q_f}{C_f m_f} \quad (4)$$

$$\frac{dT_g}{dt} = C_{p_g} \frac{1}{m_g} \left[Q_G - \frac{g M_a m_g T_g v}{T_a M_g} \right] \quad (5)$$

where: t = time

v = vertical velocity of the balloon system

g = acceleration due to gravity

ρ_a = density of air

V_g = volume of the balloon

m_f = mass of the balloon film

m_g = mass of gas

m_p = mass of the payload = mass of the balloon system - $(m_f + m_g)$

C_D = coefficient of drag

\bar{A} = effective balloon cross-sectional area = $1.2089 V_g^{2/3}$

z = balloon altitude

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p_g = balloon gas pressure

M_g = molecular weight of balloon gas

R = universal gas constant

T_g = temperature of the balloon gas

\dot{e}_g = volume flow rate of gas exhausted at entry into float

\dot{e}_v = mass flow rate of balloon gas during controlled valving operation

T_f = temperature of balloon film

Q_f = net heat flux to film

C_f = specific heat of balloon film

C_{p_g} = specific heat of balloon gas

Q_G = net heat flux to balloon gas

M_a = molecular weight of air

T_a = temperature of the air

and the radiative heat transfer to the balloon film can be expressed as

$$Q_F = \left[\frac{1}{4} G \alpha_{w, \text{eff}} + \frac{1}{2} G r_e \alpha_{w, \text{eff}} + \epsilon_{\text{int}} \sigma (T_g^4 - T_f^4) + \right. \\ \left. CH_{gf} (T_g - T_f) + CH_{fa} (T_a - T_f) - \epsilon_{w, \text{eff}} \sigma (T_f^4 - T_{BB}^4) \right] S \quad (6)$$

while the radiative heat transfer to the balloon gas can be expressed as

$$Q_G = \left[G \alpha_{g, \text{eff}} (1+r_e) - \epsilon_{\text{int}} \sigma (T_g^4 - T_f^4) - CH_{gf} (T_g - T_f) \right. \\ \left. - \epsilon_{g, \text{eff}} \sigma T^4 + \epsilon_{g, \text{eff}} \sigma T_{BB}^4 \right] S \quad (7)$$

Where the effective coefficient of absorptivity of the balloon film, the effective coefficient of infrared interchange between the balloon film and gas, the effective coefficient of emissivity of the balloon film, the effective coefficient of absorptivity of the balloon gas, and the effective coefficient of emissivity of the balloon gas are expressed in terms of the gas and film radiative properties as:

$$\alpha_{w,eff} = \alpha_w \left[1 + \frac{\tau_{w,sol} (1-\alpha_g)}{1 - r_{w,sol} (1-\alpha_g)} \right] \quad (8)$$

$$\epsilon_{int} = \frac{\epsilon_g \epsilon_w}{1 - r_w (1-\epsilon_g)} \quad (9)$$

$$\epsilon_{w,eff} = \epsilon_w \left[1 + \frac{\tau_w (1-\epsilon_g)}{1 - r_w (1-\epsilon_g)} \right] \quad (10)$$

$$\alpha_{g,eff} = \frac{\alpha_g \tau_{w,sol}}{1 - r_{w,sol} (1-\alpha_g)} \quad (11)$$

$$\epsilon_{g,eff} = \frac{\epsilon_g \tau_w}{1 - r_w (1-\epsilon_g)} \quad (12)$$

where G = solar constant

r_e = earth reflectivity (albedo)

σ = Stefan-Boltzman constant

CH_{gf} = convective heat transfer coefficient between the balloon film and gas

CH_{fa} = convective heat transfer coefficient between the balloon film and air

T_{BB} = black ball temperature

S = balloon surface area = $4.835976 V_g^{2/3}$

α_w = coefficient of absorptivity of the balloon film in the infrared spectrum

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$\tau_{w,sol}$ = coefficient of transmissivity of the balloon film in the solar spectrum

α_g = coefficient of absorptivity of the balloon gas

$r_{w,sol}$ = coefficient of reflectivity of the balloon film in the solar spectrum

ϵ_g = coefficient of emissivity of the balloon gas

ϵ_w = coefficient of emissivity of the balloon film

r_w = coefficient of reflectivity of the balloon film in the infrared spectrum

τ_w = coefficient of transmissivity of the balloon film in the infrared spectrum

Differential equations 1 through 5, along with the defining equations 6 through 12, are solved using a Kutta-Simpson, one-third rule, fourth order Runge-Kutta solution technique.

The atmospheric properties are computed using any of five "standard" atmosphere models or a user supplied model. The five standard models are the 1962 Standard Atmosphere model and four models based upon NSBF temperature-altitude profiles measured during the winter, spring, summer and fall of the year.

Ballasting is accomplished by providing a ballast rate-time schedule corresponding to the actual ballast schedule of the balloon flight being simulated. This schedule represents the ballasting rate at all times during the flight; therefore, each ballasting operation is represented with an entry at both the beginning and the end of the ballast drop.

Controlled balloon gas valving operations are modelled in a manner similar to that for ballast drops. That is, a valving mass flow rate-time schedule is provided for every point of the flight. Therefore, every valving operation is represented by two entries in the valving schedule; one

at the beginning of the valving operation and one at the end. Valving of the balloon gas at the entry into float is handled automatically by the program by monitoring the volume of the balloon. When the balloon volume exceeds the maximum volume of the balloon during a time step in the solution, a sufficient volume of gas is expelled to prevent the volume of the balloon from exceeding the maximum volume of the balloon and a smaller time step is used in the solution.

Cloud cover conditions are specified by a time schedule of albedo values and black-ball temperature profile adjustments at every point in the flight. Therefore, if accurate cloud cover information is available for the balloon flight being simulated it can be modelled within the program.

A variable time step solution of the governing differential equations was developed to economize the solution scheme. Basically, the procedure followed was to double the time step if the computed values of the increment of the balloon altitude, velocity, and film temperature and gas temperature were less than some user provided tolerance for the previous three steps in the solution. In a similar manner, the time step was reduced by a factor of 0.5 if the computed values of the same increments mentioned above exceed the user provided tolerance during any step of the solution and that solution step was repeated.

PROGRAM USAGE

The computer program is written in FORTRAN IV programming language and is operational on the Texas A&M Amdahl 470 V/6 and Amdahl 470 V/7B computers. The program uses plotting subroutines developed by California Computer Products, Inc. (Cal-Comp) which are available on the Texas A&M computer system.

This section gives an outline of the procedure for using the THERMTRAJ program for solving the equations, developed in Reference 1 and summarized in the previous section of this report, governing the vertical motion of the balloon system. Table 1 contains a summary of the input data cards necessary to run a flight simulation and Table 2 contains a summary of the units of the input data. Table 3 contains a list of the default values of the input variables for the program. Only those variables that are to be modified need to be assigned values on the data card associated with the READ (5, FIPUT) statement of line 91 of the source program listing of Appendix A. Table 4 contains a list of the FORTRAN variable names used in the program and their definitions. Table 5 contains a summary of the output of the program.

Figure 2 contains a typical four segment atmospheric temperature-altitude profile used to define the atmospheric properties at each point in the balloon flight and Figure 3 contains a summary plot of the five optional profiles that are contained in the THERMTRAJ program. A typical three segment black-ball temperature-altitude profile is presented in Figure 4 indicating the FORTRAN symbolic names of the coordinates of each of the break-points on the profile.

The user may begin the balloon simulation at any point of the balloon flight. The following input data in the NAMELIST FIPUT must be modified to correspond to the conditions which exist at the point the simulation is initialized:

TIMOL - Time of initialization of simulation (hrs)

CUTDT - Length of flight from the point the simulation was initiated
(hrs)

ASCRT and HFLIT - Must be adjusted so that

$$\frac{\text{HFLIT} - \text{BALT}}{\text{ASCRT}}$$

yields either the time from initial start to the estimated time of float or the time when TBBC(I) is to be used instead of the three segment TBB profile

MGAS - Mass of gas at the start of the simulation (g)

MPAYI- Mass of payload, including remaining ballast at the start of the simulation (g)

All other NAMELIST variables are as if the computations were started at the original launch time and altitude.

The variables of the ballast drop schedule, the cloud cover schedule and the valving schedule must also be modified to correspond to the initial start time of the simulation. Specifically, the times in the arrays TBDRP(I), YCLDC(I), and TVALVE(I) must be times measured from the time of the initialization of the flight simulation, not from the launch time of the balloon.

All input experimental data (EMB, EAIRT, EFILMT, EGAST) must be for times which occur after the time of the start of the simulation.

Finally, the value of four variables within the body of the main program must be altered to correspond to the actual beginning of the simulation. The initial values of TR, TS, Z1, and Z2 (see lines 281-284 of the source deck of Appendix A) must be balloon gas temperature, film temperature, altitude, and velocity at the time of the beginning of the simulation.

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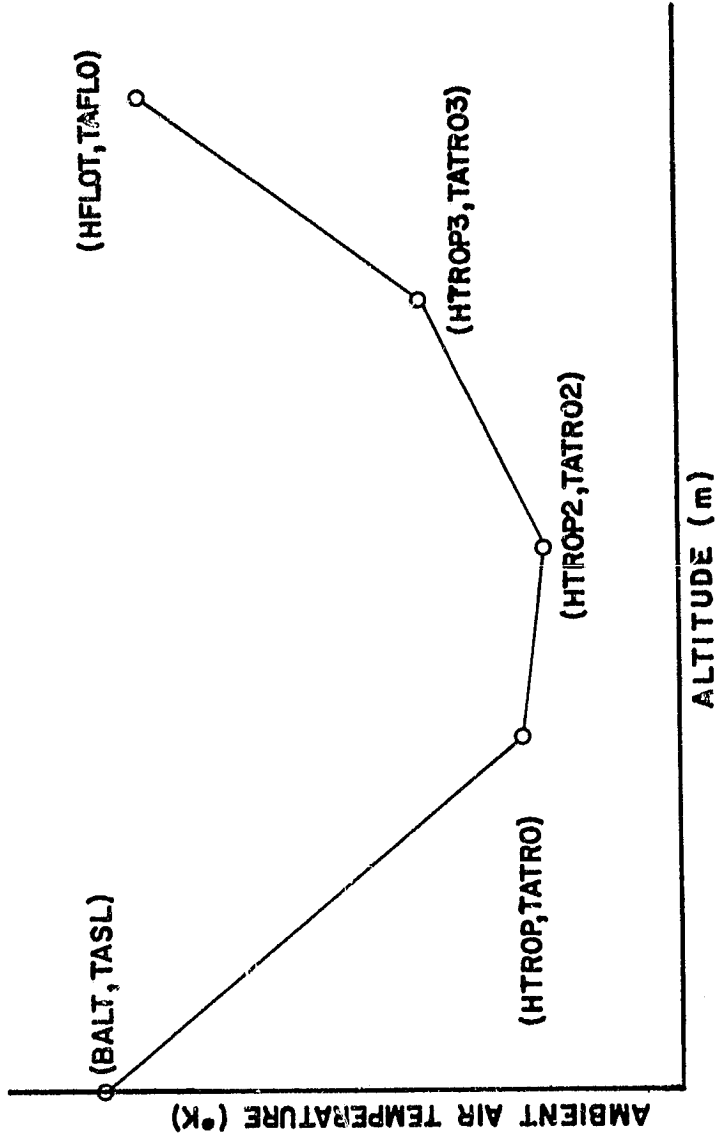


Figure 2. Typical Atmospheric Temperature Model

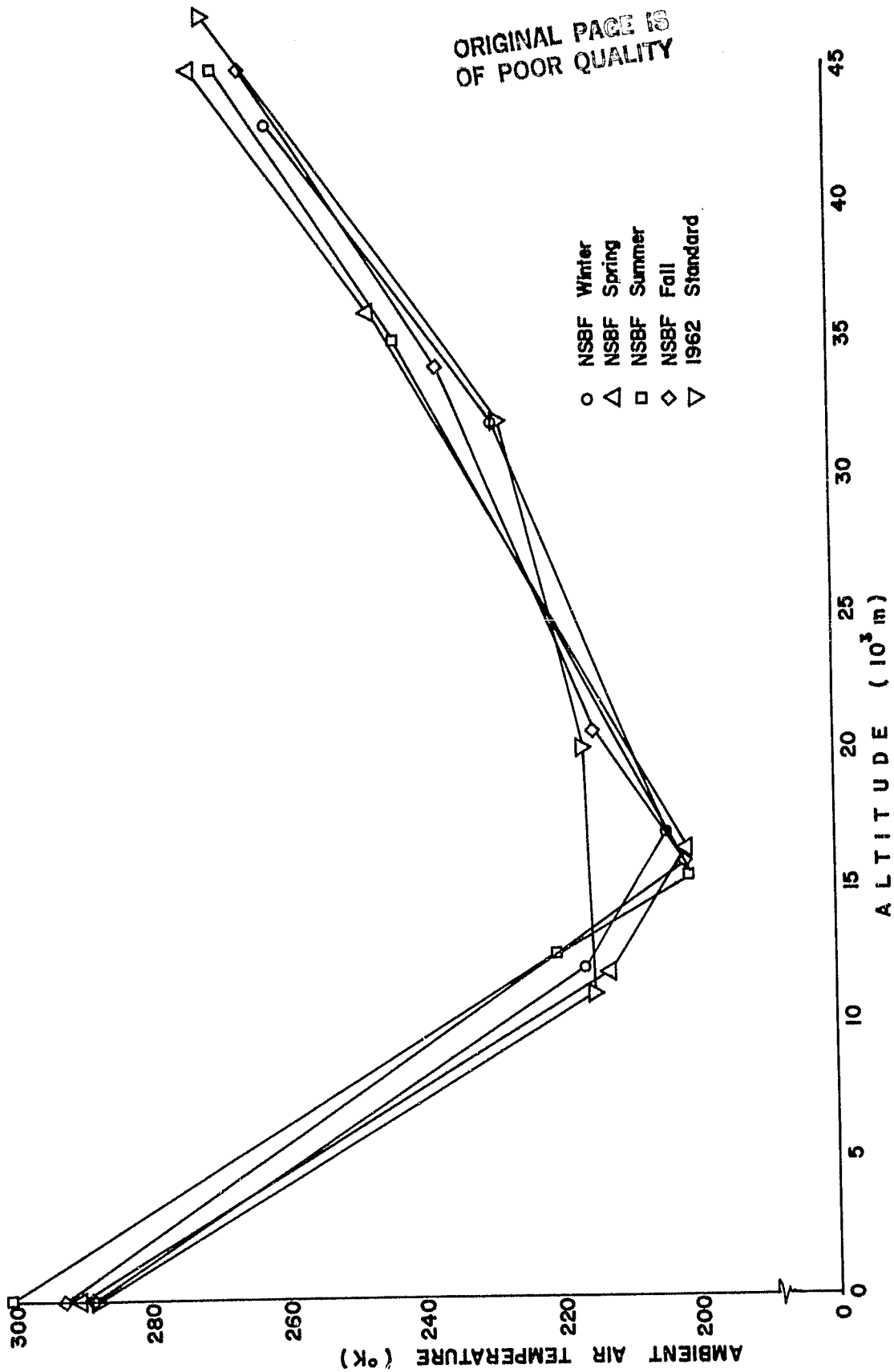


Figure 3. Five optional atmospheric temperature profiles available in the THERMTRAJ program

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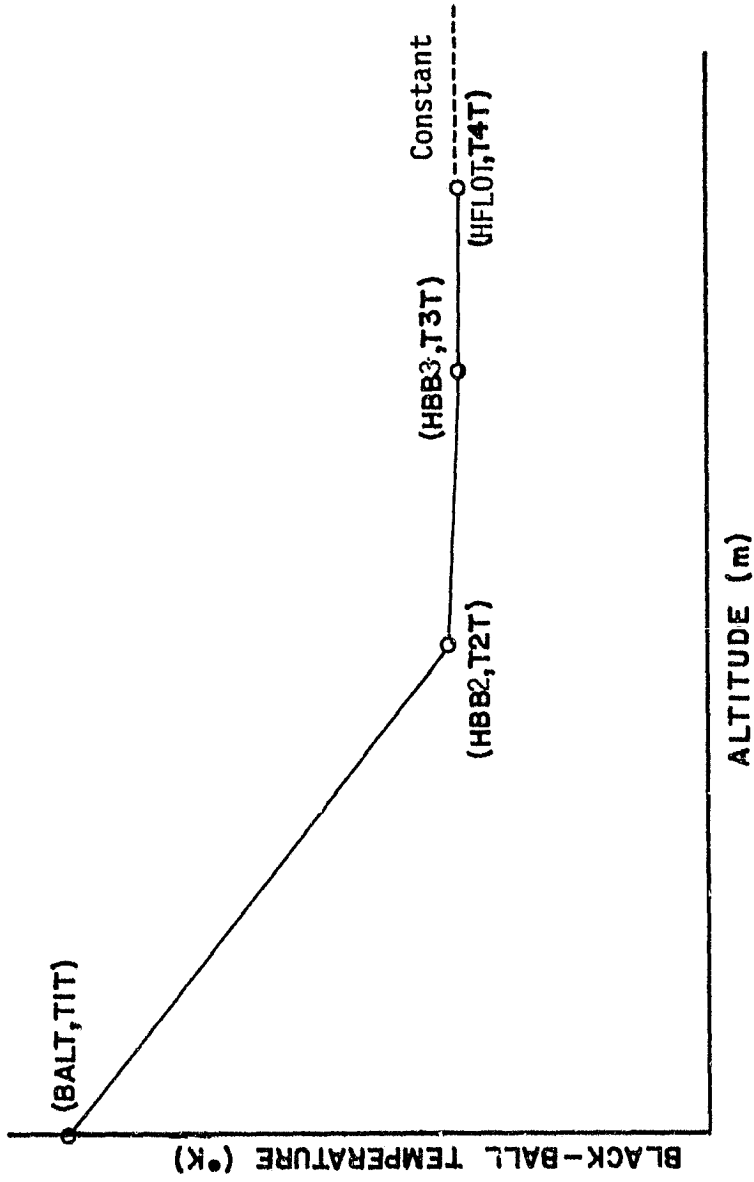


Figure 4. Typical black-ball temperature profile

Table 1. Summary of Input Cards

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Read Order	Variables	Format
1	NTITLE	20A4
2	NAMLIST/FIPUT/TIMOL,CUTDT,BALT,ASCRT,HFLIT, PASL,MASSF,MGAS,MPAY I,VOLMAX,DAYL,TWILT,ALBED, FLSOD,PTINC,DTMAX,SPHTW,SPHTG,MOLA,MOLG,ALFRES, EG,ALFSO,TWSOL,RWSOL,EW,RW,TAUW,TASL,HTROP,TATRO, HTROP2,TATRO2,HTROP3,TATRO3,HFLOT,TAFLO,HBB2,HBB3, T2T,T3T,T4T,DPLT,IATMS	namelist
3	NBDRP	
4	TBD RP(I) and BRATE(I); I=1,NBD RP (omitted if NBD RP=0)	2F10.2
5	NCLDC	I5
6	TCLDC(I),ALBC(I) and TBBC(I) (omitted if NCLDC=0)	3F10.2
7	NVALVE	
8	TVALVE(I) and VALVRT(I) (omitted if NVALVE=0)	2F10.2
9	NEX	I3
10	ELN1,ELN2,ELN3 (omitted if NEX=0)	3F3.0
11	TT(J),J=1,3; EMB(I),EAIRT(I),EFILMT(I),EGAST(I) (omitted if NEX=0)	3F3.0,1X, 4F10.4

Table 2 Summary of Units of Input Data

TIMOL -	hrs.	ORIGINAL PAGE 19' OF POOR QUALITY	HTROP3 -	m
CUTDT -	hrs.		TATROP3 -	°K
BALT -	m	HFL0T -	m	
ASCRT -	m/min.	TAFLO -	°K	
HFLIT -	m	HBB2 -	m	
PASL -	millibars	HBB3 -	m	
MASSF -	g	T2T -	°K	
MGAS -	g	T3T -	°K	
MPAYI -	g	T4T -	°K	
VOLMAX -	m ³	DPLT -	dimensionless	
DAYL -	hrs.	IATMS -	dimensionless	
TWILT -	hrs.	NBDRP -	dimensionless	
ALBED -	dimensionless	TBD RP -	min.	
FLSOD -	cal/m ² /min.	BRATE -	g/min.	
PTINC -	hrs.	NCLDC -	dimensionless	
DTMAX -	min.	TCLDC -	min.	
SPHTW -	cal/g/°K	ALBC -	dimensionless	
SPHTG -	cal/g/°K	TBBC -	°K	
MOLA -	dimensionless	NVALVE -	dimensionless	
MOLG -	dimensionless	TVALVE -	min.	
ALFRES -	dimensionless	VALVRT -	g/sec.	
EG -	dimensionless	NEX -	dimensionless	
ALFSO -	dimensionless	ELN1 -	hrs.	
TWSOL -	dimensionless	ELN2 -	min.	
RWSOL -	dimensionless	ELN3 -	sec.	
EW -	dimensionless	TT(1) -	hrs.	
RW -	dimensionless	TT(2) -	min.	
TAUW -	dimensionless	TT(3) -	sec.	
TASL -	°K	EMB -	millibars	
HTROP -	m	EAI RT -	°C	
TATRO -	°K	EFILMT -	°C	
HTROP2 -	m	EGAST -	°C	
TATROP2 -	°K			

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Table 3. Summary of Input Default Values

TIMOL = 18.0	TWSOL = 0.885
CUTDT = 24.0	RWSOL = 0.114
BALT = 120.0	EW = 0.031
ASCRT = 304.8	RW = 0.127
HFLIT = 36700.0	TAUW = 0.842
PASL = 1013.3	TASL = 288.15
MASSF = 1.842E5	HTROP = 11000.0
MGAS = 6.9221E4	TATROP = 215.65
MPAYI = 1.9682E5	HTROP2 = 20000.0
VOLMAX = 6.6375E4	TATRO2 = 216.65
DAYL = 12.0	HTROP3 = 32000.0
TWILT = 0.75	TATRO3 = 228.65
ALBED = 0.18	HFLOT = 47000.0
FLSOD = 1.9892E4	TAFLO = 270.65
PTINC = 0.01666	HBB2 = 11000.0
DTMAX = 5.0	HBB3 = 20000.0
SPHTW = 0.55	T2T = 214.4
SPHTG = 1.24119	T3T = 214.4
MOLA = 28.9644	T4T = 214.4
MOLG = 4.0026	DPLT = -1.0
ALFRES = 0.0026	IATMS = 5
EG = 0.000312	RGAS = 8.31432E7
ALFSO = 0.001	EDOTG = 0.0

Table 4. List of FORTRAN variable names used within the program

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FORTRAN Variable	Description
ABAL	- Surface area of balloon (m^2)
AG	- Acceleration due to gravity (m/min^2)
AGEF	- Effective infrared absorptance of balloon gas
ALBC(I)	- Array of Albedo factors corresponding to times TCLDC(I)
ALBED	- Current Albedo factor (0.18 for clear skies; 0.57 maximum)
ALFRES	- Absorptance of balloon gas
ALFSO	- Absorptance of balloon film
ASCRT	- Estimated balloon ascent rate (m/min)
ATMOS2	- Subroutine to compute balloon altitude in meters when the altitude is given in millibars of pressure
AWEF	- Effective infrared absorptance of balloon film
AXIS1	- Plotting subroutine (plots axes)(Local)
BALT	- Launch altitude (m)
BRATE(I)	- Array of ballast rates corresponding to times TBDRP(I) (g/min.)
C	- Thermal conductivity of air (calorie/min/m/ $^{\circ}K$)
CD	- Coefficient of drag
CFH	- Function subprogram to compute the heat transfer coefficient between the balloon film and air
CG	- Thermal conductivity of helium
CH	- Heat transfer coefficient between balloon film and air

**FORTRAN
Variable**

Description

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- CHF - Forced convection coefficient between balloon film and air
- CHN - Natural convection coefficient between the balloon film and air
- CHR - Heat transfer coefficient between the balloon film and gas
- CHRES - Function subprogram to compute the heat transfer coefficient
between the balloon film and gas
- CIT - Parameter used to determine relationship of the sun to the
balloon (day/night)
- CUTDT - Length of flight to be simulated (hrs.)
- DAYL - Length of daylight (hrs.input; converted to min. within program)
- DINCH - Time of day (hrs.)
- DPLT - Positive value of DPLT generates plotted output
- DTIME - Time increment (min.)
- DTIMEN - Minimum time increment (min.)
- DTMAX - Maximum time increment (min.)
- DTMIN - Plotting time scale increment (min./inch of plot)
- DX1 - Plotting time scale increment (min./inch of plot)
- EAIRT(I) - Array of measured ambient air temperature (°C) corresponding
to the array of times ETIME(I)
- EALT(I) - Array of measured altitudes (m) corresponding to the array
of times ETIME(I)
- EDOTG - Gas volume flow rate for "burping" of gas when float altitude
is exceeded (m^3/sec)
- EDOTV(I) - Array of gas mass flow rate during valving operation (g/sec.)
corresponding to the array of time TVALVE(I)

**FORTTRAN
Variable**

Description

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- EFILMT(I) - Array of measured balloon film temperature ($^{\circ}$ C) corresponding to the array of times ETIME(I)
- EG - Emissivity of the balloon gas
- EGAST(I) - Array of measured balloon gas temperature ($^{\circ}$ C) corresponding to the array of times ETIME(I)
- EGEF - Effective emissivity of the balloon gas
- EINT - Effective interchange emissivity between the balloon gas and film
- ELANCH - Launch time (sec.) = $3600.*ELN1+60.*ELN2+ELN3$
- ELN1 - See ELANCH (hrs.)
- ELN2 - See ELANCH (min.)
- ELN3 - See ELANCH (sec.)
- EMB(I) - Array of measured altitude (millibars) corresponding to the array of times ETIME(I)
- EMB1(I) - Array of \ln (pressure at launch site/EMB(I)); plotting parameter
- ETIME(I) - Array of times for which measured temperature and altitude data have been input (sec) = $3600.*TT(1)+60.*TT(2)+T(3)-$
ELAUNCH
- EW - Emissivity of the balloon film
- EWEF - Effective emissivity of the balloon film
- EXPO - Exponent used in computing the pressure, density and temperature as a function of balloon altitude
- EXPT - Exponent used in computing the pressure, density and temperature as a function of balloon altitude
- EXP2 - Exponent used in computing the pressure, density and temperature as a function of balloon altitude

FORTTRAN
Variable

Description

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EXP3 - Exponent used in computing the pressure, density and temperature as a function of balloon altitude

FK1,FK2,FK3,FK4,FL1,FL2,FL3,FL4,FM1,FM2,FM3,FM4,FN1,FN2,FN3,FN4,F01,F02,

F03,F04 - Runge Kutta parameters of the general form:

$$y_i(t+dt) = y_i(t) + 1/6 (F_{i1} + 2F_{i2} + 2F_{i3} + F_{i4})$$

for $i = K, L, M, N, O$

FLIFT - Free lift on the balloon (kg)

FLSOD - Solar radiation constant ($1.9892 \cdot 10^4$ cal/m²/min)

FLXSD - Solar radiation flux adjusted for the time of day

FMTOT - Total mass of balloon system minus the mass of gas (kg)

F1

F2

F3

F4

F5

- Right hand sides of the five governing first order ordinary differential equations.

GR - Grashof Number

GY - Acceleration due to gravity (m/sec²) in Subroutine ATMOS2

H - Parameter in subroutine ATMOS2 to designate altitude (m)

**FORTRAN
Variable**

Description

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- HB - Parameter in subroutine ATMOS2 to designate the base altitude of the various layers of the standard atmosphere (m)
- HBAL - Altitude of balloon (m)
- HBB2 - Black ball altitude corresponding to black ball temperature T2T in a black ball temperature-altitude three segment profile (m)
- HBB3 - Black ball altitude corresponding to black ball temperature T3T in a black ball temperature-altitude three segment profile (m)
- HFLIT - Estimated float altitude (m) used to determine TIMFL. When time exceeds TIMFL, TBBC(I) used instead of three segment TBB profile.
- HFLOT - Nominal float altitude (m)
- HMGAS - Duplicate storage location for the mass of gas during each time increment (g)
- HTR - Duplicate storage location for the balloon gas temperature during each time increment (°K)
- HTROP - Altitude corresponding to the atmosphere temperature TATRO in a four segment temperature-altitude profile (m)
- HTROP2 - Altitude corresponding to the atmosphere temperature TATRO2 in a four segment temperature-altitude profile (m)
- HTROP3 - Altitude corresponding to the atmosphere temperature TATRO3 in a four segment temperature-altitude profile (m)
- HTS - Duplicate storage location for the balloon film temperature during each time increment (°K)
- HVOLG - Duplicate storage location for the balloon volume during each time increment (m³)

FORTRAN Variable	Description
HZ1	- Balloon altitude during each time increment (m)
HZ2	- Balloon velocity during each time increment (m/sec)
IATMS	- Parameter to choose atmospheric model, i.e., IATMS = 1 NSBF Winter Atmosphere 2 NSBF Spring Atmosphere 3 NSBF Summer Atmosphere 4 NSBF Fall Atmosphere 5 1962 Standard Atmosphere 6 User supplied atmosphere
IPC	- Printer control character
ITC	- Parameter used in varying the time increment of the solution of the governing differential equations
IVOL	- Parameter used to identify regions of the flight that "burping" of balloon gas is required
IVT	- Parameter used to adjust the volume flow rate of the gas during the "burping" process
KUTTA	- Parameter used to direct the Runge-Kutta solution of the governing ordinary differential equations
LINE	- Local system subroutine used in the plot portion of the program
LP	- Lapse rate of the layers of the 1962 standard atmosphere as contained in subroutine ATMOS2
MA	- Molecular weight of air (Subroutine ATMOS2 parameter)
MASSF	- Mass of balloon film (g)

FORTRAN Variable	Description	ORIGINAL PAGE IS OF POOR QUALITY
MGAS	- Mass of gas (g)	
MGASD	- Increment of the mass of gas for each time step of the solution	
MOLA	- Molecular weight of air (main program)	
MOLG	- Molecular weight of balloon gas	
MPAY	- Mass of the balloon payload (g)	
MPAYI	- Mass of the balloon payload at launch including ballast (g)	
MPD(I)	- Array of mass of balloon payload associated with time of ballast drops TBDRP(I)	
NBDRP	- (Number of ballast drops + 1) * 2; input number of ballast drops required	
NCLDC	- (Number of cloud cover and/or black ball regions in the flight simulation) + 1; input number of cloud cover or black ball regions required for the simulation	
NEX	- Number of measured data points input	
NEX1	- NEX + 1	
NEX2	- NEX + 2	
NPC	- Printer control character	
NPSUN	- Parameter to eliminate the influence of the sun during the night portion of the flight simulation	
NSUN	- Parameter to eliminate the influence of the sun during the night portion of the flight simulation	
NTITLE(I)	- Array for storage of an 80 character title	
NVALVE	- (Number of gas valvings during the flight +1) * 2; input number of valvings required for the flight simulation	
NYC	- Number of data points collected for plotting	
NYCP1	- NYC + 1	
NYCP2	- NYC + 2	
PA	- Atmospheric pressure in subroutine ATMOS2 (millibars)	

FORTRAN Variable	Description
PASL	- Ambient air pressure at the launch site (mb)
PATRO	- Ambient air pressure at HTROP (mb)
PATRO2	- Ambient air pressure at HTROP2 (mb)
PATRO3	- Ambient air pressure at HTROP3 (mb)
PB	- Balloon gas pressure (mb)
PB1(I)	- Array of pressure altitude parameters corresponding to the array of times XPTT(I). $PB1 = \ln (PASL/PB)$
PLOT	- System subroutine used in plotting phase of program
PLOTS	- System subroutine used in plotting phase of program
PR	- Prandtl Number
PTIMH	- Time of day in hours
PTINC	- Time increment in hours
	{ Data are printed and saved for plotting in time increments of PTINC
QF	- Rate of heat transfer to the balloon film
QG	- Rate of heat transfer to the balloon gas
R	- Radius of balloon (Main program and subprograms CFH and CHRES)
	- Universal gas constant (subprogram ATMOS2)
REY	- Reynold's number
RGAS	- Universal gas constant
RHOB	- Air density at the base of the layers of the 1962 Standard
	- Altitude in subprogram ATMOS2
RRES	- Diameter of the balloon (subprogram CHRES)
RW	- Infrared reflectivity of the balloon film
RWSOL	- Ultraviolet reflectivity of the balloon film
SIGMA	- Stefan-Boltzmann constant
SPHTG	- Specific heat of the balloon gas

FORTRAN Variable	Description
SPHTW	- Specific heat of the balloon film
STOR	- Temporary storage location for the balloon gas viscosity
TA	- Ambient air temperature ($^{\circ}$ K)
TAFLO	- Air temperature corresponding to altitude HFLOT in the four segment air temperature profile ($^{\circ}$ K)
TAK	- Ambient air temperature ($^{\circ}$ C)
TASL	- Air temperature at launch ($^{\circ}$ K)
TATRO	- Air temperature corresponding to altitude HTROP in a four segment air temperature profile ($^{\circ}$ K)
TATRO2	- Air temperature corresponding to altitude HTROP2 in a four segment air temperature profile ($^{\circ}$ K)
TATRO3	- Air temperature corresponding to altitude HTROP3 in a four segment air temperature profile ($^{\circ}$ K)
TAUW	- Infrared transmittance of the balloon film
TB	- Air temperature at the base of the atmospheric layer of the 1962 Standard Atmosphere in subprogram ATMOS2
TBB	- Black ball temperature ($^{\circ}$ K)
TBBC(I)	- Array of black ball temperatures corresponding to the cloud cover array ALBC(I) and the array of times TCLDC(I). Used when time exceeds TIMFL. ($^{\circ}$ K)
TBD RP(I)	- Array of times associated with the ballast drops of the simulated flight (min.)
TCLDC(I)	- Array of times associated with the cloud cover factors ALBC(I) and TBBC(I) (min.)
TIME	- Time of day at each point of the flight simulation (min)

FORTRAN Variable	Description
TIMFL	- Estimated time to float. Computed from ASCRT and HFLIT.
TIMH	- Time of day at each point of the flight simulation (hrs)
TIMH1	- Time from launch at each point of the flight simulation (min)
TIMIO	- Temporary storage of time of launch (min)
TIMM	- Time from launch of each point of the flight simulation (min)
TIMOL	- Time of launch (hrs. local standard time input; converted to minutes within program)
TIMSR	- Time of sunrise (min)
TIMSS	- Time of sunset (min)
TOHIGH	- A parameter in subroutine ATMOS2 which indicates when the atmospheric pressure input is less than the capability of the subroutine and thus corresponds to an altitude that is too high to be accurately modeled by the sub- routine
TR	- Temperature of the balloon gas ($^{\circ}$ K)
TRDEL	- Increment of the gas temperature during each step of the Runge-Kutta solution of the governing ordinary dif- ferential equations ($^{\circ}$ K)
TRK	- Temperature of the balloon gas ($^{\circ}$ C)
TS	- Temperature of the balloon film ($^{\circ}$ K)
TSDEL	- Increment of the film temperature during each step of the Runge-Kutta solution of the governing ordinary differ- ential equations ($^{\circ}$ K)

FORTRAN Variable	Description
TSK	- Temperature of the balloon film (°C)
TSL	- Maximum allowable change in balloon film temperature during each solution step
TT(I)	- See ETIME(I)
TTIME	- Time from sunset or sunrise (min.)
TTMIN	- Plotting parameter. Minimum temperature to be plotted (°C)
TTS	- Time associated with starting conditions (min.)
TVALVE(I)	- An array of times corresponding to changes in valving rates (min)
TWILT	- Length of twilight (hrs)
TWSCGL	- Ultraviolet transmittance of the balloon film
T1	- Temperature of the air in subprogram CFH (°K)
T1T	- Black ball temperature corresponding to altitude BALT in the black ball temperature profile (°K)
T2T	- Black ball temperature corresponding to altitude HBB2 in the black ball temperature profile (°K)
T3T	- Black ball temperature corresponding to altitude HBB3 in the black ball temperature profile (°K)
T4T	- Black ball temperature corresponding to altitude HFLOT in the black ball temperature profile (°K). Used for altitudes above HFLOT
UMU	- Viscosity of the balloon gas or ambient air, as appropriate
VALVRT(I)	- Array of valving mass flow rates corresponding to the times TVALVE(I) (g/sec)

FORTRAN Variable	Description
VOLG	- Volume of the balloon (m ³)
VOLMAX	- Maximum volume of the balloon (m ³)
X	- Intermediate value in the computation of both the heat transfer coefficient between the film and gas (subprogram CHRES) and the heat transfer coefficient between the film and air (subprogram CFH)
XLT	- Physical length of the time axis on all plots (in)
XLT1	- Physical spacing between sets of axes in the plotting (in)
XLT2	- Physical spacing between sets of axes in the plotting (in)
XPTT(I)	- Array of times corresponding to the arrays of computed values of gas temperature, YPT3; air temperature, YPT1; film temperature, YPT2; balloon altitude, YPH; and the pressure altitude parameter, PB1 (min)
YPH(I)	- Array of balloon altitudes, corresponding to the array of times XPTT(I), to be plotted(m)
YPT1(I)	- Array of air temperatures, corresponding to the array of times XPTT(I), to be plotted (°C)
YPT2(I)	- Array of balloon film temperatures, corresponding to the array of times XPTT(I), to be plotted (°C)
YPT3(I)	- Array of balloon gas temperatures, corresponding to the array of times XPTT(I), to be plotted (°C)
ZSL	- Maximum allowable change in balloon altitude during each time step of the solution (m)
Z1	- Balloon altitude (m)

FORTRAN
Variable

Description

- Z1DEL - Increment of balloon altitude during each time step of
the solution (m)
- Z2 - Balloon vertical velocity (m/min)
- Z2DEL - Increment of balloon vertical velocity during each time
step of the solution (m/min)

Table 5. Summary of Program Output

Printed Output

- 1.) Heading
- 2.) Listing of input data in namelist FIPUT
- 3.) Tabular listing of the input ballast drop schedule:
Time of ballast drop (sec) Ballast rate (g/min)
(NBDRP values printed)
- 4.) Tabular listing of the input cloud cover details:
Time of cloud cover (sec) Albedo Blackball Temp. (°K)
(NCLDC values printed)
- 5.) Tabular listing of the input valving schedule:
Time of the valving (sec) Valve rate (g/min)
(NVALVE values printed)
- 6.) Tabular listing of the input measured data from the balloon flight being simulated:
Time(sec.) Altitude(m) Air Temp.(°C) Film Temp.(°C) Gas Temp.(°C)
(NEX values printed)
- 7.) The computed values of the effective emissivity of the balloon gas, the effective emissivity of the balloon film, and the effective interchange emissivity between the balloon gas and film.
- 8.) The computed values of the effective infrared absorptance of the balloon gas and the effective infrared absorptance of the balloon film.

9.) Tabular listing of the computed results:

Time(min), Altitude(m), Velocity(m/min), Air Temp. ($^{\circ}\text{C}$),
Film Temp. ($^{\circ}\text{C}$), Balloon volume(m^3), Solar Flux, Blackball
Temp. ($^{\circ}\text{K}$), Free lift (kg), Pressure altitude (millibars),
Mass of gas (g), Reynold's number, Coefficient of Drag,
Payload mass (g)

10.) The total number of data points saved for plotting (NYC).

Plotted Output (Requires local subroutines equivalent to AXIS1, PLOT, PLOTS, LINE)

- 1.) A plot of the computed balloon altitude-time history and a plot of the measured balloon altitude-time history (if NEX is not 0), on a single set of axes.
- 2.) Plots of the computed balloon film and gas temperature and the ambient air temperature as functions of flight time. Also plots of measured values of film, gas and air temperature if NEX is not 0.
- 3.) A plot of the computed balloon pressure altitude parameter, $\ln(P_{\text{launch site}}/P_{\text{altitude}})$, as a function of time, and a similar plot of the measured pressure altitude parameter if NEX is not 0.

Reference

1. Carlson, L.A. and Horn, W.J., "A Unified Thermal and Vertical Trajectory Model for the Prediction of High Altitude Balloon Performance," Texas Engineering Experiment Station Report TAMRF-4217-81-02, June, 1981.

APPENDIX A
PROGRAM LISTING

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TWILT=0.75
ALBED=0.18
FLSOD=1.9892E4
PTINC=0.01666
DTMAX=5.0
SPHTW=0.55
SPHTG=1.24119
MOLA=28.9644
MOLG=4.0026
ALFRES=0.0026
EG=0.000312
ALFSC=0.001
TWSOL=0.885
RWSOL=0.114
RW=0.127
TAUW=0.842
TASL=288.15
HTR0P=11000.0
TATRO=215.65
HTR0P2=20000.0
TATRO2=216.65
HTR0P3=20000.0
TATRO3=228.65
HFLOT=47000.0
TAFLO=270.65
HBB2=11000.0
HBB3=20000.0
I2T=214.4
I3T=214.4
I4T=214.4
DPLT=1.0
IATMS=5
RGAS=8.31432E7
EDOTG=0.0
READ (5,FIPUT)
GO TO (100,110,120,130,140,150), IATMS
C*****
C M I N T E R A T M O S P H E R E
C*****
100 TASL=288.55
HTR0P=12000.0
TATRO=216.15
HTR0P2=16900.0
TATRO2=204.65
HTR0P3=32000.0
TATRO3=229.35
HFLOT=43000.0
TAFLO=261.55
HBB2=16900.0
HBB3=20000.0
GO TO 150
C*****
C S P R I N G A T M O S P H E R E
C*****
110 TASL=291.15
HTR0P=11810.0
TATRO=212.85

HTROP2=16230.0
TATRO2=203.85
HTROP3=36000.0
TATRO3=247.05
HFLOT=45000.0
TAFLO=272.35
HBB2=16230.0
HBB3=20000.0
GO TO 150

C*****
C S U M M E R A T M C S P H E R E *****
C*****

120 TASL=304.55
HTROP=12500.0
TATRO=220.65
HTROP2=15300.0
TATRO2=201.35
HTROP3=35000.0
TATRO3=243.25
HFLOT=45000.0
TAFLO=269.25
HBB2=15300.0
HBB3=20000.0
GO TO 150

C*****
C F A L L A T M C S P H E R E *****
C*****

130 TASL=293.85
HTROP=15800.0
TATRO=202.55
HTROP2=20640.0
TATRO2=215.25
HTROP3=34000.0
TATRO3=237.65
HFLOT=45000.0
TAFLO=265.65
HBB2=15800.0
HBB3=20000.0
GO TO 150

C*****
C I 9 6 2 S T A N D A R D A T M O S P H E R E *****
C*****

140 TASL=288.15
HTROP=11000.0
TATRO=215.65
HTROP2=20000.0
TATRO2=216.65
HTROP3=32000.0
TATRO3=228.65
HFLOT=47000.0
TAFLO=270.65
HBB2=11000.0
HBB3=20000.0

150 CONTINUE
WRITE (6,FIPUT)
READ 580,NBDRP
TBDRP(1)=0.
TBDRP(2)=1.

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TBDRP(3)=2,
DO 160 I=1,3
  TCLDC(I)=TEDRP(I)
  BRATE(I)=0.
  TVALVE(I)=TBDRP(I)
  VALVRT(I)=0.0
  ALBC(I)=ALBED
  TBBC(I)=214.4
  IF (ALBED.GT.0.3) TBBC(I)=194.4
160 CONTINUE
IF (NBDROP.EQ.0) GC TC 180
PRINT 590
DO 170 I=1,NBCFP
  READ 600, TEDRP(I),ERATE(I)
  PRINT 600, TBDRP(I),ERATE(I)
170 CONTINUE
180 CONTINUE
READ 580, NCLDC
IF (NCLDC.EQ.0) GC TC 200
PRINT 610
DO 190 I=1,NCLDC
  READ 600, TCLDC(I),ALBC(I),TBBC(I)
  PRINT 600, TCLDC(I),ALBC(I),TBBC(I)
190 CONTINUE
200 CONTINUE
READ 580, NVALVE
IF (NVALVE.EQ.0) GC TC 220
PRINT 620
DO 210 I=1,NVALVE
  READ 600, TVALVE(I),VALVRT(I)
  PRINT 600, TVALVE(I),VALVRT(I)
210 CONTINUE
220 CONTINUE
C*****
C SECTION TWO == EXPERIMENTAL DATA INPUT FOR PLOTS *
C*****
IF (DPLT.LE.0.) GO TC 260
READ 630, NEX
C
C 230 CONTINUE
IF (NEX.EQ.0) GC TO 260
READ 750, ELN1,ELN2,ELN3
ELANCH=3600.*ELN1+60.*ELN2+ELN3
DO 240 I=1,NEX
C
C 240 CONTINUE
  READ 750, (TT(J),J=1,3),EMB(I),EAIRT(I),EFILMT(I),EGAST(I)
  ETIME(I)=TT(1)*3600.+TT(2)*60.+TT(3)-ELANCH
  CALL ATMOS2 (EMB(I),EALT(I),TOHIGH)
C
  WRITE (6,740)
  DO 250 J=1,NEX
    WRITE (6,760) ETIME(J),EALT(J),EAIRT(J),EFILMT(J),EGAST(J)
250 CONTINUE
260 CONTINUE
C*****
C SECTION THREE == PARAMETER SETUP *
C*****

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IPC=-1
NPC=0
C=2.90544E-01
ROSL=1.2248
SIGMA=8.1346049E-07
AG=3.5303886E+04
TIMCL=TIMOL*60.0
TIMIO=TIMOL
DO 270 I=1,NBDRP
  TBDRP(I)=TEDRF(I)+TIMOL
270 CONTINUE
DO 280 I=1,NCLDC
  TCLDC(I)=TCLDC(I)+TIMOL
280 CONTINUE
DO 290 I=1,NVALVE
  TVALVE(I)=TVALVE(I)+TIMCL
290 CONTINUE
MPD(1)=MPAYI
DO 300 I=2,NBDRP
  MPD(I)=MPC(I-1)-BRATE(I-1)*(TBDRP(I)-TBDRP(I-1))
300 CONTINUE
PR=0.74
DAYL=DAYL*60.0
TWILT=TWILT*60.0
HBAL=BALT
CUTDT=CUTDT*60.0
TIMSR=720-DAYL/2.0
TIMSS=TIMSR+DAYL
TIMFL=TIMOL+(HFLT-BALT)/ASCRT
EXPO=(TASL-TATRC)/(HTRCP-BALT)
EXPO=AG*MOLA/RGAS/EXPC/0.36
EXPT=(TATRO2-TATRO)/(HTROP2-HTRDP)
EXPT=AG*MOLA/RGAS/EXPT/0.36
EXPT2=(TATRO3-TATRC2)/(HTRCP3-HTRDP2)
EXPT3=(TAFLO-TATRO3)/(HFLOT-HTRFP3)
PATRO=PASL/((TATRO/TASL)**EXPO)
PATRO2=PATRO/((TATRO2/TATRC)**EXPT)
PATRO3=PATRO2/((TATRO3/TATRO2)**EXPT2)
INITIALIZE TEMPS TC SURFACE TEMP
TR=TASL
TS=TASL
Z1=BALT
Z2=0.0
VOLG=MGAS*RGAS*TR/(PASL*MOLG)/(1.E09)
EINT=EG*EW/(1.-RW*(1.-EG))
EGEF=EG*TAUM/(1.-RW*(1.-EG))
EWEF=EW*(1.+TAUM*(1.-EG))/(1.-RW*(1.-EG))
PRINT 640, EGEF, EMEF, EINT
AGEF=ALFRES*TWSQL/(1.-RWSOL*(1.-ALFRES))
AMEF=ALFES0*(1.+TWSQL*(1.-ALFRES))/(1.-RWSOL*(1.-ALFRES))
PRINT 650, AGEF, AMEF
RO=ROSL
TIT=TASL*5.5
DTIME=DTIMEN
NSUN=0
TTS=TIMIO

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IF (TIME.GT.TIMCL) TTS=TIMOL
IF (TTS.GE.TIMR.AND.TTS.LE.TIMSS) NSUN=1
TIME=TTS
TTIME=1440.0-TIMSS+TIME
IF (NSUN.EQ.1) TTIME=TIME-TIMSR
IF (TIME.GE.TIMSS) TTIME=TIME-TIMSS
DINCH=TIME/60.0
PTIMH=TIME/60.0
C*****
C SECTION FOUR -- START CF COMPUTATION LOOP *
C*****
310 CONTINUE
C SOLAR FLUX
IF (NSUN.EQ.0) GC TO 320
FLXSO=FLSOD*(TIME/TWILT)
IF (TTIME.GE.TWILT) FLXSO=FLSOD
IF (TTIME.GE.(DAYL-TWILT).AND.NSUN.EQ.1) FLXSO=
1 FLSOD*(FLSOD/TWILT)*(TTIME-(DAYL-TWILT))
IF (TTIME.GY.DAYL) FLXSC=0.0
GO TO 330
320 CONTINUE
FLXSC=0.0
C*****
C SECTION FIVE -- VARIABLE STORE FOR ITERATION *
C*****
330 CONTINUE
HTS=TIS
HIR=IR
HZ1=Z1
KZ2=Z2
HMGAS=MGAS
HVOLG=VOLG
HBALE=Z1
C*****
C SECTION SIX -- TA,UMU,RHC, AND P3 AS FUNCTIONS OF ALTITUDE *
C*****
IF (TIME.LE.TIMCL) HEAL=BALT
IF (HBALE.LE.HIRCF) TA=TASL-(TASL-TATRO)*(HEAL=BALT)/(HTROP=BALT)
IF (HBALE.GT.HIRCF) TA=TATRC+(TATRO2-TATRO)*(HEAL=HTROP)/
1 (HTROP2=HTRCF)
IF (HEAL.GT.HTRCF2) TA=TATRO2+(TATRO3-TATRC2)*(HEAL=HTROP2)/
1 (HTROP3=HTRCF2)
IF (HBALE.GT.HTRCF3) TA=TATRC3+(TAFLO-TATRC3)*(HEAL=HTROP3)/
1 (HFLOT=HTROP3)
IF (HBALE.LE.HTRCF) PE=FASL/((TA/TASL)**EXPC)
IF (HBALE.GT.HTRCF2) PB=PATRO/((TA/TATRO)**EXPT)
IF (HBALE.GT.HTRCF2) PB=PATRO2/((TA/TATRO2)**EXPT2)
IF (HBALE.GT.HTRCF3) PE=FATFO3/((TA/TATRO3)**EXPT3)
RO=MOLA*PB/(RGAS*TA)*1.E06
VISCOSITY CF AIR
UMU=(1.829639C1E-05-HEAL*5.06805747E-10+PBAL*PBAL*1.82009519E-14-
1 HBALE**3.0*1.72287567E-19)*60.0
IVOL=0
IVT=1
340 CONTINUE
IVOL=C
KUTTA=1
350 CONTINUE

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C*****
C SECTION SEVEN -- HEAT TRANSFER AND DRAG
C*****
C VDLG=MGAS*RGAS*TR/(PE*CLG)/(1.E+09)
C VDLG IN M CLBED
C ASCRT=22
R=0.62035*VCLG*(1./3.)
RRS=R
CHN=CFH(TA,TS)
REY=ABS(ASCRT)*FC*2.0*R/UMU
CHF=C/(2.*R)*.37*REY*.6
IF (VCLMAX.GT.5.38E5) CHF=2.*CHF
CH=CHN
IF (CHF.GT.CH) CH=CHF
ROTEMP=RO
RO=4.81E-02*PE/TF
CHR=CHRES(TR,TS)
RO=ROTEMP
DO 360 I=1,NCLDC
IF (TIME.GE.TCLDC(I)) ALBED=ALBC(I)
IF (TIME.LE.TIMFL) GC TC 360
IF (TIME.GE.TCLDC(I)) T4T=TEBC(I)
T3I=T4T
T2I=T4T
360 CONTINUE
EDOTV=0.0
DO 370 I=1,NVALVE
IF (TIME.GE.TVALVE(I)) EDCTV=VALVRT(I)
370 CONTINUE
QG=FLXSO*AMEF*(0.25+C.5*ALBED)
QF=QF+EINT*SIGMA*(TR**4-TS**4)
QF=QF+CHR*(TR-TS)
QF=QF+CH*(TA-TS)
IF (HBAL.LE.HBB2) TBB=T1T+(HBAL-HBB2)*(T3I-T2T)/(HBB2-HBB1)
IF (HBAL.GT.HBB2) TBB=T3T+(HBAL-HBB3)*(T4T-T3T)/(HFLDT-HBB3)
IF (HBAL.GE.HFLDT) TBB=T4T
QF=QF-EMEF*SIGMA*(TS**4-TBB**4)
QF=4.83598*QF*VCLG*(2./3.)
QG=FLXSO*QGEF*(1.+ALBED)
QG=QG-EINT*SIGMA*(TR**4-TS**4)
QG=QG-EGEF*SIGMA*(TR**4-TBB**4)
QG=4.83598*QG*VCLG*(2./3.)
REY=RC*ABS(22)*2*R/UMU
IF (REY.LT.0.01) CD=2400.
IF (REY.GE.0.01) AND.REY.LT.1.) CD=24./REY
IF (REY.GE.1.0) AND.REY.LT.10.0) CD=24.*REY*(=C.757)
IF (REY.GE.10.0) AND.REY.LT.100.) CD=16.04*REY*(=0.582)
IF (REY.GE.100.0) AND.REY.LT.1000.) CD=6.025*REY*(=0.369)
IF (REY.GE.1000.0) AND.REY.LT.1.E05) CD=0.47
IF (REY.GE.1.E5) AND.REY.LT.3.E5) CD=0.5
IF (REY.GE.1.E5) AND.REY.LT.3.E5) CD=0.5
IF (REY.GE.2.5E6) CD=6.7297E-20*REY**2.5495
IF (22.LT.0.0) CD=2.*CD
C*****
C SECTION EIGHT -- BEGIN DIFFERENTIAL EQUATION SOLUTION
C*****

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C*****SPHTM)
F1=QF/(MASSF*SPHTM)
F2=(QG*AG*MOLA*MGAS*TR/(TA*MCLG)*ASCRT*6.€3588E=C8)/(MGAS*SPHTG)
ABAL=1.20899*VCLG** (2./3.)
DO 38C I=2,NECRP
  IF (TIME*GE*TBDRP(I-1).AND.TIME*LI*TBDRP(I)) MPAY=
    MPD(I-1)=ERATE(I-1)*(TIME-TBDRP(I-1))
1 38C CCNTINUE
  FMIOT=(MGAS+MASSF*MPAY)/1000.0
  F3=Z2
  F4=AG*(RO*VOLG-FMTCI)=0.5*RO*CD*ABS(Z2)*Z2*AEAL
  F4=F4/(FMTCI+0.5*RO*VCLG)
  F5=PB*MOLG*1.E09/(RGAS*TR)*EDOTG=EDOTV
  FLIFT=RO*VCLG-FMTCI
  IF (KUTTA.NE.1) GO TC 390
  FK1=DTIME*F1
  FL1=DTIME*F2
  FM1=DTIME*F3
  FN1=DTIME*F4
  F01=DTIME*F5
  MGAS=+MGAS+0.5*FC1
  Z1=HZ1+0.5*FM1
  Z2=HZ2+0.5*FN1
  TS=HTS+0.5*FK1
  TR=HTR+0.5*FL1
  KUTTA=2
  IF (ABS(TS=HTS).GT.TSL) GO TC 420
  IF (ABS(TR=HTR).GT.TSL) GO TC 420
  IF (ABS(Z1=HZ1).GT.ZSL) GO TC 420
  IF (ABS(Z2=HZ2).GT.ZS.) GO TC 420
  GO TO 350
390 IF (KUTTA.NE.2) GC TC 400
  FK2=DTIME*F1
  FL2=DTIME*F2
  FM2=DTIME*F3
  FN2=DTIME*F4
  F02=DTIME*F5
  MGAS=+MGAS+0.5*FC2
  Z1=HZ1+0.5*FM2
  Z2=HZ2+0.5*FN2
  TS=HTS+0.5*FK2
  TR=HTR+0.5*FL2
  KUTTA=3
  IF (ABS(TS=HTS).GT.TSL) GO TO 420
  IF (ABS(TR=HTR).GT.TSL) GO TC 420
  IF (ABS(Z1=HZ1).GT.ZSL) GO TC 420
  IF (ABS(Z2=HZ2).GT.ZS.) GO TC 420
  GO TO 350
400 IF (KUTTA.NE.3) GO TO 410
  FK3=DTIME*F1
  FL3=DTIME*F2
  FM3=DTIME*F3
  FN3=DTIME*F4
  F03=DTIME*F5
  MGAS=+MGAS+FC3
  Z1=HZ1+FM3
  Z2=HZ2+FN3
  TS=HTS+FK3

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TR=HTR+FL3
KUTTA=4
IF (ABS(TS-HIS).GT.TSL) GO TC 420
IF (ABS(TR-HTR).GT.TSL) GO TO 420
IF (ABS(Z1-HZ1).GT.ZSL) GO TC 420
IF (ABS(Z2-HZ2).GT.ZS.) GO TO 420
GO TO 350
410 FK4=DTIME*F1
FL4=DTIME*F2
FM4=DTIME*F3
FN4=DTIME*F4
FO4=DTIME*F5
MGASD=(FO1+2.*FG2+2.*FC3+FO4)/6.0
Z1DEL=(FM1+2.*FM2+2.*FM3+FM4)/6.0
Z2DEL=(FN1+2.*FN2+2.*FN3+FN4)/6.0
TRDEL=(FL1+2.*FL2+2.*FL3+FL4)/6.0
TSDEL=(FK1+2.*FK2+2.*FK3+FK4)/6.0
IF (ABS(Z2DEL).GT.ZS.) GO TO 420
IF (ABS(Z1DEL).GT.ZSL) GO TO 420
IF (ABS(TSDEL).LE.TSL.AND.ABS(TRDEL).LE.TSL) GO TO 430
420 DTIME=DTIME/2.0
IF (IVOL.EQ.1) CTIME=2.0*DTIME
IF (IVOL.EQ.0) ITC=0
IF (DTIME.LT.0.00001) GC TC 520
TS=HTS
TR=HTR
Z1=HZ1
Z2=HZ2
MGAS=FMGAS
VOLG=HVOLG
GO TO 340
430 CONTINUE
IVOL=0
VOLG=(HMGAS+MGASD)*RGAS*(HTR+TRDEL)/(PB*MOLG)/(1.E09)
IF (VOLG.LE.VCLMAX) GC TO 460
IVOL=1
IVT=IVT+1
IF (IVT.GT.20) GC TO 460
IF (IVT.GT.2) GO TO 440
EDOTG=(VOLMAX-VCLG)/DTIME*2.0
GO TO 450
440 EDOTG=EDOTG*2.0
450 CONTINUE
460 GO TO 420
IF (IVOL.EQ.0) EDOTG=0.0
ITC=ITC+1
TR=HTR+TRDEL
TS=HTS+TSDEL
Z1=HZ1+Z1DEL
Z2=HZ2+Z2DEL
MGAS=HMGAS+MGASD
ASCRT=Z2
TIME=TIME+DTIME
ITIME=ITIME+DTIME
HBAL=Z1

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TIMH=TIME/60.
IF ((TIMH=DINCH).LE.0.25) GO TC 470
DINCH=TIMH
CONTINUE
47C IF (IPC.NE.=1.AND.ABS(TIMH-PTIMH).LT.PTINC) GC TC 500
IF (IPC.EQ.=1) IFC=0
IF (IPC.EQ.=0) PRINT 67C
IPC=IPC+1
NPC=NPC+1
TAK=TA=273.15
TSK=TS=273.15
TR=TR=273.15
R=0.62035*VOLG*(1./3.)
END 480 I=1,NCLDC
IF (TIME.GE.TCLDC(I)) ALBED=ALBC(I)
IF (TIME.LE.TIMFL) GC TO 480
IF (TIME.GE.TCLDC(I)) T4T=TBBC(I)
T3T=T4T
T2T=T4T
480 CONTINUE
IF (HBAL.LE.HBB2) TBB=T1T=(HEAL-BALT)*(T1T-T2T)/(HBB2-BALT)
IF (HBAL.GT.HBB2) TBB=T2T+(HBAL-HBB2)*(T3T-T2T)/(HBB3-HBB2)
IF (HBAL.GT.HBB3) TBB=T3T+(HBAL-HBB3)*(T4T-T3T)/(HFL0T-HBB3)
IF (HEAL.GE.FLCT) TBB=T4T
REY=RG*ABS(Z2)*2R/UMU
IF (REY.LT.0.01) CD=240C.
IF (REY.GE.0.C1.AND.REY.LT.1.) CD=24./REY
IF (REY.GE.1.C.AND.REY.LT.10.0) CD=24.*REY**(-C.757)
IF (REY.GE.10.0.AND.REY.LT.100.) CD=16.04*REY**(-C.582)
IF (REY.GE.100.0.AND.REY.LT.1000.) CD=6.025*REY**(-0.369)
IF (REY.GE.1000.0.AND.REY.LT.1.E05) CD=0.47
IF (REY.GE.1.E5.AND.REY.LT.3.E5) CD=0.5
IF (REY.GE.1.E5.AND.REY.LT.3.E5)CD=5.035E6*REY**(-1.406)
IF (REY.GE.3.E5) CD=0.5
IF (REY.GE.2.E6) CD=6.7297E-20*REY**2.5455
IF (Z2.LT.0.0) CD=2*CD
FLIFT=RO*VCLG-FMCT
TIMH=TIME-TIMOL
PRINT 690, TIMH,FEAL,Z2,TAK,TSK,TRK,VOLG,FLXSC,TBB,FLIFT,PB,MGAS.
1 IF (NYC.GE.99E) GO TC 450
NYC=NYC+1
YPT1(NYC)=TAK
YPT2(NYC)=TSK
YPT3(NYC)=TRK
YPT(NYC)=FBAL
PBI(NYC)=ALOG(PASL/PB)
TIMH1=TIMH*60.0-TIMOL
XPT1(NYC)=TIMH1
450 CONTINUE
C*****
C SECTION TEN == SOLAR COMPUTATIONS
C*****
PTIMH=TIMH
IF (NPC.LT.5) GC TO 500
NPC=0
IF (IFC.GE.50) IFC=0
PRINT 680

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C0CCCC40
C0CCG541
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500 CONTINUE
IF (DTIME.GT.CTMAX) GC TO 510
IF (ITC.LT.2) GC TO 510
DTIME=2.0*DTIME
ITC=0
510 CONTINUE
IF (DTIME.GE.CTMAX) CTIME=DTMAX
NPSUN=NSUN
IF (TIME.GE.(CLDIT+TIMCL)) GC TO 530
NSUN=0
CIT=TIME-1440.0*INT(TIME/1440.0)
IF (CIT.GE.TIMSR.AND.CIT.LE.TIMSS) NSUN=1
IF (NSUN.EQ.NPSUN) GC TO 310
IF (NSUN.EQ.1) TTIME=CIT-TIMSR
IF (NSUN.EQ.0) TTIME=CIT-TIMSS
GO TO 310
520 CCNTINUE
PRINT 660
STOP
530 WRITE (6,700)
PRINT 710
C*****
C SECTION ELEVEN == PLOT CALLS AND PLOT OUTPUT *****
C*****
IF (DPLT.LE.0.0) GO TO 550
DO 540 J=1,NEX
ETIME(J)=(ETIME(J)/60.0)
EMB1(J)=ALCG(PASL/EMB(J))
540 CONTINUE
CALL PLOTS (0.0,0)
TIMIN=120.0
DTMIN=20.0
DX1=40.0
NYCP1=NYC+1
NYCP2=NYC+2
XPTT(NYCP1)=0.0
XPTT(NYCP2)=40.0
IF (NEX.LE.0)GC TC 542
NEX1=NEX+1
NEX2=NEX+2
ETIME(NEX1)=0.0
ETIME(NEX2)=40.0
EALT(NEX1)=0.0
EALT(NEX2)=5000.0
EGAST(NEX1)=TIMIN
EGAST(NEX2)=DTMIN
EAIPT(NEX1)=TIMIN
EAIPT(NEX2)=DTMIN
EFILMT(NEX1)=TIMIN
EFILMT(NEX2)=DTMIN
EMB1(NEX1)=0.0
EMB1(NEX2)=1.0
EMB2(NEX2)=1.0
CGNTINUE
542 XLI=XPTT(NYC)/XPTT(NYCP2)
XLT=INT(XLT)+1
CALL PLOT (1.0,C.5,-3)
YPH(NYCP1)=0.0
YPH(NYCP2)=5000.00

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CALL AXIS1 (0.0,C.0.,TIME-MIN',-8,XLT,0.0,C.0.C.0,DX1,20.0)
CALL AXIS1 (0.0,C.0.,ALTITUDE-M',10.9,0.0,90.0.C.,YPH(NYCP2),20.0)
CALL LINE (XFTT,YPH,NYC,1,0,0)
IF(NEX.LE.0)GC TC 543
CALL LINE (ETIME,EALY,NEX,1,-1,2)
543 CONTINUE
XLT1=XLT+3
CALL PLOT (XLT1,0.,-3)
YPT1(NYCP1)=TTMIN
YPT1(NYCP2)=DTMIN
YPT2(NYCP1)=TTMIN
YPT2(NYCP2)=DTMIN
YPT3(NYCP1)=TTMIN
YPT3(NYCP2)=DTMIN
CALL AXIS1 (C.0.C.0.,TIME-MIN',-8,XLT,0.0,C.0,DX1,20.0)
CALL AXIS1 (0.0,C.0.,TEMPERATURE-C',13.8,C.9C.0,TTMIN,DTMIN,20.0)
CALL LINE (XFTT,YPH,NYC,1,0,0)
CALL LINE (XFTT,YPH,NYC,1,0,0)
IF(NEX.LE.0)GC TC 545
CALL LINE (ETIME,EALY,NEX,1,-1,2)
CALL LINE (ETIME,EALY,NEX,1,-1,3)
CALL LINE (ETIME,EALY,NEX,1,-1,4)
545 CONTINUE
XLT2=XLT+3.0
PBI(NYCP1)=0.0
PBI(NYCP2)=1.0
CALL PLOT (XLT2,0.5,-2)
CALL AXIS1 (C.0.C.0.,TIME-MIN',-8,XLT,0.0,C.0,DX1,20.0)
CALL AXIS1 (C.0.C.0.,LN(FASL/PE)',11,10.0,50.0,0.0,EMB1(NEX2),
1 20.0)
IF(NEX.LE.0)GC TC 547
CALL LINE (ETIME,EALY,NEX,1,-1,5)
547 CONTINUE
CALL LINE (XFTT,FBI,NYC,1,0,0)
PRINT 730, NYC
CALL PLOT (C.0.0.,959)
STOP
550 CONTINUE
PRINT 720
STOP
C
560 FCRMAT (20A4)
570 FCRMAT (1H1,20A4)
580 FCRMAT (1S)
590 FCRMAT (0.,, TEDRP BALLAST RATE(GM/MIN),)
600 FCRMAT (3F10,2) ALBEDO BLACKBALL(DEG-K')
610 FCRMAT (0.,, TCLDC VALVE RATE (GM/HIN),)
620 FCRMAT (0.,, TVALVE
630 FCRMAT (13)
640 FCRMAT (0.,,EFEG = ,F10.4., EMEF = ,F10.4., EINT = ,F10.4)
650 FCRMAT (0.,,EX, ALPHA GASEFF = ,F10.4., ALPHA WALL EFFECTIVE =
1,F10.4)
660 FCRMAT (1H1,5X,44PRCGRAM CUT CN ABNORMAL EXIT IN MAIN ROUTINE)
670 FCRMAT (1H1, TIME',2X,ALT(M)',1X,V(M/MIN)',3X,TA(C)',3X,
1 'TS(C)',3X,TG(C)',3X,VOLUME(M3)',1X,FLXSC',5X,TBB(K)',1X,
2 'FL(KG)',2X,F(MB)',1X,GAS(GM)',2X,REY NO',3X,CD',4X,
3 'PAY(GM),)

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680 FORMAT (1X)
690 FORMAT (F6.3,F9.0,F6.1,F8.0,4F8.2,E13.5,E9.2,F8.1,F7.2,F7.1,F8.0,E10.2,
700 FORMAT (33H PROGRAM COMPLETED CN NORMAL EXIT)
710 FORMAT (1H1)
720 FORMAT ('0', ' OUT CN IVT')
730 FORMAT (' ', 'NYC=', IS)
740 FORMAT (1H0,8X,'ETIME',12X,'EALT',11X,'EAIRT',10X,'EFILMT',11X,
750 FORMAT (3F3.0,1X,6F10.4)
760 FORMAT (' ',7F16.3)
END

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C*****  
C FUNCTION CFH (T1,T2)  
C*****  
C HEAT TRANSFER COEFFICIENT BETWEEN FILM AND AIR *  
C*****  
C*****  
C COMMON /AA/ R,UMU,RO,AG,PR,C  
C GR=(1.0/T1)*R**3.0*(1.0/UMU**2.0)*ABS(T1-T2)*RC*RO*AG  
C IF (GR.LE.1.40E-05) GR=1.4E-05  
C X=2.0+0.6*(GR*PR)**0.25  
C CFH=(C/R)*X  
C RETURN  
C END
```

```

FUNCTION CHRES (T1,T2)
*****
C HEAT TRANSFER COEFFICIENT BETWEEN FILM AND GAS *****
C *****
C *****
COMMON /AA/ R,UMU,RO,AG,PR,C *****
RI=2.*RRRES *****
STOR=UMU *****
UMU=1.577545E-04*(T1**1.5)/(1.8*T1+143.0) *****
GR=(1.0/T1)*RI**3.0*(1.0/UMU**2.0)*ABS(T1-T2)*RO*RO*AG *****
IF ((GR*.67).LT.0.15E9) GO TC 10 *****
X=0.13*(GR*.67)**0.333333 *****
GO TO 20 *****
10 X=2.0*0.6*(GR*0.67)**0.25 *****
20 IF (GR.LE.1.4E=C5) GR=1.4E=C5 *****
CG=.833*9.0864E-2*(T1*1.8)**0.682 *****
CHRES=CG/RI*X *****
UMU=STOR *****
RETURN *****
END *****

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SUBROUTINE ATMOS2 (PA,H,TOF,IGH)
C*****
C STANDARD ATMOSPHERE, USED TO OBTAIN ALTITUDE FROM PRESSURE *****
C IN MILLIBARS. USED WITH EXPERIMENTAL DATA ONLY FOR PLOTS. *****
C*****
REAL MA,LP
TOHIGH=1
MA=28.9664
R=8.31432E03
GY=9.80665
IF (PA.LT.226.32) GO TC 10
PB=1013.25
HB=0.0
TB=288.15
LP=0.0065
RHOB=1.225
GO TO 70
10 IF (PA.LT.54.745) GO TC 20
PB=226.32
HB=11000.
TB=216.65
LP=0.0
RHOB=0.36392
GO TO 70
20 IF (PA.LT.8.680) GC TC 30
PB=54.749
HB=20000.
TB=216.65
LP=0.001
RHOB=0.088035
GO TO 70
30 IF (PA.LT.1.105) GC TC 40
PB=8.680
HB=32000.
TB=228.65
LP=0.0028
RHOB=0.013225
GO TO 70
40 IF (PA.LT.0.550) GC TC 50
PB=1.109
HB=47000.
TB=270.65
LP=0.0
RHOB=0.0014275
GO TO 70
50 IF (PA.LT.0.01828) GC TC 60
PB=0.59
HB=52000.
TB=270.65
LP=0.002
RHOB=0.0007594
GO TO 70
60 CONTINUE

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CCCCC045
CCCCC046
CCCCC047
CCCCC048
CCCCC049
CCCCC050
CCCCC051
CCCCC052
CCCCC053
CCCCC054
CCCCC055
CCCCC056

```

```
TOHIGH=-1  
GO TO 90  
70 IF (LP.EQ.0.0) GC TO 80  
H=HB+TB/LP*((PE/PA)**(LP*R/GY/MA))-1.0)  
GO TO 90  
80 H=ALOG(PB/PA)*R*TB/GY/MA+HB  
90 RETURN  
END
```

```
00000057  
00000058  
00000059  
00000060  
00000061  
00000062  
00000063  
00000064
```

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APPENDIX B

SAMPLE CASE

The input and output for a sample case is presented on the following pages. The 167N flight launched from Palestine, Texas on July 24, 1980, was chosen because it involves most of the features of the THERMTRAJ program with the exception of programmed valving. The plotted output should provide a good indication of the accuracy of the program in terms of predicted altitude as well as balloon gas and film temperature.

Table 1.B. THERMTRAJ input data for the 167N flight
 (* Designates the column numbers of the data cards)

* 12345678901234567890123456789012345678901234567890123456789012345678901234567890
 FLIGHT 167-N NUMBER 12 WITH DOUBLE CD ON DESCENT AND HIGH CIRUS
 GFIPUT TIMOL=10.56,CUTDT=18.50,ASCRT=257.3,HPLT=35800.,PASL=1000.,
 MASSF=1.842E5,MGAS=6.9221E4,MPAY1=1.9682E5,VCLMAX=6.6375E4,CAYL=16.,
 ALB50=7.2775,TASL=304.55,HTROP=12500.,TATRO=220.65,HTROP2=18300.,
 TATRO2=221.35,HTROP3=20000.,TATRO3=211.32,HFLOT=35300.,TAFLO=245.73,
 HRR2=15300.,HRR3=20000.,T2T=209.4,T3T=209.4,T4T=209.4,DPLT=1.0,
 IAT45=6,CEND

0.0 0.0
 673. 7257.44
 676.125 0.0
 1200.0 200

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0.0 0.2775 209.4
 170. 0.2775 204.4
 545.0 0.18 214.4
 1200. 0.18 214.4
 0

83						
16.40.00.						
16.40.00.	1000.0	31.4	31.4	31.4	31.4	
16.46.00.	782.					
16.51.00.	670.		9.0	-8.5	11.5	
16.58.00.	527.					
17.03.02.	429.					
17.07.14.	360.					
17.11.12.	301.					
17.16.00.	233.	-44.	-34.0	-47.5	-31.0	-28.0
17.19.20.	206.5					
17.23.28.	170.0					
17.27.00.	134.	-67.	-60.		-53.5	-55.0
17.30.34.	116.0					
17.35.00.	96.0	-67.5	60.0		58.5	57.5
17.40.00.	75.0		-54.0	-75.0	53.0	49.0
17.44.57.	59.0					
17.51.13.	45.7	-53.0	48.7	51.3	44.0	42.7
18.00.49.	29.8		47.1	50.3	50.3	50.4
18.08.49.	30.2		43.9	49.2	57.7	35.5
18.20.49.	11.8		39.3	49.3	50.1	52.0
18.32.49.	7.03		37.5	42.1	44.5	42.7
18.42.49.	5.04		30.9	36.4	37.7	40.4
18.50.48.	4.85		29.5	36.4	27.7	25.5
19.04.48.	4.78		28.8	28.9	21.4	16.8
19.10.49.	4.79		28.3	20.0	20.8	16.8
19.20.49.	4.91		26.2	19.5	19.2	15.1
19.32.48.	4.85		27.0	17.9	19.6	16.1
19.44.49.	4.97		27.7	18.6	19.6	17.4
19.56.48.	4.85		27.0	18.1	18.1	14.6
20.08.49.	4.85		27.0	16.8	17.4	15.3
20.20.49.	4.85		27.0	16.2	17.4	15.3
20.32.49.	4.85		27.0	15.7	19.0	19.7
20.45.28.	4.85		27.0	15.2	18.1	18.6
21.06.48.	4.85		27.0	14.7	21.8	23.0
21.14.08.	4.85		27.0	14.2	22.2	23.0
21.30.48.	4.85		27.0	13.7	24.1	23.0
21.45.04.	4.85		27.0	13.2	21.7	21.3
22.04.47.	4.85		27.0	12.7	19.7	18.9
22.15.03.	4.85		27.0	12.2	20.3	19.6
22.30.39.	4.85		27.0	11.7	21.0	20.6
22.45.04.	4.85		27.0	11.2	19.6	18.3
23.03.52.	4.85		27.0	10.7	19.3	18.7
23.15.52.	4.85		27.0	10.2	21.2	19.2
23.27.51.	4.85		27.0	9.7	22.6	21.5
23.46.16.	4.85		27.0	9.2	21.8	19.6
24.01.52.	4.85		27.0	8.7	20.1	18.8
24.15.55.	4.85		27.0	8.2	18.2	14.8
24.30.47.	4.85		27.0	7.7	16.6	16.3
24.44.48.	4.85		27.0	7.2	20.2	17.0
24.59.48.	4.85		27.0	6.7	20.6	22.3
25.16.39.	4.85		27.0	6.2	21.5	16.3
25.30.47.	4.85		27.0	5.7	22.8	17.9
25.45.59.	4.85		27.0	5.2	23.7	18.9
26.01.27.	4.85		27.0	4.7	23.0	21.8
26.16.59.	4.85		27.0	4.2	29.1	25.2
26.33.27.	4.85		27.0	3.7	24.9	19.0
27.00.31.	4.85		27.0	3.2	37.0	22.9
27.14.47.	4.85		27.0	2.7	48.4	26.4
27.30.23.	4.85		27.0	2.2	48.3	27.0
27.47.51.	4.85		27.0	1.7	48.8	26.4
28.03.51.	4.85		27.0	1.2	41.4	30.2
28.19.51.	4.85		27.0	0.7	43.7	36.4
28.36.46.	4.85		27.0	0.2	49.9	42.4
28.53.47.	4.85		27.0	-0.3	50.8	49.2
29.10.47.	4.85		27.0	-0.8	51.5	49.8
29.27.47.	4.85		27.0	-1.3	52.6	49.2
29.44.47.	4.85		27.0	-1.8	49.7	49.8
29.61.47.	4.85		27.0	-2.3	52.3	49.8
29.78.47.	4.85		27.0	-2.8	51.6	50.8
30.03.57.	4.85		27.0	-3.3	51.0	50.1
30.17.59.	4.85		27.0	-3.8	51.7	49.8
30.33.59.	4.85		27.0	-4.3	51.1	49.1
30.49.59.	4.85		27.0	-4.8	51.7	49.6
31.06.59.	4.85		27.0	-5.3	52.0	50.5
31.22.59.	4.85		27.0	-5.8	51.6	50.0
31.39.59.	4.85		27.0	-6.3	52.2	49.8
31.56.59.	4.85		27.0	-6.8	52.2	50.5
32.13.59.	4.85		27.0	-7.3	52.2	50.7
32.30.59.	4.85		27.0	-7.8	52.3	50.8
32.47.59.	4.85		27.0	-8.3	52.4	50.7
33.04.59.	4.85		27.0	-8.8	52.4	50.7
33.21.59.	4.85		27.0	-9.3	52.4	50.7
33.38.59.	4.85		27.0	-9.8	52.4	50.7
33.55.59.	4.85		27.0	-10.3	52.4	50.7
34.12.59.	4.85		27.0	-10.8	52.4	50.7
34.29.59.	4.85		27.0	-11.3	52.4	50.7
34.46.59.	4.85		27.0	-11.8	52.4	50.7

Table 2.B. THERMTRAJ printed output for the 167N flight

FLIGHT 167-N NUMBER 12 WITH DOUBLE CD CN DESCENT AND HIGH CIRUS
 CFIPUT
 TIMCL= 10.5799999 ,CUTD1= 18.5CCCCC ,BALI= 120.000000 ,ASCR1= 297.300049 ,PFLIT= 35800.0000 ,PASL=
 1000.00000 ,MASSF= 184200.000 ,MGAS= 69221.0000 ,MPAYI= 156R20.000 ,VCLMA)= 66375.0000 ,DAYL= 16.00000000
 TWILT= 1500000000 ,ALBED= 277455574 ,FLSDD= 19892.0000 ,PTINC= 166600011E-01,CTMAX= 5.00000000 ,SPHYW=
 550000012 ,SPFTG= 1.241189556 ,MDLA= 23.9644012 ,MOLG= 4.00259972 ,ALFRES= 260000001E-02,EG= .312000047E-03,
 ALFSD= 599999931E-C3,TMSOL= 884595990 ,RMSOL= 1140000022 ,EV= 3099999955E-01,RN= .126995974 ,TAUN= .8420000008
 TASH= 304.550049 ,HTROP= 12500.0000 ,IATFC= 220.649954 ,HYRDP2= 15300.C0C0 ,IATFO2= 201.3500006 ,HYRDP3=
 28000.00000 ,IATRO3= 211.520004 ,HWLCI= 35800.0000 ,IAFLD= 245.7295956 ,HBB2= 15300.0000 ,HRB3= 20000.0000
 I2I= 209.359994 ,IAT13T= 209.399994 ,HWLCI= 35800.0000 ,IATFC= 220.649954 ,HYRDP2= 15300.C0C0 ,IATFO2= 201.3500006 ,HYRDP3=
 28000.00000 ,IATRO3= 211.520004 ,HWLCI= 35800.0000 ,IAFLD= 245.7295956 ,HBB2= 15300.0000 ,HRB3= 20000.0000
 6
 6

TBURP BALLAST RATE(GM/PIN)

0.0
 673.00 7257.44
 676.12 0.0
 1200.00 0.0

TCLDCL ALBEDO BLACKBALL (DEG-K)

0.0
 170.00 0.28
 545.00 0.18
 1200.00 0.18

ETINE	EALT	EAIRT	EFILMT	EGAST
0.0	110.872	51.400	31.400	31.400
360.000	2121.948	0.0	0.0	0.0
650.000	3354.871	0.0	8.000	-8.500
1090.000	5184.336	0.0	0.0	0.0
1292.000	6703.738	0.0	0.0	0.0
1634.000	7922.141	0.0	0.0	0.0
1872.000	9141.109	0.0	0.0	0.0
2160.000	10678.723	-44.000	-34.000	-47.500
2360.000	11581.124	0.0	0.0	0.0
2608.000	12814.535	0.0	0.0	0.0
2820.000	14323.469	-67.000	-60.000	0.0
3074.000	16438.184	0.0	0.0	0.0
3200.000	18003.586	-67.500	-60.000	0.0
3600.000	19525.152	0.0	0.0	-78.000
3891.000	21148.562	0.0	0.0	0.0
4273.000	22891.562	-53.700	-48.700	-51.300
4849.000	24615.762	-47.100	-45.100	-50.100
5329.000	26415.762	-45.300	-43.900	-49.200
6049.000	29953.398	-37.500	-39.300	-49.300
6769.000	33423.215	-36.500	-36.400	-42.100
7369.000	35720.371	-28.500	-34.000	-36.400
7848.000	35989.672	-28.500	-31.700	-25.900
8488.000	36091.770	-28.500	-30.400	-20.000
9049.000	36077.051	-26.500	-31.500	-19.500
9648.000	35903.383	-26.500	-31.200	-17.900
10368.000	35675.187	-27.000	-31.200	-18.600
11089.000	35818.266	-27.000	-31.200	-18.100
11820.000	35528.671	-24.500	-31.500	-16.800
12529.000	35011.141	-26.500	-31.500	-16.200
13785.000	34683.620	-26.500	-33.000	-19.000
14728.000	34283.137	-26.500	-31.800	-18.200
16008.000	34719.410	-21.700	-35.300	-22.200
16448.000	34973.914	-32.700	-35.100	-24.100
17448.000	34961.531	-30.600	-34.700	-21.700
18304.000	34719.410	-30.600	-34.600	-19.700
19487.000	34648.461	-32.700	-34.800	-20.300
20103.000	34672.059	-33.500	-34.200	-21.200
21039.000	34261.020	-30.000	-34.100	-18.900
21504.000	34236.902	-30.000	-33.800	-19.800
23032.000	34294.273	-33.100	-34.300	-21.000
23752.000	34440.375	-33.100	-34.600	-22.200
24471.000	34350.035	-30.800	-36.000	-21.200
25276.000	34097.246	-30.800	-34.500	-20.100
26112.000	33590.105	-30.200	-35.700	-18.200

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TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALT(M)	VM(MIN)	TA(C)	TS(C)	TG(C)	VOLUME(M3)	FLXSC	TBB(K)	FL(KG)	P(MB)	GAS(LGM)	REY NO	CD	PAY(LGM)
108.2	323.05	-46.19	-49.21	C:41365E+05	0.20E+05	209.4	16.95	7.8	69221.	0.20E+06	0.500	196820.		
109.3	326.59	-46.50	-48.25	C:44098E+05	0.20E+05	209.4	17.09	7.3	69221.	0.20E+06	0.500	196820.		
110.4	349.87	-44.81	-47.36	C:47044E+05	0.20E+05	209.4	17.24	6.5	69221.	0.18E+06	0.500	196820.		
111.5	345.22	-44.81	-46.41	C:50224E+05	0.20E+05	209.4	17.39	6.5	69221.	0.18E+06	0.500	196820.		
112.6	349.64	-42.44	-45.44	C:53358E+05	0.20E+05	209.4	17.54	6.1	69221.	0.18E+06	0.500	196820.		
113.7	358.12	-42.76	-44.46	C:57378E+05	0.20E+05	209.4	17.71	5.7	69221.	0.17E+06	0.500	196820.		
114.8	356.88	-42.10	-43.45	C:61392E+05	0.20E+05	209.4	17.88	5.4	69221.	0.17E+06	0.500	196820.		
115.9	363.30	-41.45	-42.43	C:65749E+05	0.20E+05	209.4	18.07	5.0	69221.	0.16E+06	0.500	196820.		
117.0	369.96	-41.13	-40.41	C:66328E+05	0.20E+05	209.4	18.87	4.8	69221.	0.16E+06	0.500	196820.		
118.0	367.69	-40.91	-38.82	C:66270E+05	0.20E+05	209.4	19.03	4.7	69221.	0.25E+05	0.940	196820.		
119.1	366.11	-39.45	-31.25	C:66254E+05	0.20E+05	209.4	2.12	4.8	69221.	0.25E+05	0.940	196820.		
120.3	367.11	-37.19	-25.42	C:66301E+05	0.20E+05	209.4	1.66	4.8	69221.	0.41E+05	0.470	196820.		
121.4	367.87	-36.07	-27.54	C:66377E+05	0.20E+05	209.4	1.08	4.7	69221.	0.42E+04	0.940	196820.		
122.5	367.14	-34.74	-25.42	C:66328E+05	0.20E+05	209.4	0.41	4.7	69221.	0.28E+05	0.940	196820.		
123.5	366.74	-33.51	-25.42	C:66042E+05	0.20E+05	209.4	2.45	4.8	60955.	0.45E+04	0.470	196820.		
124.7	367.68	-32.66	-23.65	C:66331E+05	0.20E+05	209.4	0.03	4.7	60923.	0.37E+05	0.470	196820.		
125.8	368.03	-32.25	-22.62	C:66365E+05	0.20E+05	209.4	0.96	4.7	55221.	0.21E+05	0.940	196820.		
127.1	369.59	-31.22	-20.52	C:66112E+05	0.20E+05	209.4	0.59	4.7	55221.	0.21E+05	0.940	196820.		
128.1	369.78	-30.52	-20.52	C:65771E+05	0.20E+05	209.4	1.66	4.8	55221.	0.27E+04	0.470	196820.		
129.1	367.34	-30.22	-20.27	C:65971E+05	0.20E+05	209.4	1.13	4.8	55221.	0.29E+05	0.470	196820.		
130.2	368.11	-29.22	-20.42	C:66312E+05	0.20E+05	209.4	0.70	4.7	59326.	0.32E+05	0.470	196820.		
131.5	368.51	-28.84	-18.86	C:66312E+05	0.20E+05	209.4	0.13	4.7	59326.	0.31E+05	0.940	196820.		
132.6	368.73	-28.17	-17.98	C:65677E+05	0.20E+05	209.4	0.76	4.8	59326.	0.12E+04	0.940	196820.		
133.9	369.49	-26.81	-18.01	C:65406E+05	0.20E+05	209.4	0.81	4.8	59326.	0.92E+04	0.470	196820.		
135.1	367.16	-26.51	-18.37	C:65491E+05	0.20E+05	209.4	0.12	4.8	59326.	0.16E+05	0.470	196820.		
137.5	367.81	-25.37	-16.34	C:66100E+05	0.20E+05	209.4	0.09	4.7	59326.	0.41E+04	0.470	196820.		
138.7	367.82	-25.20	-16.05	C:66340E+05	0.20E+05	209.4	0.71	4.7	59326.	0.54E+04	0.940	196820.		
139.9	367.52	-25.31	-17.58	C:65358E+05	0.20E+05	209.4	0.14	4.7	59326.	0.88E+04	0.940	196820.		
141.5	367.11	-25.31	-17.58	C:66031E+05	0.20E+05	209.4	0.42	4.7	59326.	0.47E+04	0.470	196820.		
143.9	367.91	-25.35	-17.78	C:66151E+05	0.20E+05	209.4	0.15	4.7	59326.	0.60E+04	0.470	196820.		
145.1	367.60	-25.27	-17.44	C:66358E+05	0.20E+05	209.4	0.92	4.7	59326.	0.12E+05	0.940	196820.		
146.3	367.00	-25.34	-16.90	C:66232E+05	0.20E+05	209.4	0.13	4.7	59326.	0.11E+05	0.940	196820.		
147.9	367.00	-25.46	-16.34	C:66270E+05	0.20E+05	209.4	0.37	4.8	59326.	0.12E+04	0.470	196820.		
150.5	367.24	-25.45	-17.22	C:65406E+05	0.20E+05	209.4	0.20	4.8	59326.	0.16E+04	0.470	196820.		
151.9	367.18	-25.42	-17.11	C:65322E+05	0.20E+05	209.4	0.08	4.8	59326.	0.35E+04	0.940	196820.		
155.1	367.11	-25.43	-17.05	C:65778E+05	0.20E+05	209.4	0.03	4.8	59326.	0.39E+04	0.940	196820.		
156.7	369.82	-25.45	-16.51	C:65740E+05	0.20E+05	209.4	0.21	4.8	59326.	0.15E+04	0.470	196820.		
158.3	369.82	-25.49	-17.15	C:65428E+05	0.20E+05	209.4	0.01	4.8	59326.	0.15E+04	0.470	196820.		
159.9	369.85	-25.48	-17.22	C:65568E+05	0.20E+05	209.4	0.15	4.8	59326.	0.25E+03	0.859	196820.		
161.5	366.58	-25.46	-17.12	C:65568E+05	0.20E+05	209.4	0.05	4.8	59326.	0.25E+04	0.940	196820.		
164.7	366.91	-25.47	-17.09	C:65598E+05	0.20E+05	209.4	0.05	4.8	59326.	0.39E+04	0.940	196820.		
167.3	368.26	-25.51	-17.17	C:65428E+05	0.20E+05	209.4	0.11	4.8	59326.	0.18E+03	1.768	196820.		
169.9	368.85	-25.50	-17.22	C:65406E+05	0.20E+05	209.4	0.02	4.8	59326.	0.15E+04	0.470	196820.		
171.1	366.85	-25.50	-17.22	C:65406E+05	0.20E+05	204.4	0.14	4.8	59326.	0.31E+04	0.470	196820.		
172.7	366.75	-25.50	-17.45	C:65406E+05	0.20E+05	204.4	0.54	4.8	59326.	0.72E+04	0.940	196820.		
174.3	369.26	-25.57	-17.42	C:65138E+05	0.20E+05	204.4	0.35	4.8	59326.	0.15E+05	0.940	196820.		
175.9	365.64	-25.70	-17.47	C:64588E+05	0.20E+05	204.4	0.19	4.8	59326.	0.13E+05	0.940	196820.		
177.5	365.12	-25.82	-17.61	C:64028E+05	0.20E+05	204.4	0.22	4.8	59326.	0.11E+05	0.940	196820.		
179.1	364.62	-25.93	-17.73	C:63558E+05	0.20E+05	204.4	0.23	4.8	59326.	0.12E+05	0.940	196820.		
180.7	364.11	-26.04	-17.83	C:63081E+05	0.20E+05	204.4	0.21	4.8	59326.	0.11E+05	0.940	196820.		

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE 2.B. (continued) THERMIRAJ PRINTED OUTPUT

27316.000	31491.021	34.100	37.200	-19.600
28241.000	33125.927	35.600	37.700	-20.200
29088.000	32802.723	34.200	38.200	-20.600
30042.000	33761.516	35.400	39.100	-21.500
30595.000	33761.515	36.200	39.600	-22.800
31847.000	31983.996	37.200	39.700	-23.300
32755.000	31326.141	35.300	41.200	-23.000
33687.000	30728.820	36.700	44.600	-29.100
35415.000	28151.730	42.200	47.900	-34.900
35227.000	27159.932	42.600	48.400	-37.600
37231.000	26287.867	40.500	48.300	-38.600
39687.000	25598.191	47.300	48.800	-41.400
39023.000	24824.012	45.100	49.200	-43.700
41021.000	24225.246	50.400	49.300	-46.000
41721.000	24749.012	45.400	50.800	-48.800
42591.000	24749.012	45.700	49.200	-49.200
43606.000	24650.457	49.700	52.500	-49.700
44837.000	24695.629	50.200	51.600	-49.900
45227.000	24601.655	48.200	51.600	-49.100
46247.000	24529.379	45.100	51.300	-48.900
47279.000	24340.535	48.600	51.100	-48.200
48237.000	24271.113	42.300	51.700	-48.100
50278.000	18459.221	48.400	52.000	-49.700
50552.000	24134.543	48.200	51.600	-49.100
51256.000	24022.969	45.800	51.600	-48.700
52858.000	24067.391	51.800	52.800	-50.100
53572.000	24000.863	51.600	53.300	-50.200
54296.000	23891.562	52.000	53.500	-50.100
55258.000	23678.547	51.200	53.300	-49.800
56215.000	18063.047	51.100	53.200	-49.400
58261.000	37533.676	52.300	55.400	-51.300
59752.000	22710.562	52.600	56.400	-51.800
60718.000	22361.197	53.500	57.300	-51.700
61677.000	22294.441	54.700	56.700	-51.700
62637.000	22145.266	55.700	57.100	-52.900
63361.000	18063.047	52.900	53.700	-50.900
64078.000	21882.445	54.100	52.500	-51.100
65058.000	27583.336	55.100	0.0	0.0

FFEG = 3.0003 ESEF = 0.0000 EIFT = 0.0000

ALPHA GASEFF = 0.0026 ALPHA BALL EFFECTIVE = 0.0020

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALT(M)	V(W/MIN)	TA(C)	TS(C)	TG(C)	VOLUME(M3)	FLXSD	TBB(K)	FL(KG)	P(MB)	GAS(GM)	REY NO	CD	PAY(GM)
0.0	120.	15.94	31.40	31.40	31.40	0.43791E+03	0.20E+05	299.0	50.67	1000.0	69221.	0.16E+06	0.500	196820.
1.1	390.	265.47	29.75	30.84	28.53	0.45566E+03	0.20E+05	297.5	48.30	973.0	69221.	0.26E+07	0.543	196820.
2.1	675.	271.63	29.40	29.40	25.53	0.47151E+03	0.20E+05	295.8	47.67	940.7	69221.	0.20E+07	0.576	196820.
3.2	976.	268.72	25.79	27.52	23.71	0.46881E+03	0.20E+05	294.0	47.18	910.5	69221.	0.26E+07	0.551	196820.
4.2	1265.	274.31	23.60	25.60	21.68	0.48205E+03	0.20E+05	292.3	47.20	878.4	69221.	0.26E+07	0.557	196820.
5.3	1556.	285.53	21.86	23.65	19.67	0.49431E+03	0.20E+05	290.6	46.95	851.8	69221.	0.25E+07	0.500	196820.
6.3	1849.	280.01	19.78	21.67	17.67	0.50766E+03	0.20E+05	288.8	47.06	821.5	69221.	0.26E+07	0.556	196820.
7.4	2144.	281.57	17.78	19.68	15.65	0.52318E+03	0.20E+05	287.1	47.01	794.0	69221.	0.26E+07	0.547	196820.
8.5	2457.	274.48	15.76	17.58	13.52	0.53769E+03	0.20E+05	285.3	46.79	766.6	69221.	0.25E+07	0.500	196820.
9.5	2757.	285.04	13.62	15.56	11.48	0.55420E+03	0.20E+05	283.5	46.92	738.5	69221.	0.25E+07	0.529	196820.
10.6	3061.	289.71	11.57	13.52	9.42	0.57049E+03	0.20E+05	281.7	46.88	712.2	69221.	0.26E+07	0.536	196820.
11.7	3382.	285.52	9.49	11.56	7.24	0.58735E+03	0.20E+05	279.8	46.67	686.4	69221.	0.25E+07	0.500	196820.
12.8	3691.	294.42	7.30	9.29	5.14	0.60635E+03	0.20E+05	278.0	46.81	659.5	69221.	0.25E+07	0.520	196820.
13.7	4004.	298.74	5.18	7.20	3.02	0.62516E+03	0.20E+05	276.1	46.78	635.2	69221.	0.25E+07	0.522	196820.
14.9	4335.	298.06	3.04	4.98	0.78	0.64467E+03	0.20E+05	274.2	46.56	611.0	69221.	0.25E+07	0.500	196820.
16.0	4668.	296.63	0.78	2.75	-1.47	0.66639E+03	0.20E+05	272.2	46.55	586.2	69221.	0.24E+07	0.500	196820.
17.1	5004.	303.92	-1.49	0.51	-3.73	0.68918E+03	0.20E+05	270.2	46.53	562.1	69221.	0.25E+07	0.500	196820.
18.2	5345.	311.32	-3.80	-1.76	-6.04	0.71330E+03	0.20E+05	268.2	46.50	538.4	69221.	0.25E+07	0.500	196820.
19.3	5650.	314.62	-6.13	-4.06	-8.37	0.73884E+03	0.20E+05	266.2	46.47	515.3	69221.	0.25E+07	0.500	196820.
20.4	6037.	316.49	-8.49	-6.39	-10.71	0.76573E+03	0.20E+05	264.1	46.47	492.8	69221.	0.24E+07	0.500	196820.
21.5	6387.	318.42	-10.85	-8.72	-13.05	0.79404E+03	0.20E+05	262.0	46.47	471.0	69221.	0.24E+07	0.500	196820.
22.6	6739.	320.40	-13.24	-11.07	-15.41	0.82387E+03	0.20E+05	260.0	46.47	449.8	69221.	0.24E+07	0.500	196820.
23.7	7092.	322.45	-15.63	-13.44	-17.75	0.85532E+03	0.20E+05	257.9	46.48	429.3	69221.	0.24E+07	0.500	196820.
24.8	7448.	324.55	-18.04	-15.81	-20.17	0.88850E+03	0.20E+05	255.8	46.49	409.4	69221.	0.23E+07	0.500	196820.
25.9	7817.	326.71	-20.47	-18.21	-22.57	0.92333E+03	0.20E+05	253.7	46.51	390.1	69221.	0.23E+07	0.500	196820.
27.0	8168.	328.93	-22.92	-20.61	-24.98	0.96038E+03	0.20E+05	251.5	46.53	371.5	69221.	0.23E+07	0.500	196820.
28.1	8531.	331.21	-25.38	-23.03	-27.41	0.99977E+03	0.20E+05	249.4	46.53	353.4	69221.	0.22E+07	0.500	196820.
29.1	8917.	333.56	-27.86	-25.47	-29.86	0.10413E+04	0.20E+05	247.2	46.58	336.0	69221.	0.22E+07	0.500	196820.
30.2	9266.	335.98	-30.35	-27.92	-32.32	0.10855E+04	0.20E+05	245.0	46.61	319.1	69221.	0.22E+07	0.500	196820.
31.3	9637.	338.47	-32.87	-30.39	-34.80	0.11350E+04	0.20E+05	242.8	46.64	302.8	69221.	0.21E+07	0.500	196820.
32.4	10011.	341.03	-35.40	-32.88	-37.39	0.11816E+04	0.20E+05	240.6	46.68	287.0	69221.	0.21E+07	0.500	196820.
33.5	10388.	343.67	-37.95	-35.39	-39.81	0.12344E+04	0.20E+05	238.4	46.72	271.8	69221.	0.21E+07	0.500	196820.
34.6	10768.	346.40	-40.53	-37.91	-42.34	0.12906E+04	0.20E+05	236.2	46.77	257.1	69221.	0.20E+07	0.500	196820.
35.7	11151.	349.21	-43.12	-40.45	-44.85	0.13506E+04	0.20E+05	233.9	46.82	243.0	69221.	0.20E+07	0.500	196820.
36.8	11537.	352.11	-45.73	-43.02	-47.46	0.14146E+04	0.20E+05	231.6	46.87	229.4	69221.	0.20E+07	0.500	196820.
37.9	11926.	355.11	-48.37	-45.60	-50.05	0.14830E+04	0.20E+05	229.3	46.93	216.3	69221.	0.19E+07	0.500	196820.
39.0	12319.	358.22	-51.03	-48.20	-52.66	0.15573E+04	0.20E+05	227.0	47.00	203.7	69221.	0.19E+07	0.500	196820.
40.1	12715.	361.58	-53.73	-50.83	-55.29	0.16348E+04	0.20E+05	224.7	47.12	191.6	69221.	0.19E+07	0.500	196820.
41.2	13115.	365.25	-56.49	-53.48	-57.95	0.17193E+04	0.20E+05	222.3	47.29	180.0	69221.	0.18E+07	0.500	196820.
42.3	13519.	369.02	-59.27	-56.17	-60.64	0.18101E+04	0.20E+05	219.9	47.46	168.8	69221.	0.18E+07	0.500	196820.
43.4	13928.	372.89	-62.08	-58.89	-63.36	0.19081E+04	0.20E+05	217.5	47.63	158.1	69221.	0.17E+07	0.500	196820.
44.5	14341.	376.88	-64.93	-61.64	-66.12	0.20139E+04	0.20E+05	215.1	47.80	147.8	69221.	0.17E+07	0.500	196820.
45.6	14758.	381.01	-67.80	-64.43	-68.91	0.21285E+04	0.20E+05	212.6	47.97	138.0	69221.	0.17E+07	0.500	196820.
46.7	15180.	385.28	-70.70	-67.24	-71.72	0.22527E+04	0.20E+05	210.1	48.15	129.6	69221.	0.16E+07	0.500	196820.
47.8	15600.	389.87	-73.63	-69.83	-74.44	0.23867E+04	0.20E+05	209.4	42.72	119.7	69221.	0.15E+07	0.500	196820.
48.9	15991.	393.12	-76.58	-71.61	-76.50	0.25246E+04	0.20E+05	209.4	35.56	112.0	69221.	0.13E+07	0.500	196820.
50.0	16356.	320.41	-69.59	-72.85	-77.93	0.26555E+04	0.20E+05	209.4	30.12	105.4	69221.	0.11E+07	0.500	196820.
51.1	16697.	301.62	-68.84	-73.70	-78.65	0.28006E+04	0.20E+05	209.4	26.03	96.4	69221.	0.09E+06	0.500	196820.
52.2	17020.	286.31	-68.14	-74.55	-79.49	0.29595E+04	0.20E+05	209.4	22.94	84.2	69221.	0.09E+06	0.500	196820.
53.3	17328.	274.04	-67.47	-74.57	-79.82	0.31076E+04	0.20E+05	209.4	20.59	89.5	69221.	0.09E+06	0.500	196820.

TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	AL(M)	V(M/MIN)	TA(C)	TS(C)	TG(C)	VOLUME(M3)	FLXSC	TBB(K)	FL(KG)	P(MB)	GAS(GM)	REY NC	CO	PAY(GM)
54.4	17624.	264.35	-66.83	-74.71	-79.95	0.32622E+04	0.20E+05	209.4	18.81	25.2	69221.	0.83E+06	0.500	196820.
55.5	17911.	256.86	-66.21	-74.70	-79.93	0.34212E+04	0.20E+05	209.4	17.45	81.2	69221.	0.79E+06	0.500	196820.
56.6	18190.	251.20	-65.60	-74.58	-79.75	0.35853E+04	0.20E+05	209.4	16.43	77.5	69221.	0.74E+06	0.500	196820.
57.7	18464.	247.58	-65.06	-74.43	-79.56	0.37399E+04	0.20E+05	209.4	15.76	74.4	69221.	0.70E+06	0.500	196820.
58.7	18710.	244.55	-64.53	-74.13	-79.3C	0.38994E+04	0.20E+05	209.4	15.20	71.5	69221.	0.68E+06	0.500	196820.
59.7	18953.	243.03	-64.00	-73.83	-79.55	0.40647E+04	0.20E+05	209.4	14.77	68.7	69221.	0.65E+06	0.500	196820.
60.7	19196.	241.93	-63.48	-73.50	-78.54	0.42363E+04	0.20E+05	209.4	14.44	66.0	69221.	0.63E+06	0.500	196820.
61.7	19437.	241.46	-62.95	-73.12	-77.56	0.44147E+04	0.20E+05	209.4	14.20	63.5	69221.	0.61E+06	0.500	196820.
62.7	19678.	241.50	-62.43	-72.72	-77.55	0.46006E+04	0.20E+05	209.4	14.01	61.0	69221.	0.60E+06	0.500	196820.
63.7	19920.	241.58	-61.91	-72.30	-77.42	0.47545E+04	0.20E+05	209.4	13.88	58.7	69221.	0.58E+06	0.500	196820.
64.7	20162.	243.80	-61.38	-71.86	-76.58	0.49556E+04	0.20E+05	209.4	13.79	56.4	69221.	0.57E+06	0.500	196820.
65.7	20405.	243.93	-60.86	-71.40	-76.51	0.52086E+04	0.20E+05	209.4	13.73	54.3	69221.	0.55E+06	0.500	196820.
66.7	20649.	245.28	-60.33	-70.92	-76.44	0.54301E+04	0.20E+05	209.4	13.70	52.2	69221.	0.54E+06	0.500	196820.
67.7	20895.	246.86	-59.80	-70.44	-76.55	0.56622E+04	0.20E+05	209.4	13.68	50.2	69221.	0.53E+06	0.500	196820.
68.7	21143.	248.61	-59.26	-69.94	-76.05	0.59055E+04	0.20E+05	209.4	13.69	48.2	69221.	0.52E+06	0.500	196820.
69.8	21417.	250.17	-58.62	-69.38	-74.59	0.62110E+04	0.20E+05	209.4	13.60	46.0	69221.	0.50E+06	0.500	196820.
70.9	21693.	252.51	-58.02	-68.81	-73.92	0.65048E+04	0.20E+05	209.4	13.65	44.0	69221.	0.49E+06	0.500	196820.
72.0	21972.	254.99	-57.41	-68.22	-73.33	0.68222E+04	0.20E+05	209.4	13.70	42.1	69221.	0.48E+06	0.500	196820.
73.1	22254.	257.55	-56.81	-67.64	-72.74	0.71544E+04	0.20E+05	209.4	13.77	40.3	69221.	0.47E+06	0.500	196820.
74.2	22539.	260.21	-56.19	-67.04	-72.14	0.75055E+04	0.20E+05	209.4	13.83	38.5	69221.	0.46E+06	0.500	196820.
75.3	22826.	262.95	-55.57	-66.44	-71.54	0.78766E+04	0.20E+05	209.4	13.90	36.8	69221.	0.45E+06	0.500	196820.
76.4	23117.	265.76	-54.94	-65.83	-71.02	0.82677E+04	0.20E+05	209.4	13.98	35.5	69221.	0.44E+06	0.500	196820.
77.5	23411.	268.65	-54.30	-65.21	-70.50	0.86822E+04	0.20E+05	209.4	14.05	33.2	69221.	0.43E+06	0.500	196820.
78.6	23708.	271.81	-53.66	-64.59	-69.97	0.91240E+04	0.20E+05	209.4	14.11	31.6	69221.	0.42E+06	0.500	196820.
79.7	24008.	274.64	-53.01	-63.96	-69.43	0.95855E+04	0.20E+05	209.4	14.22	30.6	69221.	0.41E+06	0.500	196820.
80.8	24312.	277.91	-52.35	-63.33	-68.79	0.10081E+05	0.20E+05	209.4	14.30	29.2	69221.	0.40E+06	0.500	196820.
81.9	24619.	280.74	-51.69	-62.69	-68.23	0.10882E+05	0.20E+05	209.4	14.39	27.9	69221.	0.39E+06	0.500	196820.
83.0	24930.	284.14	-51.02	-62.05	-67.57	0.11495E+05	0.20E+05	209.4	14.50	26.5	69221.	0.38E+06	0.500	196820.
84.1	25262.	287.55	-50.34	-61.40	-66.83	0.11995E+05	0.20E+05	209.4	14.57	25.3	69221.	0.37E+06	0.500	196820.
85.2	25662.	290.82	-49.65	-60.72	-66.02	0.12375E+05	0.20E+05	209.4	14.66	24.1	69221.	0.36E+06	0.500	196820.
86.3	26084.	294.26	-48.95	-60.09	-65.23	0.13002E+05	0.20E+05	209.4	14.75	22.9	69221.	0.36E+06	0.500	196820.
87.4	26510.	297.77	-48.25	-59.42	-64.43	0.13747E+05	0.20E+05	209.4	14.85	21.8	69221.	0.35E+06	0.500	196820.
88.5	26939.	301.36	-47.54	-58.75	-63.63	0.14495E+05	0.20E+05	209.4	14.95	20.8	69221.	0.34E+06	0.500	196820.
89.6	27420.	305.91	-46.82	-58.08	-62.81	0.15302E+05	0.20E+05	209.4	15.04	19.6	69221.	0.33E+06	0.500	196820.
90.7	27912.	308.74	-46.09	-57.40	-62.03	0.16152E+05	0.20E+05	209.4	15.14	18.6	69221.	0.32E+06	0.500	196820.
91.8	28484.	312.55	-45.35	-56.71	-61.16	0.17061E+05	0.20E+05	209.4	15.24	17.8	69221.	0.31E+06	0.500	196820.
92.9	29157.	316.43	-44.60	-56.03	-60.12	0.18034E+05	0.20E+05	209.4	15.34	16.9	69221.	0.30E+06	0.500	196820.
94.0	29848.	320.39	-43.84	-55.33	-59.57	0.19053E+05	0.20E+05	209.4	15.44	16.1	69221.	0.29E+06	0.500	196820.
95.1	30602.	324.54	-43.07	-54.64	-59.21	0.20133E+05	0.20E+05	209.4	15.54	15.3	69221.	0.28E+06	0.500	196820.
96.2	31461.	328.84	-42.30	-53.94	-58.44	0.21273E+05	0.20E+05	209.4	15.65	14.5	69221.	0.28E+06	0.500	196820.
97.3	32425.	332.75	-41.51	-53.24	-57.66	0.22601E+05	0.20E+05	209.4	15.75	13.7	69221.	0.27E+06	0.500	196820.
98.4	33506.	337.41	-40.72	-52.53	-56.87	0.23946E+05	0.20E+05	209.4	15.85	13.0	69221.	0.26E+06	0.500	196820.
99.5	34666.	341.41	-39.91	-51.83	-56.27	0.25386E+05	0.20E+05	209.4	15.96	12.3	69221.	0.26E+06	0.500	196820.
100.6	35844.	345.44	-39.09	-51.12	-55.82	0.26826E+05	0.20E+05	209.4	16.07	11.6	69221.	0.25E+06	0.500	196820.
101.7	36827.	350.48	-38.26	-50.41	-55.24	0.28376E+05	0.20E+05	209.4	16.18	11.0	69221.	0.24E+06	0.500	196820.
102.8	37815.	354.99	-37.42	-49.70	-54.61	0.30044E+05	0.20E+05	209.4	16.27	10.4	69221.	0.24E+06	0.500	196820.
103.9	38806.	359.86	-36.57	-48.99	-54.06	0.32420E+05	0.20E+05	209.4	16.40	9.9	69221.	0.23E+06	0.500	196820.
105.0	39806.	364.56	-35.71	-48.29	-53.57	0.34715E+05	0.20E+05	209.4	16.53	9.3	69221.	0.22E+06	0.500	196820.
106.1	40811.	370.21	-34.84	-47.59	-53.01	0.36671E+05	0.20E+05	209.4	16.67	8.8	69221.	0.21E+06	0.500	196820.
107.1	41821.	375.58	-33.95	-46.89	-52.42	0.38822E+05	0.20E+05	209.4	16.81	8.3	69221.	0.21E+06	0.500	196820.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALT(H)	V(M/MIN)	TA(C)	TS(C)	TG(C)	VOLUME(M3)	FLXSC	TBB(K)	FLANG)	P(MB)	G(SGM)	REY MD	CD	PAY(GM)
182.3	36363.	-30.38	-26.15	-25.25	-17.93	0.62625E+05	0.20E+05	204.4	-0.20	5.0	5E795.	0.11E+05	0.940	196820.
183.9	36315.	-29.53	-26.25	-29.31	-18.04	0.62183E+05	0.20E+05	204.4	-0.19	5.0	5E795.	0.11E+05	0.940	196820.
185.5	36269.	-28.80	-26.36	-29.36	-18.14	0.61758E+05	0.20E+05	204.4	-0.18	5.1	5E795.	0.11E+05	0.940	196820.
187.1	36222.	-29.40	-26.40	-29.40	-18.22	0.61542E+05	0.20E+05	204.4	-0.23	5.1	5E795.	0.11E+05	0.940	196820.
188.7	36177.	-27.30	-26.51	-29.44	-18.30	0.61125E+05	0.20E+05	204.4	-0.20	5.1	5E795.	0.10E+05	0.940	196820.
190.3	36134.	-25.62	-26.60	-25.49	-18.41	0.60716E+05	0.20E+05	204.4	-0.20	5.1	5E795.	0.097E+04	0.940	196820.
191.9	36093.	-25.58	-26.70	-29.54	-18.50	0.60337E+05	0.20E+05	204.4	-0.20	5.2	5E795.	0.097E+04	0.940	196820.
193.5	36052.	-23.25	-26.79	-29.59	-18.55	0.5972E+05	0.20E+05	204.4	-0.19	5.2	5E795.	0.096E+04	0.940	196820.
195.1	36012.	-24.45	-26.87	-25.63	-18.67	0.59614E+05	0.20E+05	204.4	-0.18	5.2	5E795.	0.093E+04	0.940	196820.
196.7	35974.	-23.72	-26.96	-29.68	-18.78	0.59265E+05	0.20E+05	204.4	-0.17	5.2	5E795.	0.091E+04	0.940	196820.
198.3	35936.	-23.17	-27.04	-25.72	-18.84	0.58929E+05	0.20E+05	204.4	-0.17	5.3	5E795.	0.089E+04	0.940	196820.
199.9	35899.	-22.65	-27.13	-29.77	-18.92	0.58600E+05	0.20E+05	204.4	-0.16	5.3	5E795.	0.088E+04	0.940	196820.
201.5	35863.	-22.07	-27.21	-25.81	-19.00	0.58288E+05	0.20E+05	204.4	-0.15	5.3	5E795.	0.086E+04	0.940	196820.
203.1	35829.	-21.51	-27.28	-25.85	-19.07	0.57981E+05	0.20E+05	204.4	-0.15	5.4	5E795.	0.084E+04	0.940	196820.
204.7	35795.	-20.96	-27.36	-25.89	-19.15	0.57684E+05	0.20E+05	204.4	-0.14	5.4	5E795.	0.082E+04	0.940	196820.
206.3	35761.	-20.47	-27.43	-25.93	-19.22	0.57395E+05	0.20E+05	204.4	-0.14	5.4	5E795.	0.081E+04	0.940	196820.
207.9	35729.	-19.96	-27.50	-30.15	-19.28	0.57116E+05	0.20E+05	204.4	-0.13	5.4	5E795.	0.079E+04	0.940	196820.
209.5	35698.	-19.48	-27.57	-30.01	-19.36	0.56844E+05	0.20E+05	204.4	-0.13	5.5	5E795.	0.077E+04	0.940	196820.
211.1	35667.	-19.01	-27.64	-30.04	-19.43	0.56580E+05	0.20E+05	204.4	-0.12	5.5	5E795.	0.075E+04	0.940	196820.
212.7	35637.	-18.55	-27.71	-30.08	-19.50	0.56324E+05	0.20E+05	204.4	-0.12	5.5	5E795.	0.074E+04	0.940	196820.
214.3	35608.	-18.09	-27.77	-30.11	-19.56	0.56075E+05	0.20E+05	204.4	-0.11	5.5	5E795.	0.072E+04	0.940	196820.
215.9	35579.	-17.66	-27.84	-30.15	-19.62	0.55833E+05	0.20E+05	204.4	-0.11	5.5	5E795.	0.071E+04	0.940	196820.
217.5	35551.	-17.24	-27.90	-30.18	-19.69	0.55598E+05	0.20E+05	204.4	-0.10	5.5	5E795.	0.069E+04	0.940	196820.
219.1	35524.	-16.81	-27.96	-30.21	-19.75	0.55370E+05	0.20E+05	204.4	-0.10	5.5	5E795.	0.068E+04	0.940	196820.
220.7	35498.	-16.43	-28.02	-30.25	-19.80	0.55149E+05	0.20E+05	204.4	-0.10	5.5	5E795.	0.066E+04	0.940	196820.
222.3	35472.	-16.02	-28.07	-30.28	-19.86	0.54932E+05	0.20E+05	204.4	-0.09	5.6	5E795.	0.065E+04	0.940	196820.
223.9	35447.	-15.64	-28.13	-30.31	-19.92	0.54723E+05	0.20E+05	204.4	-0.09	5.7	5E795.	0.064E+04	0.940	196820.
225.5	35422.	-15.28	-28.19	-30.34	-19.97	0.54519E+05	0.20E+05	204.4	-0.09	5.7	5E795.	0.062E+04	0.940	196820.
227.1	35398.	-14.92	-28.24	-30.37	-20.03	0.54321E+05	0.20E+05	204.4	-0.08	5.7	5E795.	0.061E+04	0.940	196820.
228.7	35374.	-14.57	-28.29	-30.40	-20.08	0.54128E+05	0.20E+05	204.4	-0.08	5.7	5E795.	0.060E+04	0.940	196820.
230.3	35352.	-14.21	-28.34	-30.43	-20.13	0.53940E+05	0.20E+05	204.4	-0.08	5.7	5E795.	0.058E+04	0.940	196820.
231.9	35330.	-13.88	-28.39	-30.45	-20.18	0.53758E+05	0.20E+05	204.4	-0.08	5.7	5E795.	0.057E+04	0.940	196820.
233.5	35309.	-13.56	-28.44	-30.48	-20.23	0.53580E+05	0.20E+05	204.4	-0.07	5.8	5E795.	0.056E+04	0.940	196820.
235.1	35286.	-13.25	-28.49	-30.51	-20.27	0.53407E+05	0.20E+05	204.4	-0.07	5.8	5E795.	0.055E+04	0.940	196820.
236.7	35265.	-12.92	-28.53	-30.53	-20.32	0.53239E+05	0.20E+05	204.4	-0.07	5.8	5E795.	0.054E+04	0.940	196820.
238.3	35245.	-12.63	-28.58	-30.56	-20.37	0.53075E+05	0.20E+05	204.4	-0.07	5.8	5E795.	0.052E+04	0.940	196820.
239.9	35226.	-12.34	-28.62	-30.58	-20.41	0.52916E+05	0.20E+05	204.4	-0.06	5.8	5E795.	0.051E+04	0.940	196820.
241.5	35207.	-12.06	-28.66	-30.61	-20.45	0.52760E+05	0.20E+05	204.4	-0.06	5.8	5E795.	0.050E+04	0.940	196820.
243.1	35189.	-11.78	-28.71	-30.63	-20.49	0.52609E+05	0.20E+05	204.4	-0.06	5.9	5E795.	0.049E+04	0.940	196820.
244.7	35169.	-11.49	-28.75	-30.65	-20.54	0.52461E+05	0.20E+05	204.4	-0.06	5.9	5E795.	0.048E+04	0.940	196820.
246.3	35151.	-11.25	-28.79	-30.68	-20.58	0.52318E+05	0.20E+05	204.4	-0.05	5.9	5E795.	0.047E+04	0.940	196820.
247.9	35134.	-11.04	-28.83	-30.69	-20.62	0.52181E+05	0.20E+05	204.4	-0.05	5.9	5E795.	0.046E+04	0.940	196820.
249.5	35119.	-10.84	-28.87	-30.73	-20.67	0.52049E+05	0.20E+05	204.4	-0.05	5.9	5E795.	0.045E+04	0.940	196820.
251.1	35104.	-10.65	-28.91	-30.75	-20.71	0.51922E+05	0.20E+05	204.4	-0.04	6.0	5E795.	0.044E+04	0.940	196820.
252.7	35090.	-10.48	-28.95	-30.77	-20.74	0.51799E+05	0.20E+05	204.4	-0.04	6.0	5E795.	0.043E+04	0.940	196820.
254.3	35077.	-10.32	-28.99	-30.81	-20.77	0.51681E+05	0.20E+05	204.4	-0.04	6.0	5E795.	0.042E+04	0.940	196820.
255.9	35069.	-10.17	-29.02	-30.83	-20.80	0.51568E+05	0.20E+05	204.4	-0.04	6.0	5E795.	0.041E+04	0.940	196820.
257.5	35067.	-10.02	-29.05	-30.85	-20.83	0.51460E+05	0.20E+05	204.4	-0.04	6.0	5E795.	0.040E+04	0.940	196820.
259.1	35061.	-9.88	-29.08	-30.88	-20.86	0.51357E+05	0.20E+05	204.4	-0.04	6.0	5E795.	0.039E+04	0.940	196820.
260.7	35050.	-9.75	-29.11	-30.89	-20.89	0.51259E+05	0.20E+05	204.4	-0.04	6.0	5E795.	0.038E+04	0.940	196820.
262.3	34992.	-9.63	-29.14	-30.89	-20.92	0.51165E+05	0.20E+05	204.4	-0.04	6.0	5E795.	0.037E+04	0.940	196820.
263.9	34976.	-9.52	-29.17	-30.89	-20.94	0.51076E+05	0.20E+05	204.4	-0.04	6.0	5E795.	0.036E+04	0.940	196820.

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALT(H)	V(M/HR)	TA(C)	TS(C)	TG(C)	VOLUME(M3)	FLX50	TBB(K)	FL(KG)	PI(MB)	CAE(GM)	RTY(MC)	CD	PAY(GM)
265.5	34963.	-6.85	-29.20	-30.91	-21.00	C.50841E+05	0.20E+05	204.4	-0.04	6.1	58755.	0.29E+04	0.940	196820.
268.7	34931.	-0.16	-29.23	-30.87	-21.04	C.50749E+05	0.20E+05	204.4	-0.07	6.1	58755.	0.68E+02	2.756	196820.
270.3	34929.	-3.68	-29.30	-30.96	-21.14	C.50456E+05	0.20E+05	204.4	-0.12	6.1	58795.	0.16E+04	0.940	196820.
271.9	34916.	-11.07	-29.31	-31.00	-21.13	C.50481E+05	0.20E+05	204.4	0.08	6.1	58795.	0.48E+04	0.940	196820.
275.1	34884.	-12.60	-29.33	-30.98	-21.10	C.50397E+05	0.20E+05	204.4	-0.01	6.1	58755.	0.54E+04	0.940	196820.
276.7	34872.	-3.00	-29.40	-30.99	-21.16	C.50158E+05	0.20E+05	204.4	0.04	6.1	58795.	0.13E+04	0.940	196820.
278.3	34868.	-3.45	-29.43	-31.03	-21.25	C.50057E+05	0.20E+05	204.4	-0.08	6.1	58795.	0.15E+04	0.940	196820.
279.9	34858.	-8.90	-29.44	-31.07	-21.26	C.50026E+05	0.20E+05	204.4	-0.07	6.1	58795.	0.39E+04	0.940	196820.
281.5	34843.	-8.80	-29.46	-31.07	-21.24	C.49957E+05	0.20E+05	204.4	-0.00	6.2	58795.	0.38E+04	0.940	196820.
283.1	34832.	-5.77	-29.49	-31.07	-21.27	C.49850E+05	0.20E+05	204.4	-0.00	6.2	58755.	0.25E+04	0.940	196820.
284.7	34822.	-5.36	-29.52	-31.09	-21.32	C.49763E+05	0.20E+05	204.4	-0.04	6.2	58755.	0.23E+04	0.940	196820.
289.5	34795.	-1.57	-29.53	-31.07	-21.31	C.49698E+05	0.20E+05	204.4	-0.05	6.2	58795.	0.68E+03	1.064	196820.
289.5	34795.	-3.08	-29.59	-31.12	-21.41	C.49512E+05	0.20E+05	204.4	-0.07	6.2	58755.	0.13E+04	0.940	196820.
291.1	34765.	-7.76	-29.60	-31.15	-21.41	C.494519E+05	0.20E+05	204.4	-0.06	6.2	58795.	0.34E+04	0.940	196820.
294.3	34762.	-8.45	-29.62	-31.15	-21.40	C.49426E+05	0.20E+05	204.4	-0.01	6.2	58755.	0.37E+04	0.940	196820.
295.9	34754.	-2.63	-29.67	-31.16	-21.44	C.49354E+05	0.20E+05	204.4	0.02	6.2	58795.	0.12E+04	0.940	196820.
297.5	34749.	-3.25	-29.69	-31.19	-21.50	C.49183E+05	0.20E+05	204.4	-0.05	6.2	58795.	0.14E+04	0.940	196820.
300.7	34731.	-0.26	-29.69	-31.18	-21.55	C.49143E+05	0.20E+05	204.4	-0.12	6.3	58795.	0.11E+03	2.105	196820.
303.9	34713.	5.87	-29.73	-31.14	-21.63	C.49033E+05	0.20E+05	204.4	-0.19	6.3	58795.	0.26E+04	0.940	196820.
306.4	34704.	-0.68	-29.77	-31.19	-21.65	C.48977E+05	0.20E+05	204.4	-0.14	6.3	58795.	0.30E+03	1.471	196820.
308.9	34691.	-4.07	-29.79	-31.23	-21.67	C.48916E+05	0.20E+05	204.4	-0.08	6.3	58755.	0.18E+04	0.940	196820.
311.4	34677.	-2.55	-29.82	-31.23	-21.63	C.48725E+05	0.20E+05	204.4	-0.02	6.3	58795.	0.13E+04	0.940	196820.
313.9	34670.	-0.51	-29.85	-31.25	-21.66	C.48629E+05	0.20E+05	204.4	-0.02	6.3	58795.	0.40E+03	1.319	196820.
316.4	34658.	-0.61	-29.87	-31.27	-21.69	C.48550E+05	0.20E+05	204.4	-0.04	6.3	58795.	0.36E+03	1.377	196820.
318.9	34648.	-1.79	-29.89	-31.29	-21.71	C.48485E+05	0.20E+05	204.4	-0.04	6.3	58795.	0.79E+03	1.026	196820.
321.4	34639.	-2.40	-29.91	-31.31	-21.73	C.48419E+05	0.20E+05	204.4	-0.03	6.3	58755.	0.11E+04	0.940	196820.
323.9	34629.	-1.54	-29.93	-31.32	-21.74	C.48349E+05	0.20E+05	204.4	-0.02	6.3	58795.	0.10E+04	0.940	196820.
326.4	34620.	-1.55	-29.96	-31.33	-21.76	C.48260E+05	0.20E+05	204.4	-0.02	6.4	58795.	0.87E+03	0.952	196820.
328.9	34611.	-1.63	-29.98	-31.34	-21.78	C.48214E+05	0.20E+05	204.4	-0.02	6.4	58755.	0.81E+03	1.016	196820.
331.4	34603.	-1.89	-29.99	-31.36	-21.80	C.48153E+05	0.20E+05	204.4	-0.02	6.4	58795.	0.64E+03	1.003	196820.
333.9	34595.	-1.51	-30.01	-31.37	-21.82	C.48093E+05	0.20E+05	204.4	-0.02	6.4	58795.	0.45E+03	0.959	196820.
336.4	34587.	-1.86	-30.03	-31.38	-21.84	C.48035E+05	0.20E+05	204.4	-0.02	6.4	58795.	0.84E+03	1.003	196820.
338.9	34576.	-1.80	-30.05	-31.39	-21.85	C.47979E+05	0.20E+05	204.4	-0.02	6.4	58795.	0.81E+03	1.020	196820.
341.4	34571.	-1.75	-30.06	-31.40	-21.87	C.47925E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.77E+03	1.031	196820.
343.9	34565.	-1.75	-30.08	-31.41	-21.89	C.47872E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.77E+03	1.036	196820.
346.4	34558.	-1.68	-30.09	-31.43	-21.90	C.47823E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.75E+03	1.047	196820.
348.9	34552.	-1.65	-30.11	-31.43	-21.92	C.47777E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.74E+03	1.054	196820.
351.4	34544.	-1.60	-30.12	-31.44	-21.93	C.47727E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.72E+03	1.064	196820.
353.9	34539.	-1.55	-30.14	-31.44	-21.94	C.47681E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.70E+03	1.077	196820.
356.4	34533.	-1.50	-30.15	-31.45	-21.95	C.47637E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.67E+03	1.091	196820.
359.9	34527.	-1.42	-30.16	-31.46	-21.97	C.47595E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.64E+03	1.112	196820.
361.4	34522.	-1.39	-30.18	-31.47	-21.99	C.47554E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.62E+03	1.126	196820.
363.9	34517.	-1.37	-30.19	-31.48	-22.00	C.47515E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.62E+03	1.128	196820.
366.4	34511.	-1.33	-30.20	-31.48	-22.01	C.47477E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.60E+03	1.139	196820.
368.9	34506.	-1.28	-30.21	-31.49	-22.02	C.47440E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.58E+03	1.154	196820.
371.4	34501.	-1.23	-30.22	-31.50	-22.03	C.47404E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.55E+03	1.171	196820.
373.9	34497.	-1.22	-30.23	-31.50	-22.04	C.47370E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.55E+03	1.174	196820.
376.4	34492.	-1.16	-30.24	-31.51	-22.05	C.47337E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.52E+03	1.197	196820.
378.9	34488.	-1.12	-30.25	-31.52	-22.06	C.47304E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.51E+03	1.210	196820.
381.4	34484.	-1.11	-30.26	-31.52	-22.07	C.47274E+05	0.20E+05	204.4	-0.01	6.4	58795.	0.50E+03	1.215	196820.

TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALT(M)	V(M/MIN)	IA(IC)	IS(C)	IG(C)	VOLUME(M3)	FLKSC	TBR(K)	FL(KG)	P(MB)	GAS(GM)	REY NO	CC	PAY(GM)
383.9	34480.	-1.07	-30.27	-31.53	-22.08	0.47244E+05	0.20E+05	204.4	-0.01	6.5	58795.	0.48E+03	1.232	196820.
384.9	34476.	-1.04	-30.28	-31.53	-22.08	0.47215E+05	0.20E+05	204.4	-0.01	6.5	58795.	0.47E+03	1.246	196820.
385.9	34475.	-1.02	-30.29	-31.54	-22.10	0.47187E+05	0.20E+05	204.4	-0.01	6.5	58795.	0.46E+03	1.254	196820.
386.9	34466.	-0.99	-30.30	-31.54	-22.11	0.47160E+05	0.20E+05	204.4	-0.01	6.5	58795.	0.45E+03	1.269	196820.
387.9	34465.	-0.92	-30.30	-31.55	-22.12	0.47134E+05	0.20E+05	204.4	-0.01	6.5	58795.	0.44E+03	1.300	196820.
395.4	34461.	-0.81	-30.31	-31.55	-22.12	0.47109E+05	0.20E+05	204.4	-0.01	6.5	58795.	0.41E+03	1.308	196820.
396.9	34458.	-0.80	-30.32	-31.56	-22.13	0.47084E+05	0.20E+05	204.4	-0.01	6.5	58795.	0.39E+03	1.315	196820.
401.4	34455.	-0.67	-30.33	-31.56	-22.14	0.47061E+05	0.20E+05	204.4	-0.00	6.5	58795.	0.37E+03	1.329	196820.
403.9	34451.	-0.61	-30.33	-31.57	-22.15	0.47038E+05	0.20E+05	204.4	-0.00	6.5	58795.	0.37E+03	1.360	196820.
403.9	34426.	20.43	-30.34	-31.58	-22.15	0.47038E+05	0.20E+05	204.4	0.00	6.5	58795.	0.37E+04	0.470	196820.
410.2	34450.	16.27	-30.40	-31.53	-22.32	0.46815E+05	0.20E+05	204.4	-0.20	6.5	58795.	0.74E+04	0.470	196820.
411.4	34457.	-1.17	-30.33	-31.63	-22.30	0.47055E+05	0.20E+05	204.4	-0.25	6.5	58795.	0.19E+04	0.470	196820.
412.7	34445.	-12.44	-30.35	-31.65	-22.24	0.47055E+05	0.20E+05	204.4	-0.01	6.5	58795.	0.56E+04	0.470	196820.
413.4	34434.	-4.10	-30.35	-31.57	-22.19	0.46877E+05	0.20E+05	204.4	0.14	6.5	58795.	0.19E+04	0.470	196820.
413.4	34435.	4.10	-30.38	-31.57	-22.19	0.46894E+05	0.20E+05	204.4	0.06	6.5	58795.	0.19E+04	0.470	196820.
418.9	34437.	2.67	-30.38	-31.59	-22.20	0.46895E+05	0.20E+05	204.4	-0.03	6.5	58795.	0.12E+04	0.470	196820.
421.4	34435.	-0.49	-30.37	-31.60	-22.21	0.46911E+05	0.20E+05	204.4	-0.04	6.5	58795.	0.22E+03	1.478	196820.
423.9	34432.	-1.81	-30.37	-31.61	-22.19	0.46904E+05	0.20E+05	204.4	-0.01	6.5	58795.	0.82E+03	1.013	196820.
423.9	34426.	-12.24	-30.38	-31.63	-22.19	0.46888E+05	0.20E+05	204.4	0.09	6.5	58795.	0.26E+03	1.543	196820.
431.4	34417.	-0.58	-30.40	-31.58	-22.13	0.46882E+05	0.20E+05	204.4	0.15	6.5	58795.	0.26E+03	1.543	196820.
433.9	34420.	5.75	-30.41	-31.52	-22.21	0.46778E+05	0.20E+05	204.4	0.03	6.5	58795.	0.26E+04	0.470	196820.
435.9	34421.	-0.88	-30.40	-31.62	-22.24	0.46811E+05	0.20E+05	204.4	-0.05	6.5	58795.	0.12E+04	0.470	196820.
441.4	34417.	-1.78	-30.41	-31.62	-22.22	0.46801E+05	0.20E+05	204.4	-0.04	6.5	58795.	0.81E+03	1.321	196820.
443.9	34415.	-1.07	-30.41	-31.62	-22.22	0.46775E+05	0.20E+05	204.4	-0.01	6.5	58795.	0.49E+03	1.227	196820.
446.4	34413.	-0.43	-30.42	-31.62	-22.23	0.46759E+05	0.20E+05	204.4	0.00	6.6	58795.	0.19E+03	1.726	196820.
448.9	34411.	-0.30	-30.42	-31.62	-22.24	0.46746E+05	0.20E+05	204.4	-0.00	6.6	58795.	0.17E+03	1.970	196820.
451.9	34397.	12.42	-30.43	-31.62	-22.23	0.46738E+05	0.20E+05	204.4	0.02	6.6	58795.	0.37E+04	0.470	196820.
453.2	34412.	9.16	-30.46	-31.61	-22.32	0.46653E+05	0.20E+05	204.4	-0.13	6.6	58795.	0.42E+04	0.470	196820.
455.2	34415.	-3.21	-30.43	-31.67	-22.32	0.46722E+05	0.20E+05	204.4	-0.15	6.6	58795.	0.15E+04	0.540	196820.
458.9	34408.	-7.37	-30.42	-31.67	-22.24	0.46758E+05	0.20E+05	204.4	-0.02	6.6	58795.	0.34E+04	0.540	196820.
461.4	34401.	-0.38	-30.43	-31.64	-22.24	0.46716E+05	0.20E+05	204.4	0.06	6.6	58795.	0.16E+04	0.540	196820.
463.9	34400.	0.58	-30.45	-31.63	-22.24	0.46670E+05	0.20E+05	204.4	0.04	6.6	58795.	0.27E+03	0.769	196820.
465.4	34401.	0.98	-30.45	-31.64	-22.26	0.46658E+05	0.20E+05	204.4	-0.00	6.6	58795.	0.44E+03	0.638	196820.
468.9	34400.	-0.04	-30.45	-31.64	-22.27	0.46651E+05	0.20E+05	204.4	-0.01	6.6	58795.	0.20E+02	5.593	196820.
471.4	34399.	-0.62	-30.45	-31.65	-22.27	0.46657E+05	0.20E+05	204.4	-0.01	6.6	58795.	0.28E+03	1.502	196820.
475.4	34394.	-0.61	-30.46	-31.63	-22.27	0.46645E+05	0.20E+05	204.4	-0.01	6.6	58795.	0.17E+03	1.805	196820.
478.9	34393.	0.61	-30.46	-31.67	-22.28	0.46617E+05	0.20E+05	204.4	-0.00	6.6	58795.	0.28E+03	0.754	196820.
481.4	34393.	0.55	-30.47	-31.64	-22.26	0.46611E+05	0.20E+05	204.4	-0.01	6.6	58795.	0.25E+03	0.767	196820.
486.4	34386.	1.35	-30.48	-31.65	-22.32	0.46559E+05	0.20E+05	204.4	-0.20	6.6	58795.	0.91E+04	0.470	196820.
487.7	34397.	7.45	-30.49	-31.61	-22.42	0.46557E+05	0.20E+05	204.4	-0.19	6.6	58795.	0.34E+04	0.470	196820.
488.9	34397.	-5.35	-30.46	-31.68	-22.34	0.46631E+05	0.20E+05	204.4	-0.11	6.6	58795.	0.24E+04	0.470	196820.
491.4	34390.	-5.89	-30.46	-31.67	-22.27	0.466235E+05	0.20E+05	204.4	0.01	6.6	58795.	0.27E+04	0.470	196820.
493.9	34386.	-1.36	-30.47	-31.65	-22.36	0.46591E+05	0.20E+05	204.4	0.05	6.6	58795.	0.62E+03	1.124	196820.
496.4	34386.	1.35	-30.48	-31.65	-22.32	0.46550E+05	0.20E+05	204.4	0.02	6.6	58795.	0.62E+03	0.563	196820.
498.9	34387.	0.88	-30.48	-31.66	-22.30	0.46550E+05	0.20E+05	204.4	-0.01	6.6	58795.	0.40E+03	0.558	196820.
501.4	34392.	19.68	-30.48	-31.59	-22.50	0.46588E+05	0.20E+05	204.4	-0.37	6.6	58795.	0.90E+04	0.470	196820.
503.2	34399.	-5.09	-30.47	-31.72	-22.45	0.46588E+05	0.20E+05	204.4	-0.28	6.6	58795.	0.20E+04	0.470	196820.
504.4	34386.	-13.26	-30.45	-31.70	-22.26	0.46655E+05	0.20E+05	204.4	0.01	6.6	58795.	0.60E+04	0.470	196820.
508.9	34376.	-2.91	-30.48	-31.64	-22.31	0.46552E+05	0.20E+05	204.4	0.14	6.6	58795.	0.13E+04	0.540	196820.

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TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALT(H)	V(M/HR)	TA(C)	TS(C)	TS(C)	VOLUME(M3)	FLXSC	TBR(K)	FL(KG)	P(WB)	GAS(GM)	REY NO	CD	PAY(GM)
511.4	34374.	5.19	-30.50	-31.64	-23.28	0.46399E+05	0.20E+05	204.4	0.06	6.6	58795.	0.24E+04	0.470	196820.
513.9	34380.	5.38	-30.50	-31.66	-23.33	0.46398E+05	0.20E+05	204.4	-0.03	6.6	58795.	0.15E+04	0.470	196820.
516.4	34386.	0.02	-30.49	-31.67	-23.37	0.46398E+05	0.20E+05	204.4	-0.04	6.6	58795.	0.74E+03	1.264	196820.
518.9	34388.	-1.26	-30.49	-31.67	-23.37	0.46398E+05	0.20E+05	204.4	-0.01	6.6	58795.	0.58E+03	1.154	196820.
521.4	34388.	-0.23	-30.49	-31.67	-23.30	0.46398E+05	0.20E+05	204.4	0.01	6.6	58795.	0.73E+03	1.349	196820.
522.7	34376.	-7.25	-30.49	-31.72	-23.41	0.46398E+05	0.15E+05	204.4	-0.17	6.6	58795.	0.33E+04	0.940	196820.
523.9	34358.	-21.45	-30.50	-31.80	-23.49	0.46398E+05	0.15E+05	204.4	-0.70	6.6	58795.	0.98E+04	0.940	196820.
525.2	34328.	-32.67	-30.54	-31.88	-23.56	0.46398E+05	0.15E+05	204.4	-0.70	6.6	58795.	0.15E+05	0.940	196820.
526.4	34280.	-39.11	-30.61	-31.96	-23.65	0.46398E+05	0.15E+05	204.4	-0.70	6.6	58795.	0.18E+05	0.940	196820.
527.7	34229.	-45.13	-30.76	-32.09	-23.92	0.46398E+05	0.17E+05	204.4	-0.57	6.7	58795.	0.21E+05	0.940	196820.
528.9	34167.	-54.11	-30.89	-32.24	-23.14	0.45198E+05	0.16E+05	204.4	-0.75	6.8	58795.	0.25E+05	0.940	196820.
530.2	34095.	-61.47	-31.03	-32.40	-23.38	0.45198E+05	0.16E+05	204.4	-0.91	6.8	58795.	0.32E+05	0.940	196820.
531.4	34015.	-67.87	-31.20	-32.58	-23.65	0.44304E+05	0.13E+05	204.4	-1.07	5.9	58795.	0.32E+05	0.940	196820.
532.7	33927.	-74.03	-31.38	-32.77	-23.54	0.44304E+05	0.15E+05	204.4	-1.26	7.0	58795.	0.35E+05	0.940	196820.
533.9	33831.	-79.98	-31.58	-32.57	-23.25	0.44304E+05	0.14E+05	204.4	-1.45	7.1	58795.	0.39E+05	0.940	196820.
535.2	33729.	-84.64	-31.85	-33.15	-23.61	0.42800E+05	0.13E+05	204.4	-1.59	7.2	58795.	0.41E+05	0.940	196820.
536.4	33620.	-90.68	-32.08	-33.42	-23.57	0.41501E+05	0.13E+05	204.4	-1.81	7.3	58795.	0.48E+05	0.940	196820.
537.7	33503.	-96.02	-32.33	-33.68	-23.35	0.40769E+05	0.12E+05	204.4	-2.01	7.4	58795.	0.48E+05	0.940	196820.
538.9	33380.	-100.91	-32.59	-33.94	-23.73	0.40100E+05	0.12E+05	204.4	-2.22	7.4	58795.	0.51E+05	0.940	196820.
540.2	33251.	-105.82	-32.87	-34.21	-23.13	0.39229E+05	0.11E+05	204.4	-2.43	7.7	58795.	0.54E+05	0.940	196820.
541.4	33117.	-109.87	-33.16	-34.48	-23.55	0.38229E+05	0.11E+05	204.4	-2.64	7.8	58795.	0.57E+05	0.940	196820.
542.7	32977.	-113.97	-33.45	-34.77	-23.67	0.37614E+05	0.10E+05	204.4	-2.82	8.0	58795.	0.60E+05	0.940	196820.
543.9	32833.	-117.84	-33.77	-35.06	-23.41	0.36787E+05	0.06E+04	204.4	-3.05	8.2	58795.	0.73E+05	0.940	196820.
545.2	32683.	-121.49	-34.09	-35.36	-23.65	0.35952E+05	0.05E+04	204.4	-3.26	8.3	58795.	0.66E+05	0.940	196820.
546.4	32530.	-124.43	-34.42	-34.92	-23.17	0.35130E+05	0.04E+04	214.4	-3.21	8.5	58795.	0.68E+05	0.940	196820.
547.7	32381.	-116.80	-34.74	-34.84	-23.35	0.34354E+05	0.079E+04	214.4	-2.94	8.7	58795.	0.66E+05	0.940	196820.
548.9	32238.	-113.21	-35.06	-34.91	-23.47	0.33614E+05	0.073E+04	214.4	-2.82	8.9	58795.	0.65E+05	0.940	196820.
550.2	32097.	-112.36	-35.36	-35.08	-23.92	0.32999E+05	0.08E+04	214.4	-2.83	9.1	58795.	0.66E+05	0.940	196820.
551.4	31957.	-113.20	-35.67	-35.29	-23.28	0.32194E+05	0.06E+04	214.4	-2.91	9.3	58795.	0.67E+05	0.940	196820.
552.7	31814.	-114.94	-35.97	-35.54	-23.66	0.31495E+05	0.07E+04	214.4	-3.03	9.4	58795.	0.69E+05	0.940	196820.
553.9	31670.	-117.11	-36.28	-35.82	-30.06	0.30797E+05	0.05E+04	214.4	-3.17	9.6	58795.	0.72E+05	0.940	196820.
555.2	31522.	-119.45	-36.60	-36.11	-30.47	0.30101E+05	0.04E+04	214.4	-3.32	9.8	58795.	0.74E+05	0.940	196820.
556.4	31372.	-121.83	-36.93	-36.41	-30.89	0.29405E+05	0.04E+04	214.4	-3.48	10.1	58795.	0.77E+05	0.940	196820.
557.7	31218.	-124.16	-37.26	-36.72	-31.31	0.28712E+05	0.03E+04	214.4	-3.63	10.3	58795.	0.80E+05	0.940	196820.
558.9	31062.	-126.40	-37.59	-37.04	-31.75	0.28021E+05	0.03E+04	214.4	-3.79	10.5	58795.	0.83E+05	0.940	196820.
560.2	30903.	-128.54	-37.94	-37.36	-32.18	0.27355E+05	0.024E+04	214.4	-3.95	10.8	58795.	0.85E+05	0.940	196820.
561.4	30741.	-130.56	-38.29	-37.68	-32.63	0.26654E+05	0.024E+04	214.4	-4.10	11.0	58795.	0.88E+05	0.940	196820.
562.7	30577.	-132.45	-38.64	-38.02	-33.07	0.25979E+05	0.071E+03	214.4	-4.25	11.3	58795.	0.91E+05	0.940	196820.
563.9	30411.	-134.23	-39.00	-38.35	-33.52	0.25312E+05	0.071E+03	214.4	-4.40	11.6	58795.	0.94E+05	0.940	196820.
565.2	30242.	-135.88	-39.36	-38.65	-33.97	0.24652E+05	0.071E+03	214.4	-4.54	11.8	58795.	0.97E+05	0.940	196820.
567.4	30072.	-136.84	-39.73	-39.02	-34.39	0.24005E+05	0.0	214.4	-4.62	12.1	58795.	0.10E+06	1.000	196820.
568.7	29907.	-138.22	-40.10	-39.33	-34.77	0.23380E+05	0.0	214.4	-4.64	12.5	58795.	0.10E+06	1.000	196820.
569.9	29737.	-139.12	-40.46	-39.62	-35.12	0.22800E+05	0.0	214.4	-4.59	12.8	58795.	0.10E+06	1.000	196820.
570.2	29570.	-139.32	-40.82	-39.88	-35.44	0.22280E+05	0.0	214.4	-4.51	13.1	58795.	0.10E+06	1.000	196820.
571.4	29410.	-139.24	-41.17	-40.13	-35.76	0.21649E+05	0.0	214.4	-4.43	13.4	58795.	0.10E+06	1.000	196820.
572.7	29252.	-138.31	-41.51	-40.37	-36.06	0.21021E+05	0.0	214.4	-4.34	13.7	58795.	0.10E+06	1.000	196820.
573.9	29095.	-138.25	-41.85	-40.61	-36.36	0.20411E+05	0.0	214.4	-4.23	14.0	58795.	0.10E+06	1.000	196820.
575.2	28942.	-138.06	-42.19	-40.84	-36.65	0.19824E+05	0.0	214.4	-4.12	14.3	58795.	0.10E+06	1.000	196820.
576.4	28791.	-137.84	-42.51	-41.05	-36.93	0.19257E+05	0.0	214.4	-4.00	14.6	58795.	0.10E+06	1.000	196820.
577.7	28643.	-137.63	-42.84	-41.26	-37.17	0.18707E+05	0.0	214.4	-3.89	15.0	58795.	0.10E+06	1.000	196820.

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OF POOR QUALITY

TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALT(H)	V(M/MIN)	T(A(C))	TS(C)	TG(C)	VOLUME(M3)	FLX50	TBB(K)	FL(KG)	P(MB)	GAS(GM)	REY NO	CD	PAY(GM)
578.9	26498.	-115.43	-43.15	-41.47	-37.43	0.18771E+05	0.0	214.4	-3.77	15.3	52735.	0.10E+06	1.000	196820.
580.2	28335.	-114.75	-43.46	-41.88	-37.69	0.19355E+05	0.0	214.4	-3.66	15.7	52735.	0.10E+06	1.000	196820.
581.4	28214.	-112.06	-44.77	-41.88	-37.94	0.17954E+05	0.0	214.4	-3.53	16.0	52735.	0.10E+06	1.000	196820.
582.7	26075.	-110.59	-44.07	-42.58	-38.12	0.17567E+05	0.0	214.4	-3.41	16.3	52735.	0.10E+06	1.000	196820.
583.0	27940.	-108.70	-44.37	-42.27	-38.42	0.17155E+05	0.0	214.4	-3.30	16.7	52735.	0.10E+06	1.000	196820.
585.2	27806.	-106.18	-44.66	-42.46	-38.66	0.16838E+05	0.0	214.4	-3.19	17.0	52735.	0.10E+06	1.000	196820.
586.4	27676.	-104.37	-44.94	-42.65	-38.91	0.16493E+05	0.0	214.4	-3.11	17.3	52735.	0.10E+06	0.940	196820.
587.7	27577.	-102.58	-45.22	-42.83	-39.15	0.16160E+05	0.0	214.4	-3.03	17.7	52735.	0.10E+06	0.940	196820.
588.9	27421.	-100.87	-45.49	-43.02	-39.39	0.15840E+05	0.0	214.4	-2.93	18.0	52735.	0.10E+06	0.940	196820.
590.2	27296.	-99.58	-45.77	-43.21	-39.61	0.15530E+05	0.0	214.4	-2.83	18.4	52735.	0.10E+06	0.940	196820.
591.4	27173.	-97.56	-46.03	-43.39	-39.83	0.15229E+05	0.0	214.4	-2.73	18.7	52735.	0.09E+05	0.940	196820.
592.7	27052.	-95.66	-46.30	-43.56	-40.05	0.14940E+05	0.0	214.4	-2.63	19.1	52735.	0.08E+05	0.940	196820.
593.9	26932.	-93.92	-46.55	-43.74	-40.28	0.14661E+05	0.0	214.4	-2.56	19.4	52735.	0.08E+05	0.940	196820.
595.2	26818.	-92.27	-46.81	-43.92	-40.51	0.14392E+05	0.0	214.4	-2.42	19.7	52735.	0.07E+05	0.940	196820.
596.4	26704.	-90.69	-47.05	-44.10	-40.71	0.14131E+05	0.0	214.4	-2.42	20.1	52735.	0.07E+05	0.940	196820.
597.7	26592.	-89.16	-47.30	-44.27	-40.93	0.13880E+05	0.0	214.4	-2.36	20.4	52735.	0.07E+05	0.940	196820.
598.9	26481.	-87.70	-47.54	-44.44	-41.14	0.13637E+05	0.0	214.4	-2.31	20.8	52735.	0.06E+05	0.940	196820.
600.2	26371.	-86.27	-47.77	-44.62	-41.36	0.13401E+05	0.0	214.4	-2.24	21.1	52735.	0.06E+05	0.940	196820.
601.4	26262.	-84.89	-48.01	-44.80	-41.56	0.13173E+05	0.0	214.4	-2.18	21.5	52735.	0.05E+05	0.940	196820.
602.7	26161.	-83.55	-48.23	-44.96	-41.77	0.12952E+05	0.0	214.4	-2.12	21.8	52735.	0.05E+05	0.940	196820.
603.9	26058.	-82.24	-48.46	-45.13	-41.97	0.12738E+05	0.0	214.4	-2.07	22.2	52735.	0.05E+05	0.940	196820.
605.2	25956.	-80.98	-48.68	-45.29	-42.17	0.12530E+05	0.0	214.4	-2.02	22.5	52735.	0.04E+05	0.940	196820.
606.4	25856.	-79.74	-48.90	-45.45	-42.37	0.12330E+05	0.0	214.4	-1.97	22.9	52735.	0.04E+05	0.940	196820.
607.7	25757.	-78.54	-49.11	-45.61	-42.57	0.12135E+05	0.0	214.4	-1.92	23.2	52735.	0.04E+05	0.940	196820.
608.9	25657.	-77.46	-49.32	-45.77	-42.74	0.11944E+05	0.0	214.4	-1.86	23.6	52735.	0.03E+05	0.940	196820.
610.2	25563.	-77.49	-49.48	-45.92	-42.94	0.11804E+05	0.0	214.4	-1.81	23.8	52735.	0.04E+05	0.940	196820.
611.4	25468.	-76.16	-49.69	-46.08	-43.13	0.11623E+05	0.0	214.4	-1.86	24.2	52735.	0.04E+05	0.940	196820.
612.7	25374.	-74.91	-49.89	-46.23	-43.31	0.11447E+05	0.0	214.4	-1.81	24.5	52735.	0.03E+05	0.940	196820.
613.9	25282.	-73.75	-50.09	-46.38	-43.48	0.11277E+05	0.0	214.4	-1.76	24.9	52735.	0.03E+05	0.940	196820.
615.2	25192.	-72.65	-50.29	-46.53	-43.65	0.11122E+05	0.0	214.4	-1.72	25.2	52735.	0.02E+05	0.940	196820.
616.4	25102.	-71.59	-50.49	-46.68	-43.86	0.10951E+05	0.0	214.4	-1.68	25.6	52735.	0.02E+05	0.940	196820.
617.7	25014.	-70.56	-50.68	-46.83	-44.03	0.10795E+05	0.0	216.4	-1.64	25.9	52735.	0.01E+05	0.940	196820.
618.9	24928.	-69.56	-50.87	-46.98	-44.21	0.10643E+05	0.0	214.4	-1.61	26.3	52735.	0.01E+05	0.940	196820.
620.2	24842.	-68.59	-51.05	-47.12	-44.38	0.10495E+05	0.0	214.4	-1.57	26.6	52735.	0.01E+05	0.940	196820.
621.4	24755.	-67.64	-51.24	-47.26	-44.55	0.10350E+05	0.0	214.4	-1.54	27.0	52735.	0.01E+05	0.940	196820.
622.7	24675.	-66.72	-51.42	-47.41	-44.72	0.10210E+05	0.0	214.4	-1.50	27.7	52735.	0.01E+05	0.940	196820.
623.9	24592.	-65.82	-51.60	-47.55	-44.89	0.10074E+05	0.0	214.4	-1.47	28.0	52735.	0.00E+05	0.940	196820.
625.2	24512.	-64.94	-51.77	-47.69	-45.06	0.99405E+04	0.0	214.4	-1.44	28.4	52735.	0.00E+05	0.940	196820.
627.7	24432.	-63.24	-52.12	-47.82	-45.22	0.98644E+04	0.0	214.4	-1.41	28.7	52735.	0.00E+05	0.940	196820.
628.9	24355.	-62.42	-52.29	-48.00	-45.34	0.97911E+04	0.0	214.4	-1.38	29.1	52735.	0.00E+05	0.940	196820.
630.2	24282.	-61.62	-52.46	-48.23	-45.44	0.97440E+04	0.0	214.4	-1.35	29.4	52735.	0.00E+05	0.940	196820.
631.4	24212.	-60.87	-52.62	-48.37	-45.54	0.97022E+04	0.0	214.4	-1.32	29.8	52735.	0.00E+05	0.940	196820.
632.7	24147.	-60.06	-52.79	-48.49	-45.61	0.96688E+04	0.0	214.4	-1.27	30.1	52735.	0.00E+05	0.940	196820.
633.9	24077.	-59.31	-52.95	-48.62	-45.66	0.96370E+04	0.0	214.4	-1.24	30.5	52735.	0.00E+05	0.940	196820.
635.2	23977.	-58.57	-53.11	-48.75	-45.71	0.96078E+04	0.0	214.4	-1.22	30.8	52735.	0.00E+05	0.940	196820.
636.4	23888.	-57.84	-53.26	-48.88	-45.76	0.95811E+04	0.0	214.4	-1.17	31.2	52735.	0.00E+05	0.940	196820.
637.7	23797.	-57.13	-53.42	-49.01	-45.81	0.95564E+04	0.0	214.4	-1.15	31.5	52735.	0.00E+05	0.940	196820.
638.9	23707.	-56.44	-53.57	-49.12	-45.86	0.95335E+04	0.0	214.4	-1.12	31.9	52735.	0.00E+05	0.940	196820.
640.2	23617.	-55.76	-53.72	-49.25	-45.90	0.95126E+04	0.0	214.4	-1.11	32.2	52735.	0.00E+05	0.940	196820.

TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALTIM	V(P/MIN)	T(C)	TS(C)	TG(C)	VCLLME(M3)	FLXSO	TEB(K)	FL(KG)	P(MB)	GAS(GM)	KEY_NO	CC	PAY(GM)
641.4	23548.	-55.04	-49.58	-51.67	-47.04	0.62789E+04	0.0	214.4	-0.10	32.6	58795.	0.85E+05	0.940	196820.
642.7	23549.	-54.02	-48.50	-50.09	-47.15	0.63838E+04	0.0	214.4	-0.08	32.9	58795.	0.84E+05	0.940	196820.
643.9	23549.	-54.17	-48.52	-50.02	-47.33	0.64298E+04	0.0	214.4	-0.06	33.3	58795.	0.84E+05	0.940	196820.
645.2	23552.	-54.31	-49.65	-50.54	-47.46	0.65119E+04	0.0	214.4	-1.02	34.0	58795.	0.83E+05	0.940	196820.
647.7	23517.	-54.60	-49.67	-50.57	-47.74	0.65239E+04	0.0	214.4	-1.00	34.3	58795.	0.83E+05	0.940	196820.
648.9	23553.	-54.73	-50.09	-50.09	-48.87	0.79289E+04	0.0	214.4	-0.98	34.7	58795.	0.83E+05	0.940	196820.
650.2	23589.	-50.77	-50.20	-50.76	-48.00	0.78558E+04	0.0	214.4	-0.96	35.0	58795.	0.83E+05	0.940	196820.
651.4	23620.	-50.80	-50.31	-50.86	-48.14	0.77739E+04	0.0	214.4	-0.95	35.4	58795.	0.82E+05	0.940	196820.
652.7	23665.	-49.64	-50.42	-50.42	-48.27	0.76941E+04	0.0	214.4	-0.93	35.7	58795.	0.82E+05	0.940	196820.
653.9	23704.	-49.68	-50.54	-50.54	-48.40	0.76158E+04	0.0	214.4	-0.91	36.0	58795.	0.81E+05	0.940	196820.
655.4	23743.	-48.54	-50.65	-50.76	-48.52	0.75392E+04	0.0	214.4	-0.90	36.4	58795.	0.81E+05	0.940	196820.
656.9	23783.	-48.51	-50.76	-50.86	-48.65	0.74641E+04	0.0	214.4	-0.88	36.7	58795.	0.81E+05	0.940	196820.
657.4	23744.	-47.1	-50.86	-50.86	-48.77	0.73908E+04	0.0	214.4	-0.87	37.1	58795.	0.80E+05	0.940	196820.
658.9	23685.	-47.02	-50.97	-51.42	-48.90	0.73182E+04	0.0	214.4	-0.85	37.4	58795.	0.80E+05	0.940	196820.
660.2	23707.	-46.6	-51.08	-51.08	-49.02	0.72478E+04	0.0	214.4	-0.84	37.8	58795.	0.80E+05	0.940	196820.
661.4	23750.	-46.1	-51.19	-51.19	-49.14	0.71789E+04	0.0	214.4	-0.83	38.1	58795.	0.79E+05	0.940	196820.
662.7	23793.	-45.70	-51.30	-51.30	-49.27	0.71058E+04	0.0	214.4	-0.81	38.5	58795.	0.79E+05	0.940	196820.
663.9	23837.	-45.21	-51.41	-51.41	-49.39	0.70428E+04	0.0	214.4	-0.80	38.8	58795.	0.78E+05	0.940	196820.
665.2	23881.	-44.53	-51.52	-51.52	-49.51	0.69770E+04	0.0	214.4	-0.79	39.1	58795.	0.78E+05	0.940	196820.
666.4	23925.	-44.6	-51.62	-51.62	-49.63	0.69122E+04	0.0	214.4	-0.78	39.5	58795.	0.78E+05	0.940	196820.
667.9	23970.	-44.28	-51.73	-51.73	-49.75	0.68482E+04	0.0	214.4	-0.77	39.8	58795.	0.78E+05	0.940	196820.
668.9	23915.	-43.84	-51.84	-51.84	-49.86	0.67863E+04	0.0	214.4	-0.76	40.2	58795.	0.78E+05	0.940	196820.
670.2	23861.	-43.50	-51.94	-51.94	-49.98	0.67242E+04	0.0	214.4	-0.75	40.5	58795.	0.78E+05	0.940	196820.
671.4	23808.	-43.17	-52.05	-52.05	-50.10	0.66663E+04	0.0	214.4	-0.74	40.9	58795.	0.78E+05	0.940	196820.
672.7	23854.	-42.84	-52.15	-52.15	-50.21	0.66042E+04	0.0	214.4	-0.74	41.2	58795.	0.78E+05	0.940	196820.
673.9	23800.	-42.60	-52.24	-52.24	-50.42	0.65342E+04	0.0	214.4	-0.74	41.6	58795.	0.78E+05	0.940	196820.
674.7	23827.	-42.02	-52.34	-52.34	-50.54	0.64663E+04	0.0	214.4	-0.74	41.9	58795.	0.78E+05	0.940	196820.
675.9	23872.	-41.67	-52.43	-52.43	-50.66	0.63998E+04	0.0	214.4	-0.74	42.2	58795.	0.78E+05	0.940	196820.
676.9	23918.	-41.30	-52.53	-52.53	-50.78	0.63342E+04	0.0	214.4	-0.74	42.5	58795.	0.78E+05	0.940	196820.
678.0	23977.	-40.86	-52.62	-52.62	-50.90	0.62663E+04	0.0	214.4	-0.74	42.8	58795.	0.78E+05	0.940	196820.
679.2	23978.	-41.02	-52.71	-52.71	-50.92	0.61982E+04	0.0	214.4	-0.74	43.1	58795.	0.78E+05	0.940	196820.
680.5	23969.	-40.50	-52.80	-52.80	-51.04	0.61327E+04	0.0	214.4	-0.74	43.4	58795.	0.78E+05	0.940	196820.
682.3	23948.	-40.79	-52.89	-52.89	-51.16	0.60663E+04	0.0	214.4	-0.74	43.7	58795.	0.78E+05	0.940	196820.
683.6	23979.	-40.42	-52.98	-52.98	-51.27	0.60008E+04	0.0	214.4	-0.74	44.0	58795.	0.78E+05	0.940	196820.
684.8	23977.	-40.86	-53.07	-53.07	-51.39	0.59382E+04	0.0	214.4	-0.74	44.3	58795.	0.78E+05	0.940	196820.
686.1	23978.	-40.50	-53.16	-53.16	-51.51	0.58727E+04	0.0	214.4	-0.74	44.6	58795.	0.78E+05	0.940	196820.
687.3	23946.	-40.79	-53.25	-53.25	-51.63	0.58063E+04	0.0	214.4	-0.74	44.9	58795.	0.78E+05	0.940	196820.
688.6	23917.	-40.86	-53.34	-53.34	-51.75	0.57402E+04	0.0	214.4	-0.74	45.2	58795.	0.78E+05	0.940	196820.
691.4	23913.	-40.86	-53.43	-53.43	-51.87	0.56742E+04	0.0	214.4	-0.74	45.5	58795.	0.78E+05	0.940	196820.
692.3	23924.	-40.86	-53.52	-53.52	-51.99	0.56082E+04	0.0	214.4	-0.74	45.8	58795.	0.78E+05	0.940	196820.
694.8	23859.	-40.86	-53.61	-53.61	-52.10	0.55422E+04	0.0	214.4	-0.74	46.1	58795.	0.78E+05	0.940	196820.
696.1	23881.	-40.86	-53.70	-53.70	-52.22	0.54763E+04	0.0	214.4	-0.74	46.4	58795.	0.78E+05	0.940	196820.
697.3	23988.	-40.86	-53.79	-53.79	-52.33	0.54102E+04	0.0	214.4	-0.74	46.7	58795.	0.78E+05	0.940	196820.
698.6	23914.	-40.86	-53.88	-53.88	-52.45	0.53442E+04	0.0	214.4	-0.74	47.0	58795.	0.78E+05	0.940	196820.
701.1	23956.	-40.86	-53.97	-53.97	-52.56	0.52782E+04	0.0	214.4	-0.74	47.3	58795.	0.78E+05	0.940	196820.
702.3	23970.	-40.86	-54.06	-54.06	-52.68	0.52122E+04	0.0	214.4	-0.74	47.6	58795.	0.78E+05	0.940	196820.
703.6	23984.	-40.86	-54.15	-54.15	-52.79	0.51462E+04	0.0	214.4	-0.74	47.9	58795.	0.78E+05	0.940	196820.
706.1	23925.	-40.86	-54.24	-54.24	-52.90	0.50802E+04	0.0	214.4	-0.74	48.2	58795.	0.78E+05	0.940	196820.

TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	AL(M)	V(M/MIN)	TA(C)	TS(C)	TG(C)	VOLUME(M3)	FLXSD	TBR(M)	FL(KG)	F(WD)	CAS(GM)	REFY NC	CC	PAY(GM)
707.3	23440.	11.45	-54.21	-57.71	-58.48	0.7858E+04	0.0	21.44	0.04	33.4	58795.	0.18E+05	0.470	174140.
708.6	23455.	13.05	-54.18	-57.66	-58.42	0.7875E+04	0.0	21.44	0.10	33.5	58795.	0.20E+05	0.470	174140.
711.1	23465.	13.37	-54.15	-57.61	-58.41	0.7892E+04	0.0	21.44	0.05	33.2	58795.	0.20E+05	0.470	174140.
712.3	23509.	9.53	-54.06	-57.57	-58.32	0.75470E+04	0.0	21.44	0.05	33.0	58795.	0.15E+05	0.470	174140.
713.6	23523.	13.22	-54.03	-57.53	-58.26	0.79659E+04	0.0	21.44	0.12	32.9	58795.	0.20E+05	0.470	174140.
716.1	23562.	14.05	-54.00	-57.42	-58.23	0.79237E+04	0.0	21.44	0.08	32.9	58795.	0.21E+05	0.470	174140.
717.3	23577.	10.81	-53.92	-57.44	-58.19	0.80349E+04	0.0	21.44	0.04	32.7	58795.	0.18E+05	0.470	174140.
718.6	23591.	12.53	-53.89	-57.40	-58.13	0.8056E+04	0.0	21.44	0.10	32.6	58795.	0.19E+05	0.470	174140.
721.1	23629.	12.94	-53.86	-57.35	-58.12	0.8073E+04	0.0	21.44	0.05	32.5	58795.	0.20E+05	0.470	174140.
722.3	23642.	9.458	-53.77	-57.32	-58.04	0.81151E+04	0.0	21.44	0.05	32.3	58795.	0.14E+05	0.470	174140.
723.6	23656.	12.62	-53.74	-57.28	-57.98	0.81439E+04	0.0	21.44	0.11	32.3	58795.	0.19E+05	0.470	174140.
726.1	23693.	13.39	-53.71	-57.23	-57.97	0.81612E+04	0.0	21.44	0.07	32.2	58795.	0.20E+05	0.470	174140.
727.3	23707.	10.15	-53.63	-57.19	-57.91	0.82115E+04	0.0	21.44	0.04	32.0	58795.	0.15E+05	0.470	174140.
728.6	23721.	12.01	-53.60	-57.16	-57.85	0.82315E+04	0.0	21.44	0.09	31.9	58795.	0.18E+05	0.470	174140.
731.1	23757.	12.52	-53.57	-57.11	-57.85	0.82489E+04	0.0	21.44	0.05	31.9	58795.	0.19E+05	0.470	174140.
732.3	23770.	9.23	-53.49	-57.07	-57.77	0.82932E+04	0.0	21.44	0.04	31.7	58795.	0.14E+05	0.470	174140.
733.6	23783.	11.99	-53.47	-57.03	-57.71	0.8319E+04	0.0	21.44	0.10	31.6	58795.	0.18E+05	0.470	174140.
736.1	23819.	12.71	-53.44	-56.99	-57.71	0.8334E+04	0.0	21.44	0.06	31.6	58795.	0.19E+05	0.470	174140.
737.3	23832.	9.60	-53.36	-56.96	-57.64	0.83839E+04	0.0	21.44	0.04	31.4	58795.	0.14E+05	0.470	174140.
738.6	23845.	11.53	-53.33	-56.92	-57.59	0.84032E+04	0.0	21.44	0.09	31.3	58795.	0.17E+05	0.470	174140.
741.1	23880.	12.09	-53.31	-56.87	-57.56	0.84201E+04	0.0	21.44	0.05	31.3	58795.	0.18E+05	0.470	174140.
742.3	23892.	8.67	-53.23	-56.84	-57.51	0.84692E+04	0.0	21.44	0.04	31.1	58795.	0.13E+05	0.470	174140.
743.6	23905.	11.40	-53.20	-56.80	-57.46	0.8484E+04	0.0	21.44	0.10	31.0	58795.	0.17E+05	0.470	174140.
746.1	23939.	12.67	-53.18	-56.76	-57.45	0.85038E+04	0.0	21.44	0.06	30.8	58795.	0.18E+05	0.470	174140.
747.3	23951.	9.09	-53.10	-56.72	-57.39	0.85519E+04	0.0	21.44	0.03	30.6	58795.	0.13E+05	0.470	174140.
748.6	23964.	11.04	-53.07	-56.69	-57.34	0.85705E+04	0.0	21.44	0.09	30.8	58795.	0.16E+05	0.470	174140.
751.1	23997.	11.62	-53.05	-56.65	-57.33	0.8586E+04	0.0	21.44	0.04	30.7	58795.	0.17E+05	0.470	174140.
752.3	24009.	8.45	-52.97	-56.62	-57.27	0.8634E+04	0.0	21.44	0.03	30.5	58795.	0.12E+05	0.470	174140.
753.6	24021.	10.24	-52.95	-56.58	-57.21	0.8655E+04	0.0	21.44	0.09	30.5	58795.	0.16E+05	0.470	174140.
756.1	24054.	11.48	-52.92	-56.54	-57.21	0.8668E+04	0.0	21.44	0.05	30.4	58795.	0.16E+05	0.470	174140.
757.3	24065.	8.60	-52.85	-56.51	-57.15	0.87152E+04	0.0	21.44	0.03	30.3	58795.	0.12E+05	0.470	174140.
758.6	24077.	10.56	-52.80	-56.48	-57.10	0.87331E+04	0.0	21.44	0.08	30.2	58795.	0.15E+05	0.470	174140.
761.1	24109.	11.16	-52.77	-56.43	-57.09	0.8748E+04	0.0	21.44	0.04	30.2	58795.	0.16E+05	0.470	174140.
762.3	24120.	8.08	-52.73	-56.41	-57.03	0.87957E+04	0.0	21.44	0.03	30.0	58795.	0.11E+05	0.470	174140.
763.6	24131.	10.28	-52.71	-56.37	-56.98	0.88127E+04	0.0	21.44	0.09	30.0	58795.	0.15E+05	0.470	174140.
766.1	24153.	10.89	-52.68	-56.33	-56.98	0.8829E+04	0.0	21.44	0.05	29.9	58795.	0.15E+05	0.470	174140.
767.3	24178.	8.71	-52.62	-56.27	-56.92	0.8874E+04	0.0	21.44	0.02	29.7	58795.	0.11E+05	0.470	174140.
768.6	24185.	10.04	-52.57	-56.23	-56.87	0.8900E+04	0.0	21.44	0.08	29.7	58795.	0.14E+05	0.470	174140.
771.1	24216.	10.69	-52.53	-56.23	-56.81	0.8924E+04	0.0	21.44	0.03	29.5	58795.	0.11E+05	0.470	174140.
772.3	24227.	7.69	-52.50	-56.21	-56.81	0.8954E+04	0.0	21.44	0.03	29.5	58795.	0.11E+05	0.470	174140.
773.6	24237.	9.77	-52.48	-56.17	-56.76	0.8968E+04	0.0	21.44	0.08	29.5	58795.	0.14E+05	0.470	174140.
776.1	24278.	10.36	-52.46	-56.17	-56.75	0.8982E+04	0.0	21.44	0.04	29.4	58795.	0.15E+05	0.470	174140.
777.3	24288.	7.659	-52.39	-56.11	-56.70	0.90270E+04	0.0	21.44	0.03	29.3	58795.	0.11E+05	0.470	174140.
778.6	24288.	9.459	-52.37	-56.08	-56.65	0.90437E+04	0.0	21.44	0.08	29.2	58795.	0.14E+05	0.470	174140.
781.1	24317.	10.18	-52.35	-56.04	-56.65	0.9058E+04	0.0	21.44	0.04	29.2	58795.	0.14E+05	0.470	174140.
782.3	24328.	7.30	-52.28	-56.02	-56.59	0.9100E+04	0.0	21.44	0.03	29.1	58795.	0.10E+05	0.470	174140.
783.6	24328.	9.299	-52.26	-56.00	-56.54	0.9118E+04	0.0	21.44	0.06	29.0	58795.	0.13E+05	0.470	174140.
786.1	24366.	7.823	-52.24	-56.55	-56.54	0.9132E+04	0.0	21.44	0.04	28.8	58795.	0.14E+05	0.470	174140.
787.3	24376.	9.420	-52.13	-56.52	-56.49	0.9175E+04	0.0	21.44	0.03	28.8	58795.	0.09E+05	0.470	174140.
788.6	24386.	9.413	-52.15	-56.89	-56.44	0.91914E+04	0.0	21.44	0.07	28.8	58795.	0.13E+05	0.470	174140.

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TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALT(M)	V(M/MIN)	TA(C)	TS(C)	TG(C)	VOLUME(M3)	FLXSO	TBB(K)	FL(KG)	P(MB)	CAS(GM)	REY NO	CC	PAY(GM)
891.1	2514.6	4.68	-50.53	-54.51	-54.85	0.10392E+05	0.0	214.4	-0.01	25.7	58795.	0.59E+04	0.470	174140.
893.6	2515.9	6.01	-50.48	-54.48	-54.85	0.10418E+05	0.0	214.4	-0.08	25.6	58795.	0.76E+04	0.470	174140.
894.8	2516.2	0.55	-50.46	-54.47	-54.82	0.10446E+05	0.0	214.4	0.00	25.5	58795.	0.69E+03	0.539	174140.
896.1	2516.4	4.28	-50.45	-54.45	-54.76	0.10454E+05	0.0	214.4	0.10	25.5	58795.	0.54E+04	0.470	174140.
898.6	2518.1	3.32	-50.45	-54.44	-54.77	0.10457E+05	0.0	214.4	0.08	25.5	58795.	0.42E+04	0.470	174140.
901.1	2519.6	3.53	-50.41	-54.41	-54.78	0.10483E+05	0.0	214.4	-0.01	25.4	58795.	0.49E+04	0.470	174140.
903.6	2521.1	5.35	-50.38	-54.38	-54.78	0.10509E+05	0.0	214.4	0.08	25.4	58795.	0.67E+04	0.470	174140.
904.8	2521.3	0.19	-50.35	-54.38	-54.71	0.10535E+05	0.0	214.4	0.00	25.3	58795.	0.24E+03	0.800	174140.
906.1	2521.6	4.22	-50.34	-54.36	-54.65	0.10542E+05	0.0	214.4	0.10	25.3	58795.	0.53E+04	0.470	174140.
908.6	2523.1	3.26	-50.34	-54.34	-54.66	0.10545E+05	0.0	214.4	0.08	25.3	58795.	0.41E+04	0.470	174140.
911.1	2524.6	3.74	-50.30	-54.32	-54.67	0.10570E+05	0.0	214.4	-0.00	25.2	58795.	0.47E+04	0.470	174140.
913.6	2526.6	5.26	-50.27	-54.30	-54.67	0.10594E+05	0.0	214.4	0.07	25.2	58795.	0.66E+04	0.470	174140.
914.8	2526.6	0.42	-50.24	-54.29	-54.61	0.10620E+05	0.0	214.4	-0.00	25.1	58795.	0.52E+03	0.600	174140.
916.1	2526.6	3.85	-50.24	-54.27	-54.46	0.10626E+05	0.0	214.4	0.09	25.1	58795.	0.48E+04	0.470	174140.
918.6	2527.9	2.87	-50.23	-54.26	-54.56	0.10630E+05	0.0	214.4	0.07	25.1	58795.	0.36E+04	0.470	174140.
921.1	2529.6	3.57	-50.20	-54.24	-54.57	0.10653E+05	0.0	214.4	-0.01	25.1	58795.	0.44E+04	0.470	174140.
923.6	2530.8	5.12	-50.17	-54.21	-54.57	0.10676E+05	0.0	214.4	-0.08	25.0	58795.	0.64E+04	0.470	174140.
924.8	2530.8	0.06	-50.14	-54.20	-54.51	0.10700E+05	0.0	214.4	-0.00	25.0	58795.	0.77E+02	1.285	174140.
926.1	2531.9	3.48	-50.14	-54.19	-54.46	0.10706E+05	0.0	214.4	0.09	24.9	58795.	0.43E+04	0.470	174140.
928.6	2532.4	2.43	-50.13	-54.18	-54.46	0.10709E+05	0.0	214.4	0.07	24.9	58795.	0.30E+04	0.470	174140.
931.1	2533.8	3.06	-50.10	-54.16	-54.48	0.10732E+05	0.0	214.4	-0.01	24.9	58795.	0.38E+04	0.470	174140.
933.6	2535.6	4.70	-50.07	-54.13	-54.48	0.10754E+05	0.0	214.4	-0.08	24.9	58795.	0.58E+04	0.470	174140.
934.8	2535.6	-0.11	-50.05	-54.13	-54.42	0.10777E+05	0.0	214.4	-0.00	24.8	58795.	0.14E+03	1.968	174140.
936.1	2535.6	3.35	-50.04	-54.11	-54.36	0.10782E+05	0.0	214.4	0.09	24.8	58795.	0.41E+04	0.470	174140.
938.6	2536.7	2.30	-50.04	-54.10	-54.37	0.10785E+05	0.0	214.4	0.07	24.8	58795.	0.28E+04	0.470	174140.
941.1	2537.9	2.86	-50.01	-54.08	-54.38	0.10806E+05	0.0	214.4	-0.01	24.7	58795.	0.35E+04	0.470	174140.
943.6	2539.6	4.56	-49.98	-54.06	-54.39	0.10827E+05	0.0	214.4	-0.07	24.7	58795.	0.56E+04	0.470	174140.
946.1	2540.8	5.84	-49.96	-54.03	-54.38	0.10846E+05	0.0	214.4	-0.10	24.6	58795.	0.72E+04	0.470	174140.
947.3	2540.8	-0.56	-49.94	-54.03	-54.32	0.10866E+05	0.0	214.4	-0.03	24.6	58795.	0.69E+03	1.079	174140.
948.6	2540.8	2.04	-49.93	-54.02	-54.26	0.10873E+05	0.0	214.4	0.09	24.6	58795.	0.25E+04	0.470	174140.
951.1	2541.7	0.78	-49.93	-54.01	-54.27	0.10894E+05	0.0	214.4	0.06	24.6	58795.	0.96E+03	0.478	174140.
953.6	2542.6	1.63	-49.90	-54.00	-54.29	0.10894E+05	0.0	214.4	-0.03	24.5	58795.	0.20E+04	0.470	174140.
956.1	2544.0	3.75	-49.88	-53.97	-54.30	0.10914E+05	0.0	214.4	-0.10	24.5	58795.	0.41E+04	0.470	174140.
957.3	2544.0	-1.44	-49.85	-53.97	-54.22	0.10933E+05	0.0	214.4	0.01	24.4	58795.	0.18E+04	0.940	174140.
958.6	2544.1	3.36	-49.85	-53.95	-54.17	0.10938E+05	0.0	214.4	0.10	24.4	58795.	0.41E+04	0.470	174140.
961.1	2545.7	2.37	-49.85	-53.94	-54.18	0.10940E+05	0.0	214.4	0.09	24.4	58795.	0.29E+04	0.470	174140.
963.6	2547.4	2.07	-49.82	-53.93	-54.19	0.10959E+05	0.0	214.4	0.02	24.4	58795.	0.25E+04	0.470	174140.
966.1	2548.3	3.54	-49.80	-53.91	-54.20	0.10977E+05	0.0	214.4	-0.05	24.4	58795.	0.43E+04	0.470	174140.
968.6	2548.3	5.26	-49.78	-53.89	-54.19	0.10995E+05	0.0	214.4	-0.08	24.3	58795.	0.64E+04	0.470	174140.
971.1	2549.8	6.82	-49.76	-53.87	-54.17	0.11011E+05	0.0	214.4	-0.08	24.3	58795.	0.83E+04	0.470	174140.
973.6	2549.9	8.36	-49.74	-53.85	-54.14	0.11026E+05	0.0	214.4	-0.07	24.3	58795.	0.10E+05	0.470	174140.
976.1	2550.9	9.67	-49.72	-53.82	-54.11	0.11040E+05	0.0	214.4	-0.06	24.3	58795.	0.12E+05	0.470	174140.
978.6	2551.9	10.59	-49.71	-53.82	-54.08	0.11049E+05	0.0	214.4	0.01	24.2	58795.	0.13E+05	0.470	174140.
981.1	2552.6	10.76	-49.69	-53.81	-54.04	0.11062E+05	0.0	214.4	0.06	24.2	58795.	0.17E+05	0.470	174140.
983.6	2552.6	10.05	-49.68	-53.80	-54.09	0.11082E+05	0.0	214.4	0.12	24.2	58795.	0.12E+05	0.470	174140.
986.1	2553.9	7.86	-49.66	-53.80	-54.06	0.11088E+05	0.0	214.4	-0.09	24.1	58795.	0.95E+04	0.470	174140.
988.6	2554.7	-1.35	-49.64	-53.79	-54.06	0.11100E+05	0.0	214.4	-0.08	24.1	58795.	0.16E+04	0.940	174140.
990.6	2555.4	5.79	-49.63	-53.75	-54.07	0.11121E+05	0.0	214.4	0.07	24.1	58795.	0.16E+04	0.940	174140.
991.1	2555.4	4.99	-49.63	-53.76	-54.05	0.11122E+05	0.0	214.4	0.09	24.1	58795.	0.16E+04	0.940	174140.

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TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALT(H)	V(M/MIN)	I(A/C)	IS(C)	IG(C)	VOLUME(M3)	FLXSC	TBR(K)	FL(KG)	F(MB)	CAS(GM)	REF NO.	CC	PAY(GM)
701.1	2447.7	0.70	-52.17	-55.82	-52.44	0.9205E+04	0.0	214.4	0.03	28.6	5875.2	0.13E+05	0.470	1741.00
703.6	2447.7	0.37	-52.07	-55.81	-52.45	0.9240E+04	0.0	214.4	-0.00	28.6	5875.2	0.13E+05	0.470	1741.00
706.1	2447.7	2.27	-52.01	-55.79	-52.37	0.9280E+04	0.0	214.4	0.02	28.5	5875.2	0.13E+04	0.470	1741.00
708.6	2447.9	8.24	-52.00	-55.77	-52.32	0.9320E+04	0.0	214.4	0.14	28.5	5875.2	0.11E+05	0.470	1741.00
801.1	2450.6	8.89	-51.97	-55.69	-52.24	0.9378E+04	0.0	214.4	0.03	28.7	5875.2	0.12E+05	0.470	1741.00
803.6	2453.7	8.29	-51.82	-55.64	-52.25	0.9435E+04	0.0	214.4	-0.00	28.7	5875.2	0.12E+05	0.470	1741.00
806.1	2457.3	7.86	-51.81	-55.59	-52.17	0.9492E+04	0.0	214.4	0.02	28.1	5875.2	0.11E+05	0.470	1741.00
808.6	2458.8	7.86	-51.79	-55.56	-52.06	0.9549E+04	0.0	214.4	0.13	28.1	5875.2	0.10E+05	0.470	1741.00
811.1	2459.7	8.20	-51.74	-55.53	-52.04	0.9606E+04	0.0	214.4	0.02	28.0	5875.2	0.11E+05	0.470	1741.00
813.6	2461.6	8.22	-51.69	-55.49	-52.07	0.9663E+04	0.0	214.4	-0.00	27.9	5875.2	0.11E+05	0.470	1741.00
816.1	2462.8	1.91	-51.62	-55.47	-52.08	0.9720E+04	0.0	214.4	0.02	27.7	5875.2	0.24E+04	0.470	1741.00
818.6	2463.2	7.22	-51.61	-55.44	-52.02	0.9777E+04	0.0	214.4	0.13	27.7	5875.2	0.10E+05	0.470	1741.00
821.1	2465.6	7.77	-51.56	-55.37	-52.08	0.9834E+04	0.0	214.4	0.03	27.6	5875.2	0.10E+05	0.470	1741.00
823.6	2469.9	6.21	-51.51	-55.32	-52.09	0.9891E+04	0.0	214.4	-0.00	27.4	5875.2	0.11E+05	0.470	1741.00
826.1	2473.9	6.53	-51.45	-55.27	-52.12	0.9948E+04	0.0	214.4	0.01	27.4	5875.2	0.26E+04	0.470	1741.00
828.6	2473.2	6.41	-51.43	-55.26	-52.12	0.9995E+04	0.0	214.4	0.11	27.4	5875.2	0.65E+04	0.470	1741.00
831.1	2475.8	7.01	-51.38	-55.23	-52.12	0.9995E+04	0.0	214.4	0.00	27.3	5875.2	0.93E+04	0.470	1741.00
833.6	2477.0	1.22	-51.34	-55.17	-52.14	0.9995E+04	0.0	214.4	-0.00	27.3	5875.2	0.92E+04	0.470	1741.00
836.1	2478.5	6.76	-51.29	-55.14	-52.12	0.9995E+04	0.0	214.4	0.03	27.1	5875.2	0.19E+04	0.470	1741.00
838.6	2480.8	6.51	-51.27	-55.12	-52.12	0.9995E+04	0.0	214.4	0.02	27.0	5875.2	0.83E+04	0.470	1741.00
841.1	2482.8	6.76	-51.22	-55.09	-52.12	0.9995E+04	0.0	214.4	0.02	26.9	5875.2	0.89E+04	0.470	1741.00
843.6	2485.9	1.79	-51.19	-55.05	-52.15	0.9995E+04	0.0	214.4	-0.00	26.8	5875.2	0.23E+04	0.470	1741.00
846.1	2488.6	6.55	-51.12	-55.01	-52.14	0.9995E+04	0.0	214.4	0.01	26.8	5875.2	0.79E+04	0.470	1741.00
848.6	2489.9	5.57	-51.11	-55.01	-52.14	0.9995E+04	0.0	214.4	0.09	26.7	5875.2	0.70E+04	0.470	1741.00
851.1	2489.9	6.02	-51.07	-54.96	-52.12	0.9995E+04	0.0	214.4	-0.00	26.6	5875.2	0.78E+04	0.470	1741.00
853.6	2492.8	0.75	-50.99	-54.91	-52.22	0.1010E+05	0.0	214.4	0.00	26.4	5875.2	0.60E+04	0.470	1741.00
856.1	2493.5	5.55	-50.97	-54.87	-52.22	0.1025E+05	0.0	214.4	0.01	26.4	5875.2	0.77E+04	0.470	1741.00
858.6	2493.5	5.36	-50.97	-54.87	-52.22	0.1038E+05	0.0	214.4	0.11	26.3	5875.2	0.69E+04	0.470	1741.00
861.1	2495.6	5.73	-50.92	-54.84	-52.26	0.1089E+05	0.0	214.4	0.02	26.4	5875.2	0.74E+04	0.470	1741.00
863.6	2498.7	1.48	-50.88	-54.80	-52.27	0.1119E+05	0.0	214.4	-0.00	26.3	5875.2	0.67E+04	0.470	1741.00
866.1	2499.1	5.39	-50.84	-54.79	-52.19	0.1131E+05	0.0	214.4	0.00	26.2	5875.2	0.19E+04	0.470	1741.00
868.6	2501.0	4.62	-50.82	-54.77	-52.13	0.1168E+05	0.0	214.4	0.08	26.2	5875.2	0.59E+04	0.470	1741.00
871.1	2503.9	5.33	-50.78	-54.72	-52.14	0.1158E+05	0.0	214.4	0.01	26.1	5875.2	0.68E+04	0.470	1741.00
873.6	2508.8	0.45	-50.71	-54.69	-52.14	0.1224E+05	0.0	214.4	-0.00	26.0	5875.2	0.58E+05	0.470	1741.00
876.1	2509.1	5.07	-50.69	-54.65	-52.00	0.1266E+05	0.0	214.4	0.00	25.9	5875.2	0.65E+04	0.470	1741.00
878.6	2509.0	4.27	-50.69	-54.64	-52.00	0.1267E+05	0.0	214.4	0.10	25.9	5875.2	0.54E+04	0.470	1741.00
881.1	2508.7	4.64	-50.65	-54.61	-52.00	0.1295E+05	0.0	214.4	0.01	25.8	5875.2	0.59E+04	0.470	1741.00
883.6	2510.7	0.90	-50.62	-54.58	-52.01	0.1323E+05	0.0	214.4	-0.00	25.7	5875.2	0.75E+04	0.470	1741.00
886.1	2511.0	4.88	-50.57	-54.57	-52.01	0.1360E+05	0.0	214.4	0.01	25.7	5875.2	0.12E+04	0.470	1741.00
888.6	2512.7	4.61	-50.57	-54.55	-52.01	0.1365E+05	0.0	214.4	0.08	25.7	5875.2	0.92E+04	0.470	1741.00

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TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALT(H)	V(M/MIN)	T(AIC)	TS(C)	TG(C)	VOLUME(M3)	FL(MSO)	TBL(K)	FL(KG)	P(MB)	CAS(GR)	REY MC	CC	PAY(GR)
993.6	2559.6	4.06	-49.61	-53.75	-53.94	0.11137E+05	0.0	214.4	0.028	24.0	58795.	0.49E+04	0.470	174140.
995.1	2558.8	3.15	-49.59	-53.74	-53.54	0.11151E+05	0.0	214.4	0.035	24.0	58795.	0.38E+04	0.470	174140.
998.6	2557.6	2.96	-49.57	-52.73	-53.54	0.11166E+05	0.0	214.4	0.022	23.9	58795.	0.36E+04	0.470	174140.
1001.1	2556.4	3.88	-49.56	-52.71	-53.54	0.11180E+05	0.0	214.4	-0.022	23.9	58795.	0.47E+04	0.470	174140.
1003.6	2559.1	5.25	-49.54	-53.69	-53.52	0.11194E+05	0.0	214.4	-0.033	23.9	58795.	0.63E+04	0.470	174140.
1006.1	2559.7	6.44	-49.52	-53.68	-53.51	0.11207E+05	0.0	214.4	-0.02	23.9	58795.	0.77E+04	0.470	174140.
1008.6	2562.3	7.10	-49.51	-53.67	-53.8E	0.11219E+05	0.0	214.4	0.01	23.9	58795.	0.85E+04	0.470	174140.
1011.1	2560.9	6.98	-49.50	-53.66	-53.8E	0.11231E+05	0.0	214.4	0.04	23.8	58795.	0.84E+04	0.470	174140.
1013.6	2561.5	6.02	-49.49	-53.6	-53.83	0.11243E+05	0.0	214.4	0.07	23.8	58795.	0.72E+04	0.470	174140.
1016.1	2562.1	4.57	-49.47	-53.64	-53.80	0.11254E+05	0.0	214.4	0.09	23.8	58795.	0.60E+04	0.470	174140.
1018.6	2562.8	3.96	-49.46	-53.63	-53.79	0.11265E+05	0.0	214.4	0.09	23.8	58795.	0.47E+04	0.470	174140.
1021.1	2563.5	2.90	-49.44	-53.62	-53.75	0.11277E+05	0.0	214.4	0.07	23.8	58795.	0.35E+04	0.470	174140.
1023.6	2564.3	2.07	-49.43	-53.61	-53.79	0.11289E+05	0.0	214.4	0.04	23.7	58795.	0.25E+04	0.470	174140.
1026.1	2565.1	-2.18	-49.41	-53.64	-53.78	0.11303E+05	0.0	214.4	0.03	23.7	58795.	0.26E+05	0.940	174140.
1029.6	2564.5	-2.57	-49.37	-53.60	-53.56	0.11314E+05	0.0	214.4	0.37	23.6	58795.	0.31E+04	0.940	174140.
1031.1	2565.8	18.04	-49.41	-53.57	-53.72	0.11310E+05	0.0	214.4	0.13	23.7	58795.	0.22E+05	0.470	174140.
1032.3	2567.5	7.94	-49.38	-53.58	-53.82	0.11323E+05	0.0	214.4	-0.23	23.6	58795.	0.94E+04	0.470	174140.
1033.6	2567.3	-8.29	-49.34	-53.58	-53.78	0.11335E+05	0.0	214.4	0.11	23.6	58795.	0.98E+04	0.940	174140.
1034.8	2566.4	3.40	-49.35	-53.58	-53.64	0.11352E+05	0.0	214.4	0.16	23.6	58795.	0.40E+04	0.940	174140.
1036.1	2566.9	9.12	-49.37	-53.54	-53.68	0.11345E+05	0.0	214.4	0.12	23.6	58795.	0.11E+05	0.470	174140.
1037.3	2568.0	7.42	-49.36	-53.54	-53.75	0.11348E+05	0.0	214.4	0.09	23.6	58795.	0.88E+04	0.470	174140.
1038.6	2567.0	-2.02	-49.30	-53.55	-53.76	0.11369E+05	0.0	214.4	-0.09	23.6	58795.	0.24E+04	0.940	174140.
1039.8	2567.0	4.87	-49.33	-53.54	-53.67	0.11372E+05	0.0	214.4	0.07	23.6	58795.	0.28E+04	0.940	174140.
1041.1	2568.1	4.05	-49.33	-53.52	-53.67	0.11372E+05	0.0	214.4	0.09	23.6	58795.	0.58E+04	0.470	174140.
1043.6	2568.7	4.05	-49.33	-53.52	-53.65	0.11376E+05	0.0	214.4	0.11	23.6	58795.	0.48E+04	0.470	174140.
1046.1	2568.3	3.18	-49.32	-53.52	-53.65	0.11377E+05	0.0	214.4	0.10	23.5	58795.	0.38E+04	0.470	174140.
1048.6	2570.0	1.55	-49.30	-53.50	-53.66	0.11397E+05	0.0	214.4	0.05	23.5	58795.	0.23E+04	0.470	174140.
1049.8	2571.6	10.73	-49.27	-53.48	-53.54	0.11430E+05	0.39E+03	214.4	0.22	23.5	58795.	0.13E+05	0.470	174140.
1051.1	2571.7	22.22	-49.25	-53.40	-53.54	0.11442E+05	0.21E+04	214.4	0.19	23.4	58795.	0.26E+05	0.470	174140.
1052.3	2570.6	23.33	-49.21	-53.35	-53.55	0.11479E+05	0.26E+04	214.4	0.09	23.4	58795.	0.28E+05	0.470	174140.
1053.6	2579.3	26.26	-49.15	-53.30	-53.46	0.11534E+05	0.32E+04	214.4	0.24	23.2	58795.	0.26E+05	0.470	174140.
1054.8	2583.0	32.63	-49.02	-53.15	-53.35	0.11588E+05	0.37E+04	214.4	0.24	23.2	58795.	0.31E+05	0.470	174140.
1057.3	2593.2	36.30	-48.94	-52.98	-53.26	0.11644E+05	0.43E+04	214.4	0.29	23.1	58795.	0.38E+05	0.470	174140.
1058.6	2594.5	38.38	-48.85	-52.98	-53.19	0.11714E+05	0.48E+04	214.4	0.33	22.9	58795.	0.42E+05	0.470	174140.
1059.8	2598.6	40.48	-48.70	-52.87	-53.20	0.11756E+05	0.54E+04	214.4	0.33	22.9	58795.	0.44E+05	0.470	174140.
1061.1	2605.0	48.56	-48.59	-52.75	-53.20	0.11931E+05	0.62E+04	214.4	0.36	22.5	58795.	0.46E+05	0.470	174140.
1062.3	2611.1	50.56	-48.47	-52.75	-53.25	0.12072E+05	0.67E+04	214.4	0.35	22.4	58795.	0.51E+05	0.470	174140.
1064.8	2617.6	53.90	-48.33	-52.50	-53.64	0.12475E+05	0.79E+04	214.4	0.38	22.2	58795.	0.58E+05	0.470	174140.
1064.8	2624.5	57.54	-48.33	-52.50	-53.64	0.12475E+05	0.79E+04	214.4	0.38	22.2	58795.	0.61E+05	0.470	174140.
1064.8	2624.5	57.54	-48.33	-52.50	-53.64	0.12475E+05	0.79E+04	214.4	0.38	22.2	58795.	0.64E+05	0.470	174140.
1066.1	2631.9	61.73	-48.03	-52.17	-53.08	0.12553E+05	0.80E+04	214.4	0.38	21.5	58795.	0.68E+05	0.470	174140.
1068.6	2639.8	65.87	-47.86	-51.99	-53.80	0.12712E+05	0.95E+04	214.4	0.45	21.0	58795.	0.72E+05	0.470	174140.
1068.6	2648.3	70.01	-47.69	-51.79	-53.68	0.12883E+05	0.10E+05	214.4	0.45	21.0	58795.	0.76E+05	0.470	174140.
1069.8	2657.2	74.26	-47.50	-51.58	-53.43	0.13068E+05	0.11E+05	214.4	0.45	20.7	58795.	0.80E+05	0.470	174140.
1071.1	2666.7	78.61	-47.30	-51.35	-53.18	0.13266E+05	0.11E+05	214.4	0.42	20.4	58795.	0.84E+05	0.470	174140.
1072.3	2674.6	81.72	-47.03	-51.11	-53.00	0.13531E+05	0.12E+05	214.4	0.36	20.1	58795.	0.86E+05	0.470	174140.
1073.6	2684.2	87.10	-46.81	-50.84	-53.61	0.13762E+05	0.12E+05	214.4	0.35	19.7	58795.	0.91E+05	0.470	174140.
1074.8	2694.0	91.53	-46.57	-50.60	-53.22	0.14011E+05	0.13E+05	214.4	0.30	19.4	58795.	0.94E+05	0.470	174140.
1076.1	2710.1	96.48	-46.32	-50.22	-53.01	0.14278E+05	0.14E+05	214.4	0.22	19.1	58795.	0.98E+05	0.470	174140.
1077.3	2722.4	100.59	-46.06	-50.04	-53.68	0.14564E+05	0.14E+05	214.4	0.14	18.7	58795.	0.10E+06	0.500	174140.

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TABLE 2.B. (continued) THERMTRAJ PRINTED OUTPUT

TIME	ALY(M)	V(M/MIN)	TA(C)	TS(C)	TG(C)	VOLUME(M3)	FLXSC	TBB(K)	FL(KG)	P(MB)	GAS(GM)	REY.AC	CC	PAY(GM)
1078.6	27352.	104.03	-45.78	-49.75	-49.32	0.14867E+05	0.13E+05	214.4	1.71	18.4	58795.	0.10E+06	0.500	174140.
1079.8	27485.	109.55	-45.44	-49.44	-48.56	0.15188E+05	0.13E+05	214.4	1.67	18.0	58795.	0.11E+06	0.500	174140.
1081.1	27625.	114.72	-45.20	-49.12	-48.58	0.15533E+05	0.15E+05	214.4	2.02	17.7	58795.	0.11E+06	0.500	174140.
1082.3	27771.	119.67	-44.88	-48.79	-48.18	0.15901E+05	0.16E+05	214.4	2.18	17.3	58795.	0.11E+06	0.500	174140.
1083.6	27921.	124.70	-44.56	-48.45	-47.78	0.16293E+05	0.17E+05	214.4	2.34	16.9	58795.	0.12E+06	0.500	174140.
1084.8	28082.	129.83	-44.22	-48.10	-47.35	0.16711E+05	0.17E+05	214.4	2.51	16.5	58795.	0.12E+06	0.500	174140.
1086.1	28247.	135.07	-43.86	-47.73	-46.90	0.17158E+05	0.18E+05	214.4	2.69	16.1	58795.	0.12E+06	0.500	174140.
1087.3	28419.	140.40	-43.50	-47.36	-46.44	0.17633E+05	0.18E+05	214.4	2.87	15.7	58795.	0.13E+06	0.500	174140.
1088.6	28598.	145.87	-43.11	-46.56	-45.96	0.18143E+05	0.19E+05	214.4	3.07	15.3	58795.	0.13E+06	0.500	174140.
1089.8	28783.	151.46	-42.71	-46.56	-45.45	0.18688E+05	0.20E+05	214.4	3.27	14.9	58795.	0.13E+06	0.500	174140.
1091.1	28976.	156.92	-42.30	-46.14	-44.55	0.19264E+05	0.20E+05	214.4	3.45	14.5	58795.	0.13E+06	0.500	174140.
1092.2	29149.	159.71	-41.87	-45.79	-44.53	0.19869E+05	0.20E+05	214.4	3.44	14.1	58795.	0.13E+06	0.500	174140.
1093.3	29324.	161.44	-41.50	-45.44	-44.12	0.20427E+05	0.20E+05	214.4	3.51	13.7	58795.	0.13E+06	0.500	174140.
1094.4	29502.	163.61	-41.11	-45.10	-43.71	0.21005E+05	0.20E+05	214.4	3.57	13.3	58795.	0.13E+06	0.500	174140.
1095.5	29682.	165.43	-40.72	-44.77	-43.30	0.21605E+05	0.20E+05	214.4	3.61	13.0	58795.	0.13E+06	0.500	174140.
1096.6	29864.	167.03	-40.33	-44.45	-42.85	0.22228E+05	0.20E+05	214.4	3.64	12.7	58795.	0.12E+06	0.500	174140.
1097.7	30047.	168.51	-39.93	-44.12	-42.48	0.22878E+05	0.20E+05	214.4	3.67	12.3	58795.	0.12E+06	0.500	174140.
1098.7	30232.	169.91	-39.53	-43.80	-42.08	0.23542E+05	0.20E+05	214.4	3.70	12.0	58795.	0.12E+06	0.500	174140.
1099.8	30419.	171.26	-39.13	-43.48	-41.66	0.24235E+05	0.20E+05	214.4	3.72	11.7	58795.	0.12E+06	0.500	174140.
1100.9	30606.	172.57	-38.72	-43.16	-41.25	0.24955E+05	0.20E+05	214.4	3.74	11.4	58795.	0.12E+06	0.500	174140.
1102.0	30795.	173.84	-38.31	-42.84	-40.84	0.25695E+05	0.20E+05	214.4	3.76	11.0	58795.	0.12E+06	0.500	174140.
1103.1	30987.	175.08	-37.90	-42.53	-40.42	0.26465E+05	0.20E+05	214.4	3.77	10.7	58795.	0.11E+06	0.500	174140.
1104.2	31179.	176.30	-37.49	-42.21	-40.00	0.27280E+05	0.20E+05	214.4	3.79	10.4	58795.	0.11E+06	0.500	174140.
1105.3	31372.	177.50	-37.07	-41.89	-35.58	0.28088E+05	0.20E+05	214.4	3.80	10.2	58795.	0.11E+06	0.500	174140.
1106.4	31567.	178.68	-36.65	-41.57	-35.16	0.28938E+05	0.20E+05	214.4	3.81	9.9	58795.	0.11E+06	0.500	174140.
1107.5	31763.	179.84	-36.22	-41.26	-38.73	0.29828E+05	0.20E+05	214.4	3.83	9.6	58795.	0.11E+06	0.500	174140.
1108.6	31920.	180.98	-35.80	-40.94	-38.30	0.30736E+05	0.20E+05	214.4	3.83	9.3	58795.	0.11E+06	0.500	174140.
1109.7	32158.	182.10	-35.37	-40.63	-37.87	0.31682E+05	0.20E+05	214.4	3.84	9.1	58795.	0.11E+06	0.500	174140.

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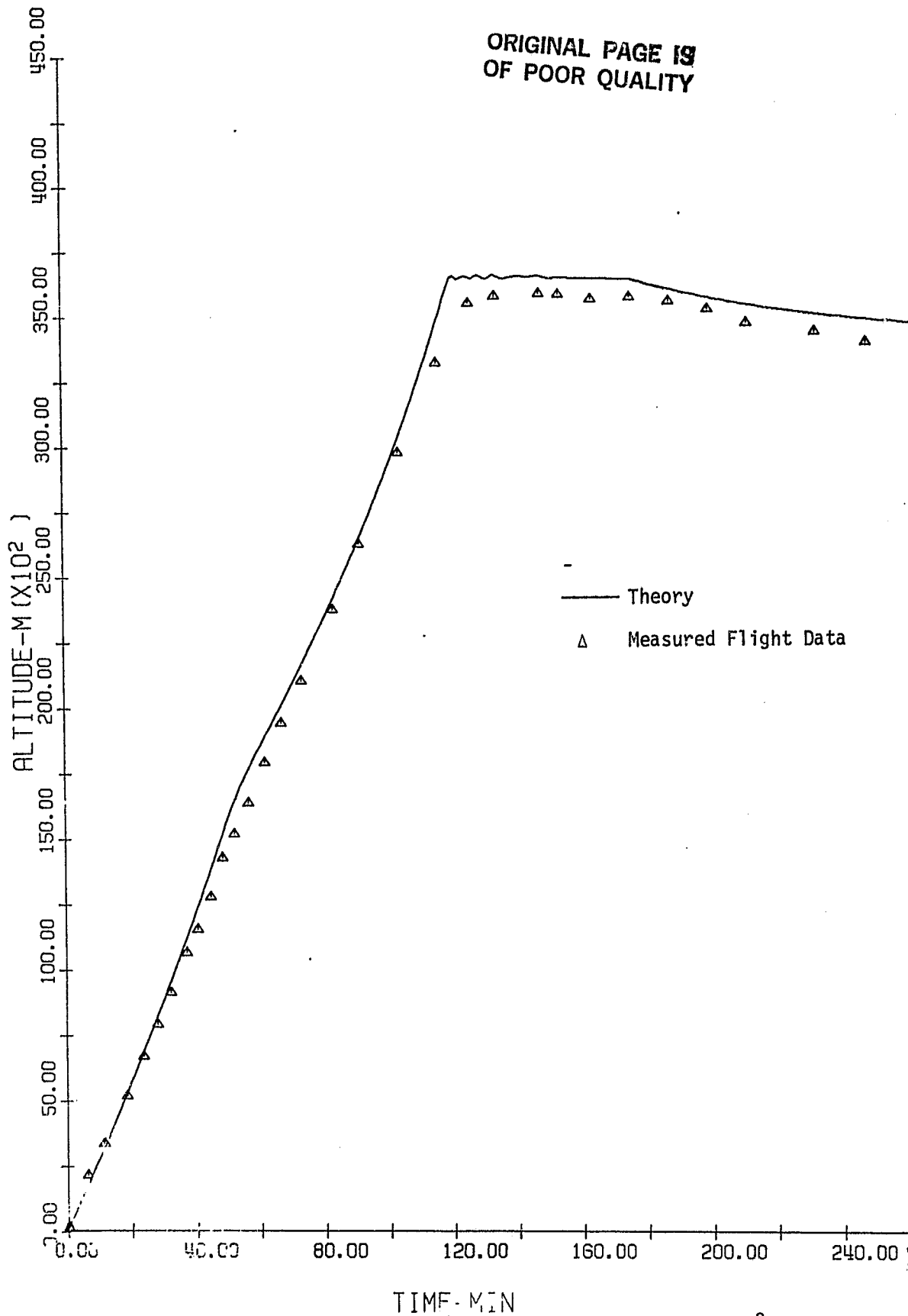


Figure 1B. Altitude Trajectory for Flight 167N (66375 m³ balloon
launched 1135 CDT, 24 July, 1980) 69

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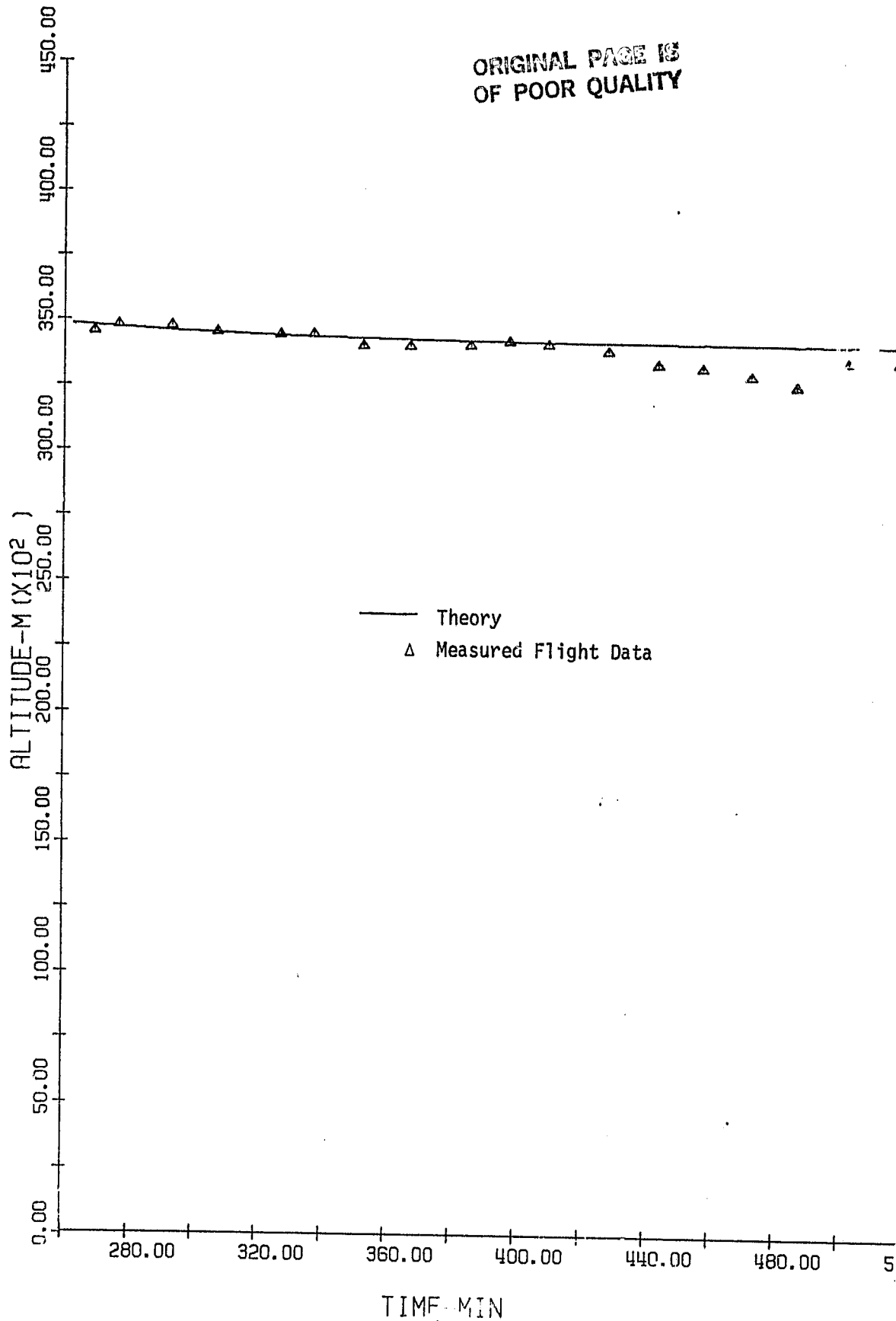


Figure 1.B. (continued) Altitude Trajectory for Flight 167N (66375 m³
balloon launched 1135 CDT, 24 July, 1980)

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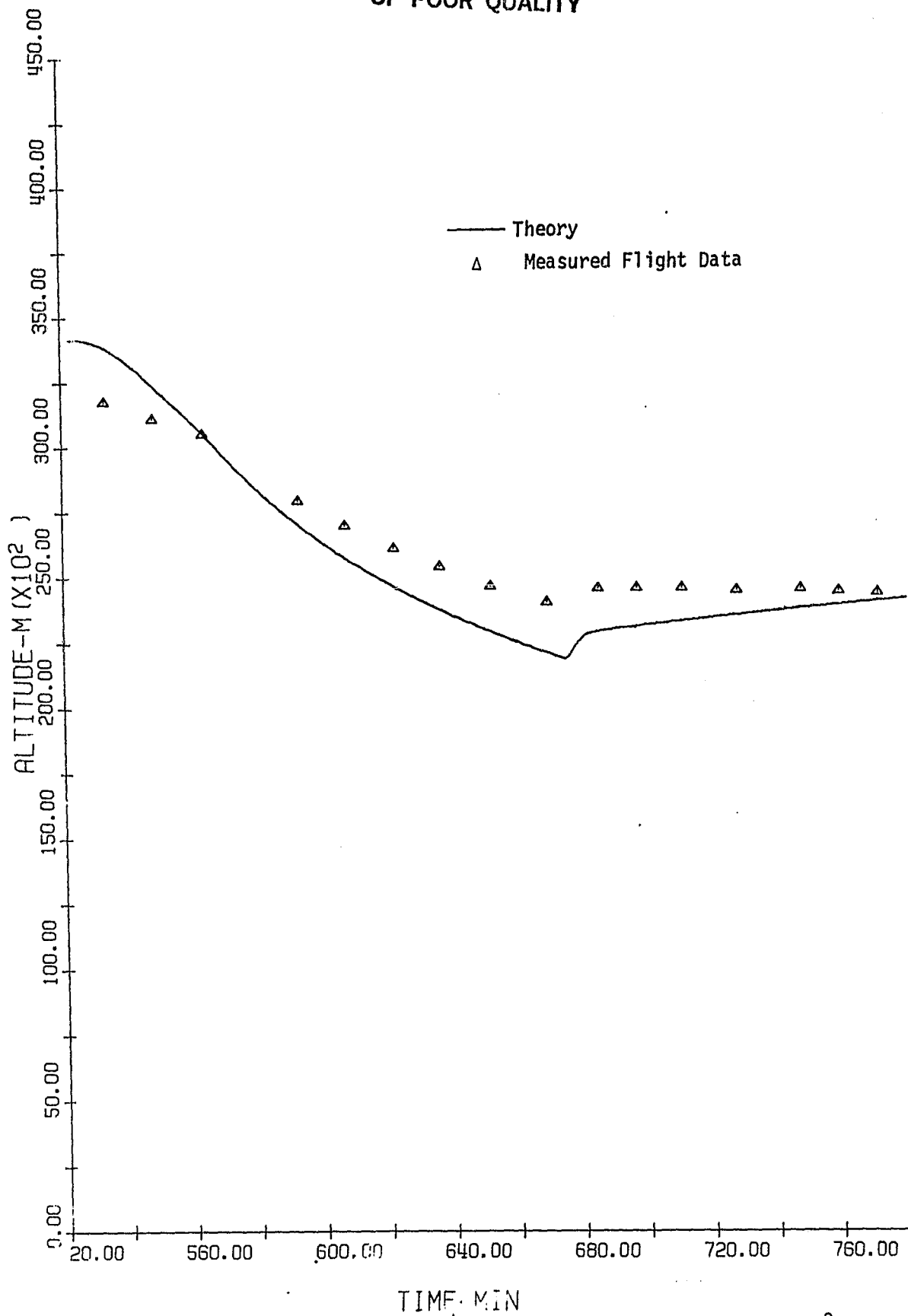


Figure 1.B. (continued) Altitude Trajectory for Flight 167N (66375 m³
balloon launched 1135 CDT, 24 July 1980) 71

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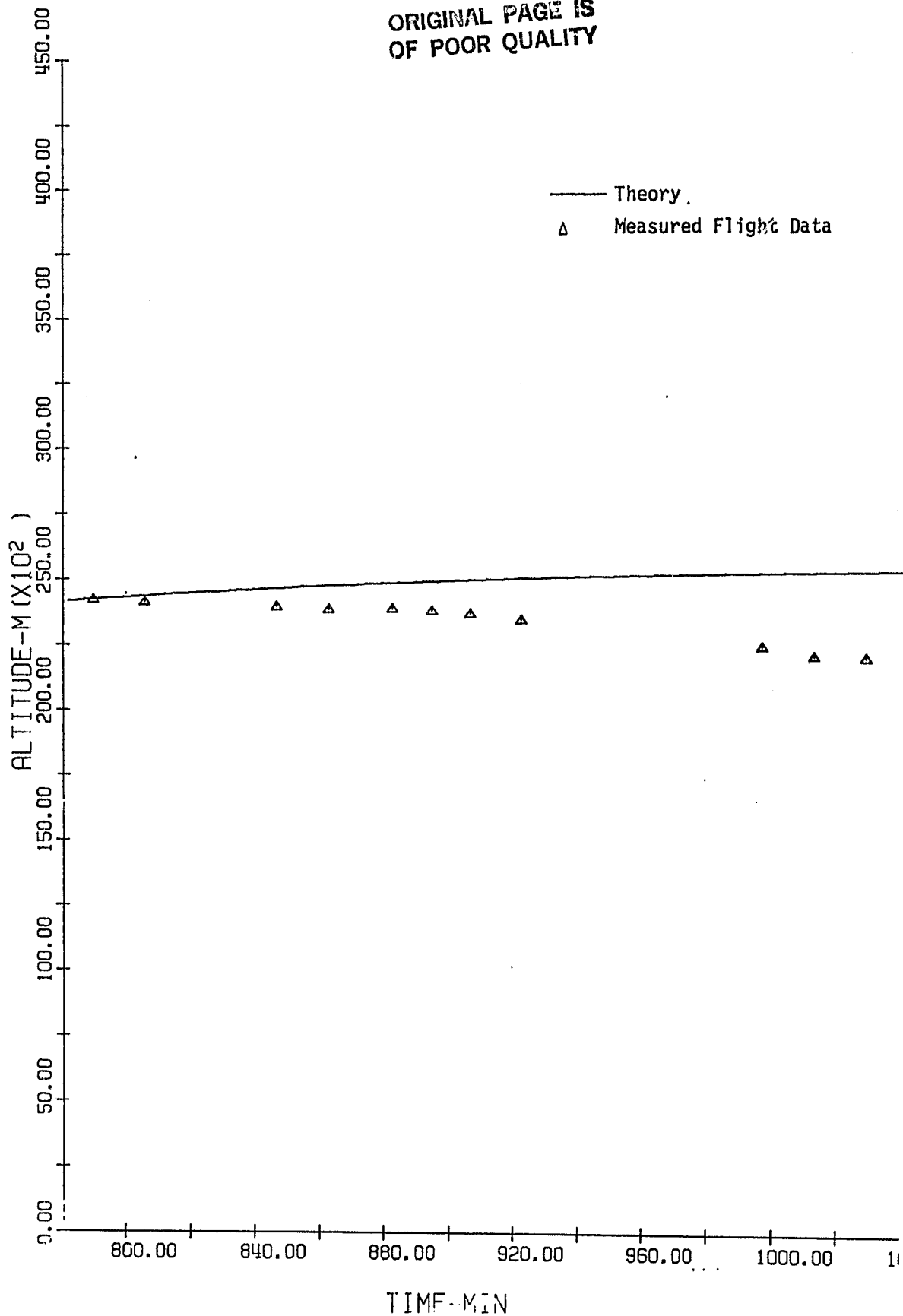


Figure 1.B. (continued) Altitude Trajectory for Flight 167N(66375 m³
balloon launched 1135 CDT, 24 July, 1980)

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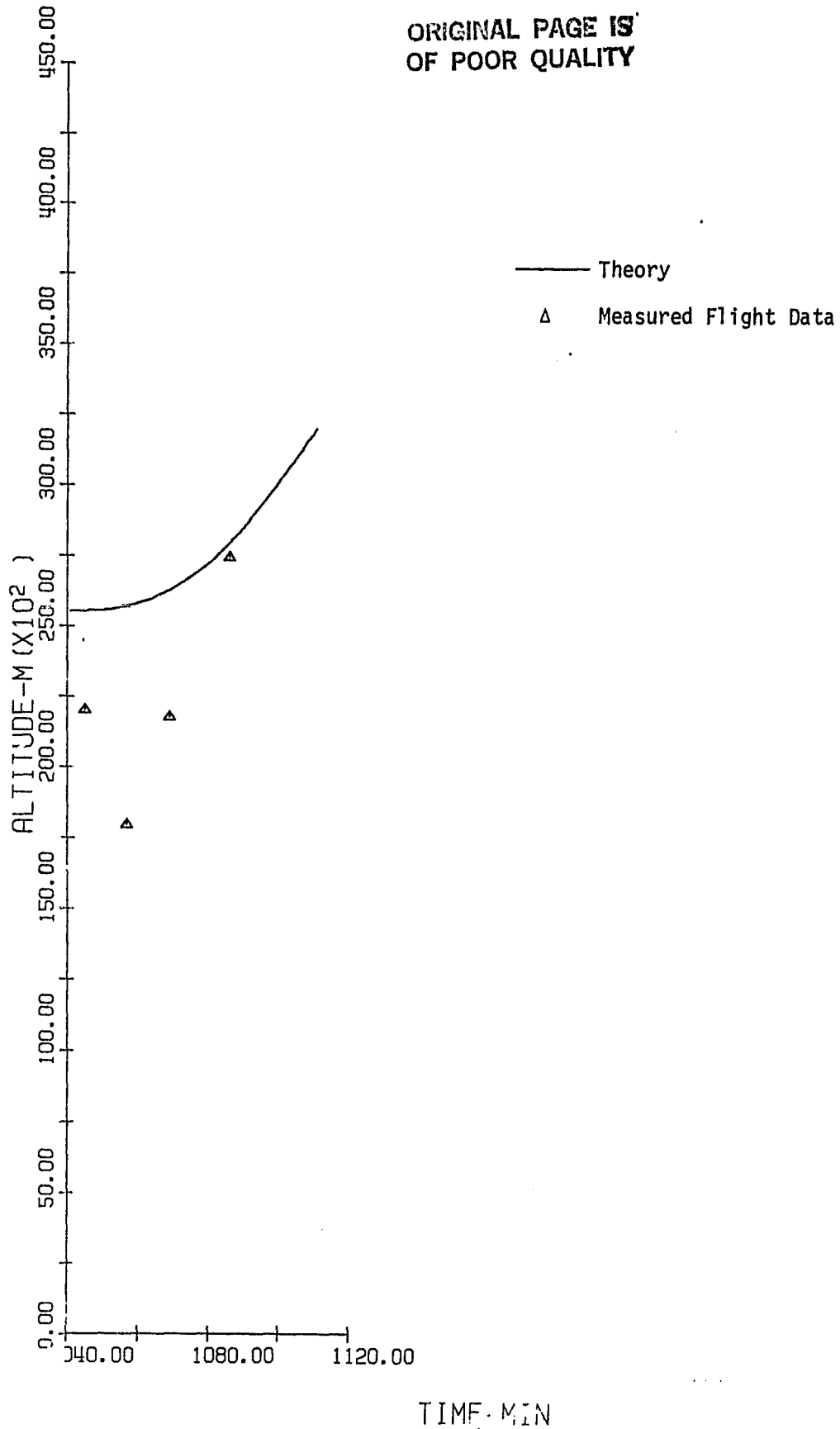


Figure 1.B. (continued) Altitude Trajectory for Flight 167N (66375 m³
balloon launched 1135 CDT, 24 July, 1980) 73

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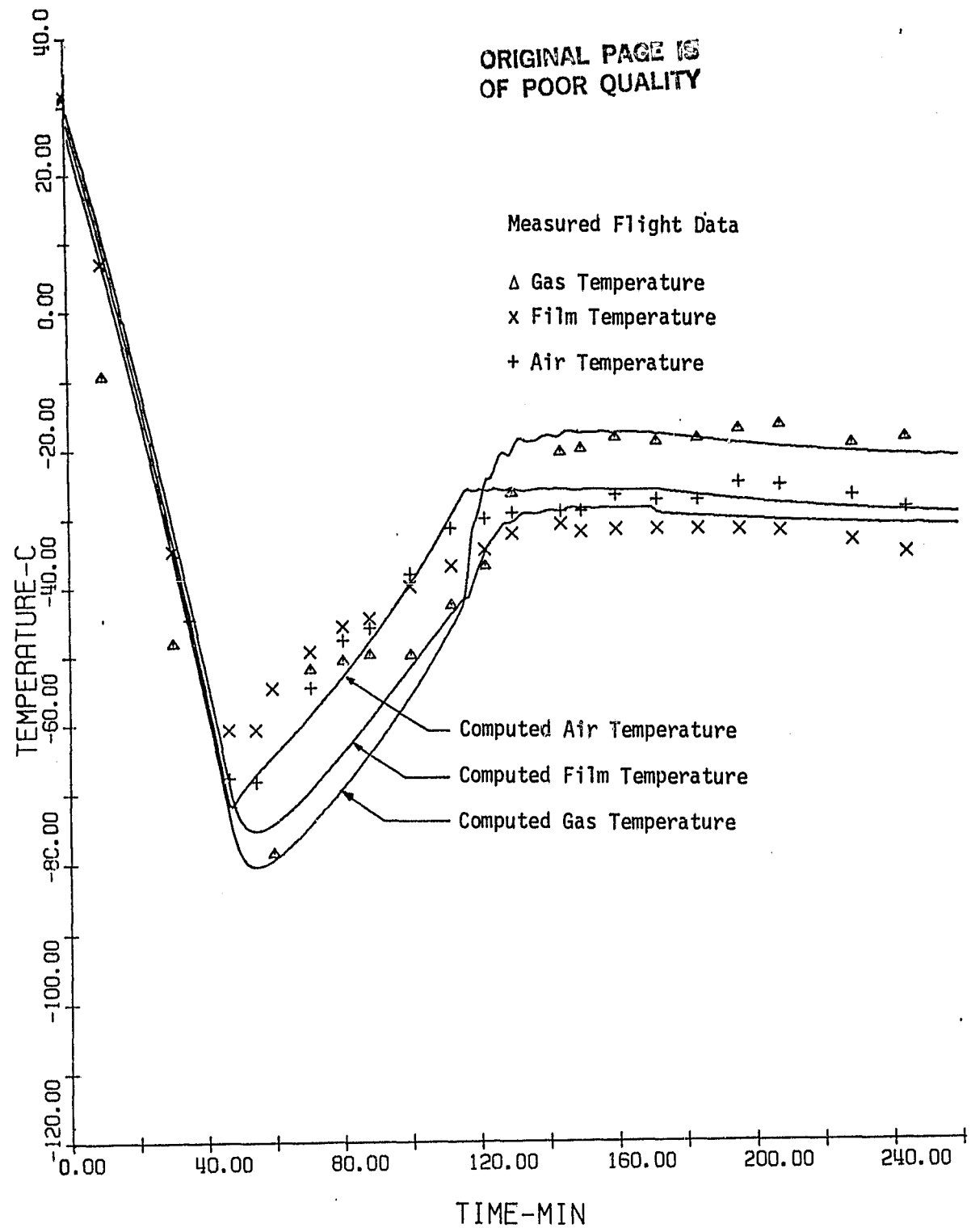


Figure 2.B. Temperature Profile for Flight 167N (66375 m³ balloon launched 1135 CDT, 24 July, 1980)

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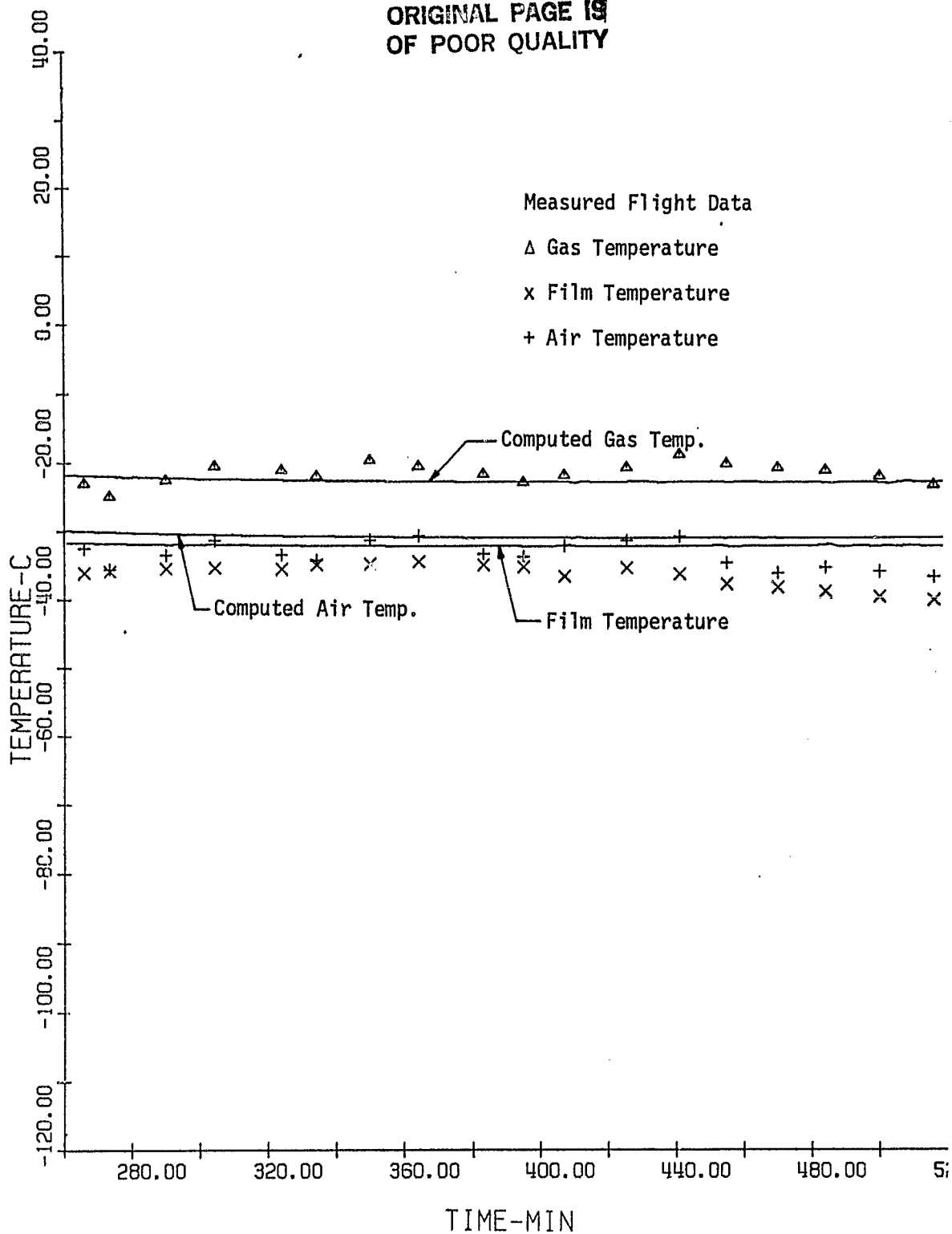


Figure 2.B. (continued) Temperature Profile for Flight 167N(66375 m³ balloon launched 1135 CDT, 24 July, 1980)

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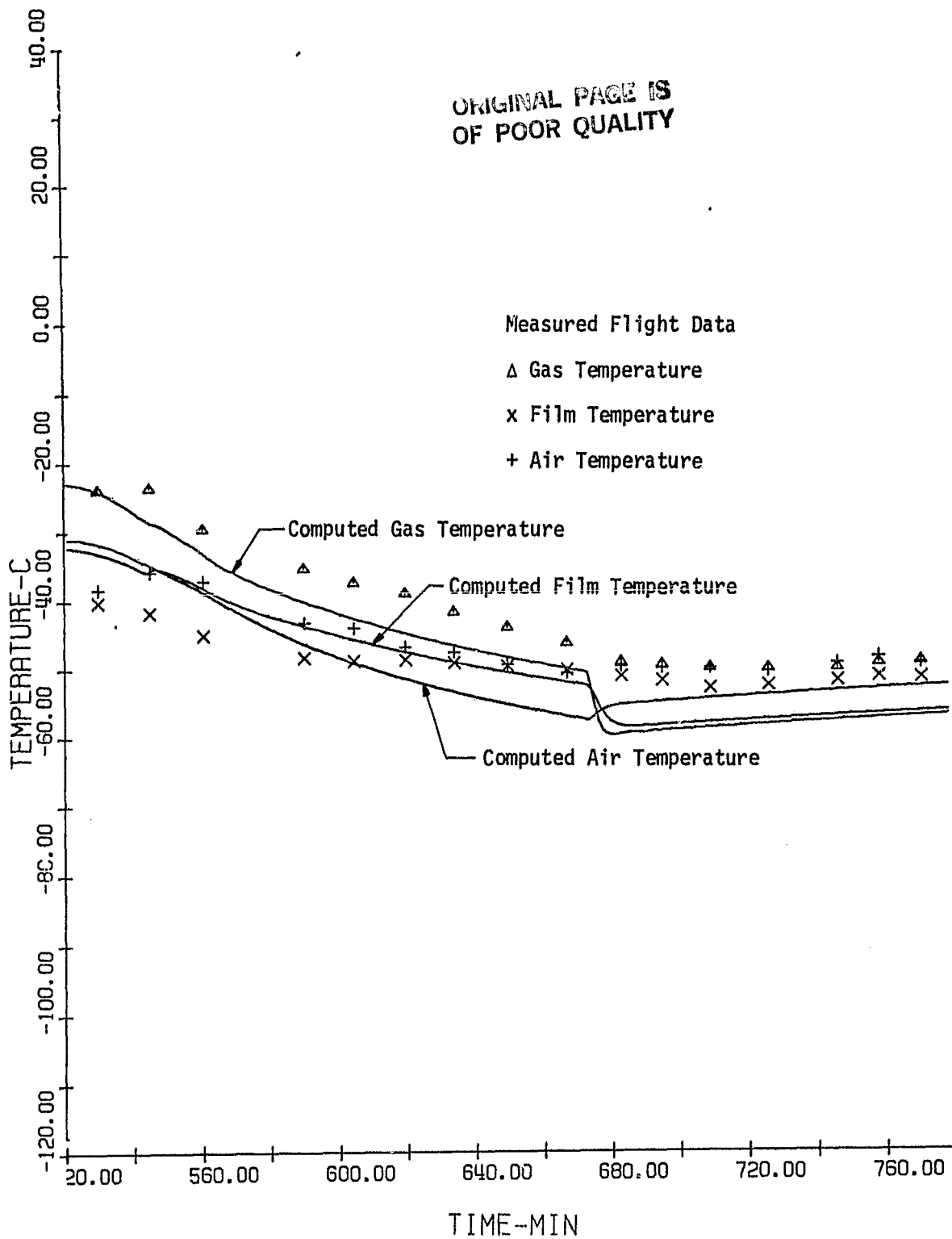


Figure 2.B. (continued) Temperature Profile for Flight 167N (66375 m³ balloon launched 1135 CDT, 24 July, 1980)

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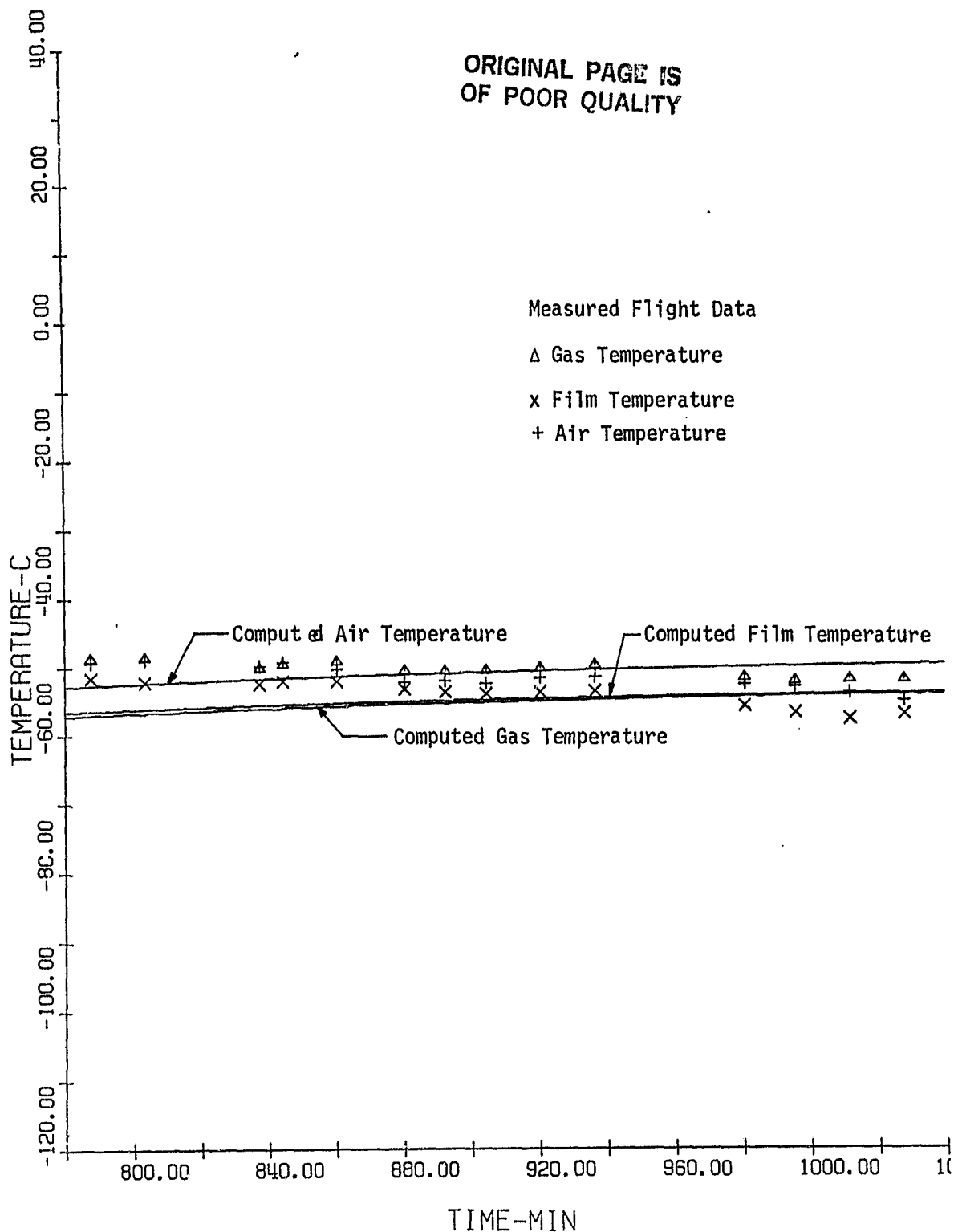


Figure 2.B. (continued) Temperature Profile for Flight 167N (66375 m³
balloon launched 1135 CDT, 24 July, 1980

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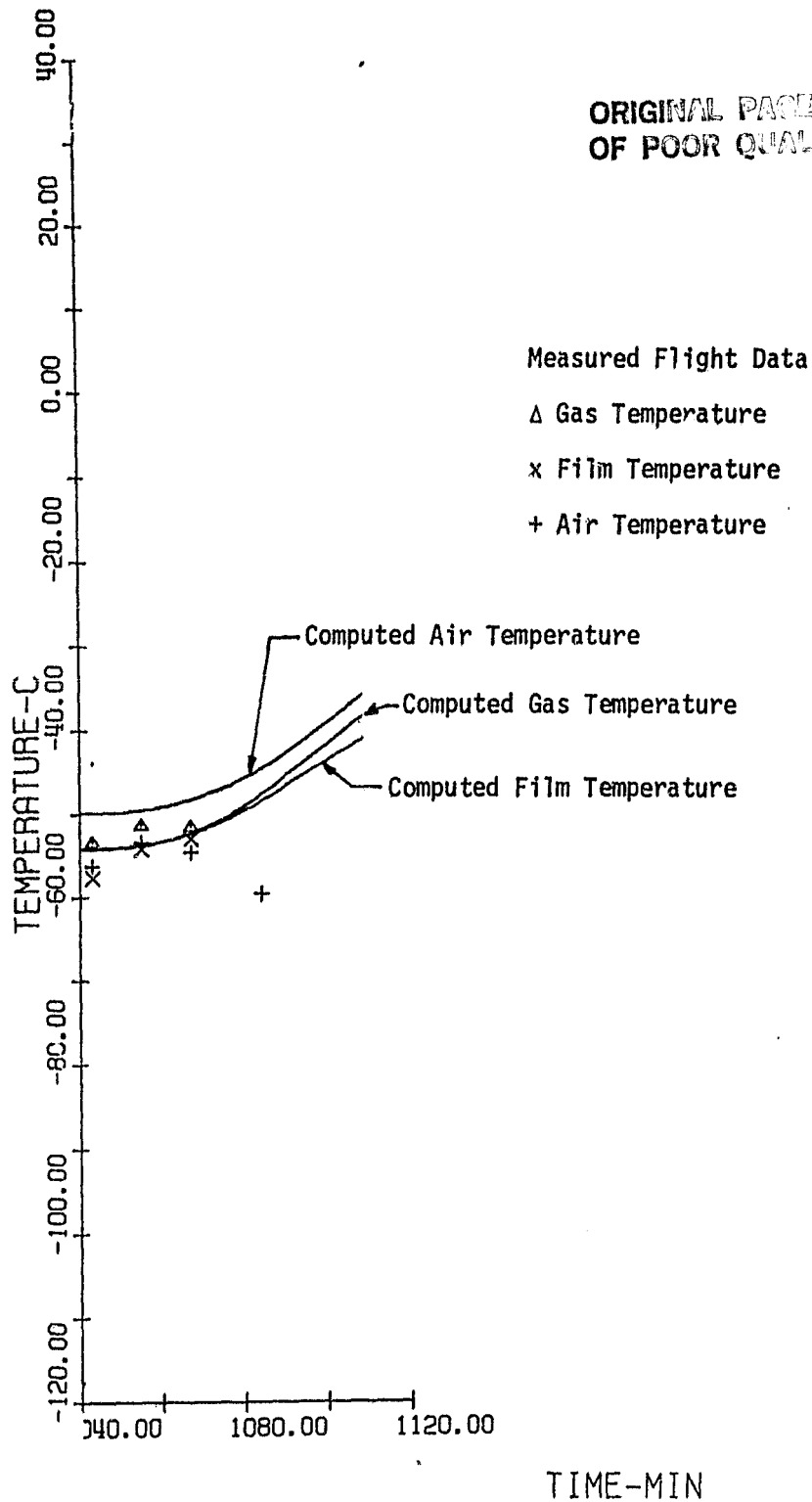


Figure 2.B. (continued) Temperature Profile for Flight
167N (66375 m³ balloon launched 1135 CDT, 24 July 1980)

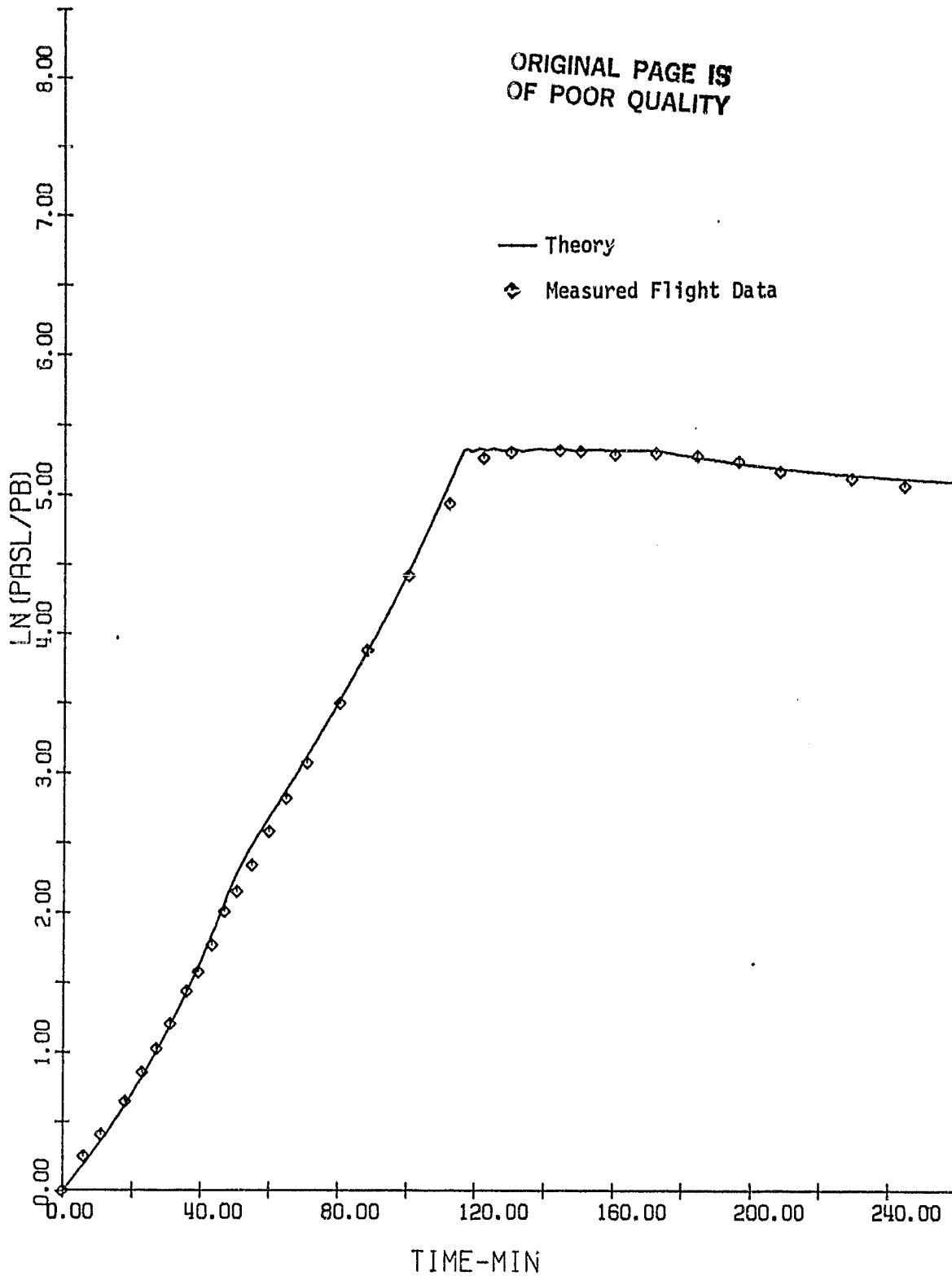


Figure 3.B. Pressure Trajectory for Flight 167N(66375 m³
balloon launched 1135 CDT, 24 July, 1980)

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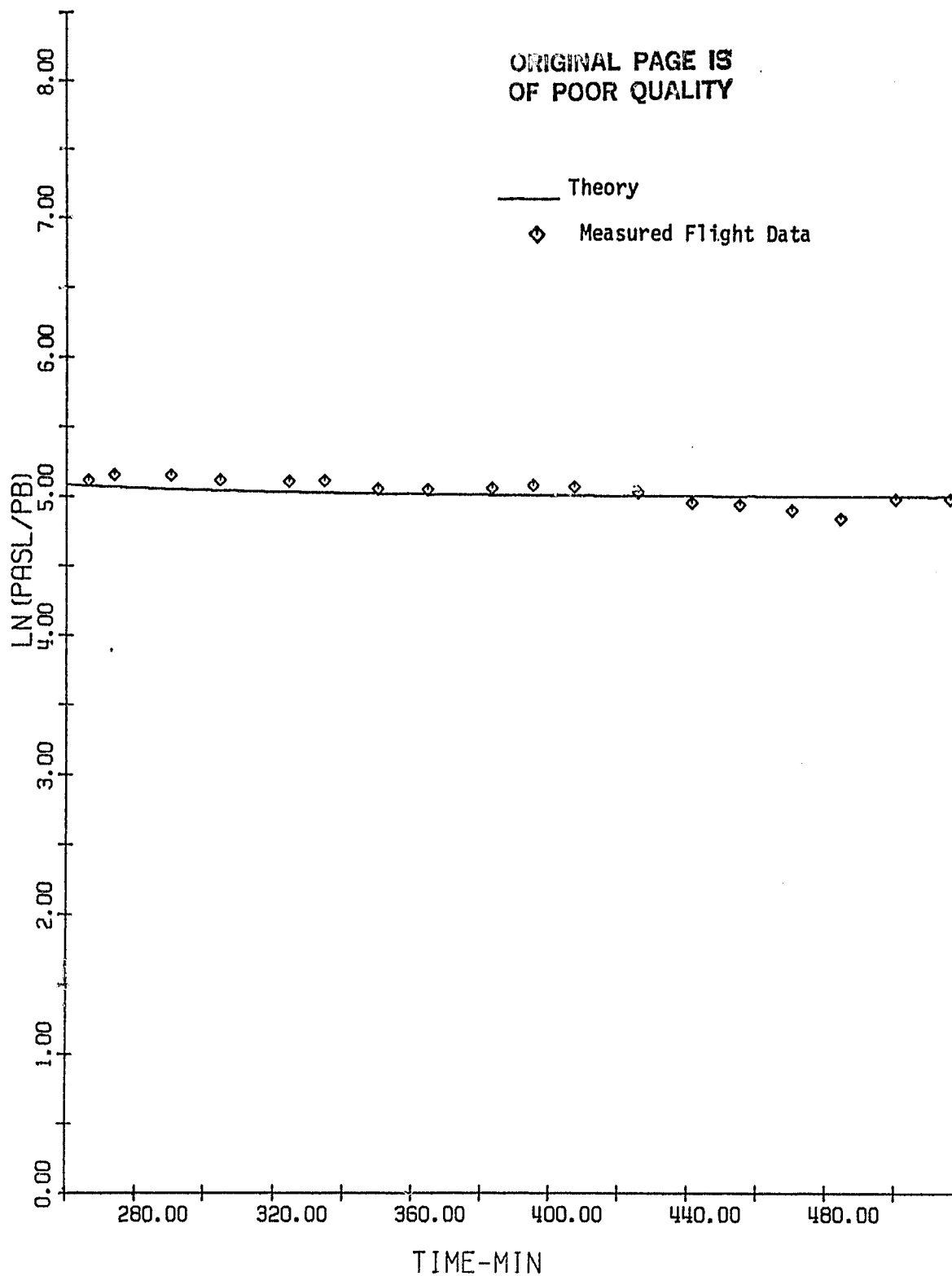


Figure 3.B. (continued) Pressure Trajectory for Flight 167N (66375 m³ balloon launched 1135 CDT, 24 July, 1980)

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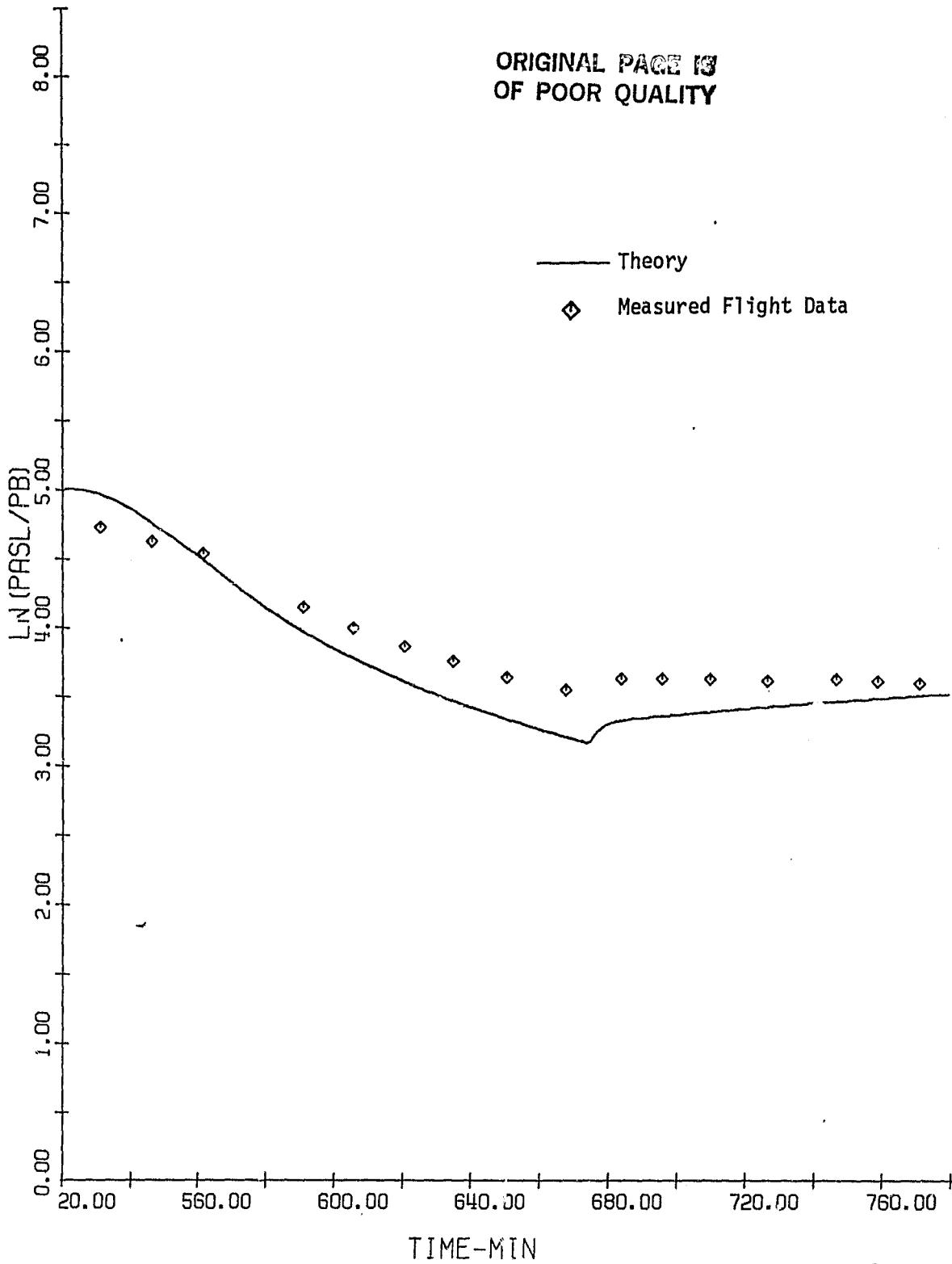


Figure 3.B. (continued) Pressure Trajectory for Flight 167N(66375 m³
balloon launched 1135 CDT, 24 July, 1980)

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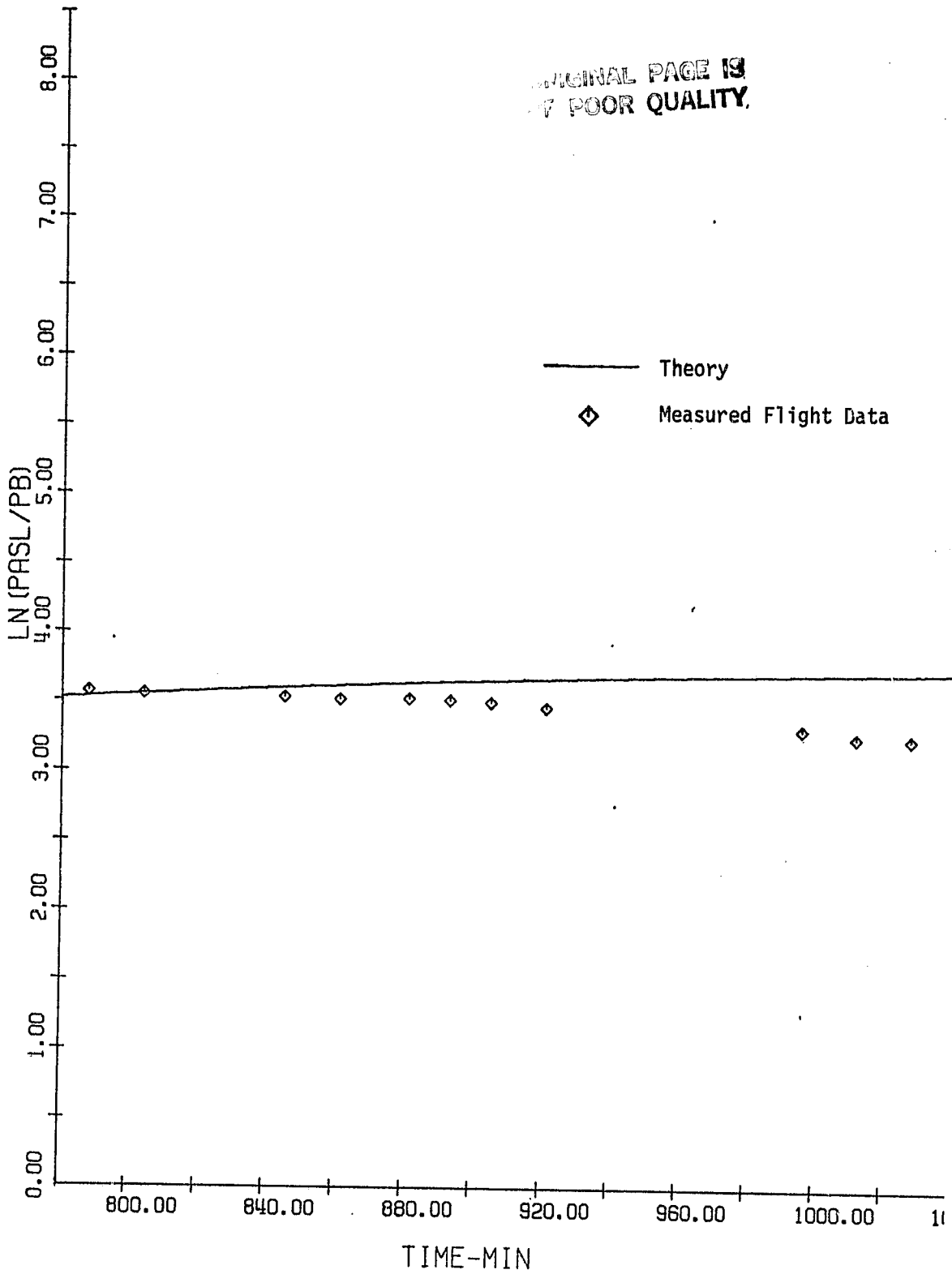


Figure 3.B. (continued) Pressure Trajectory for Flight 167N(66375 m³
balloon launched 1135 CDT, 24 July, 1980)

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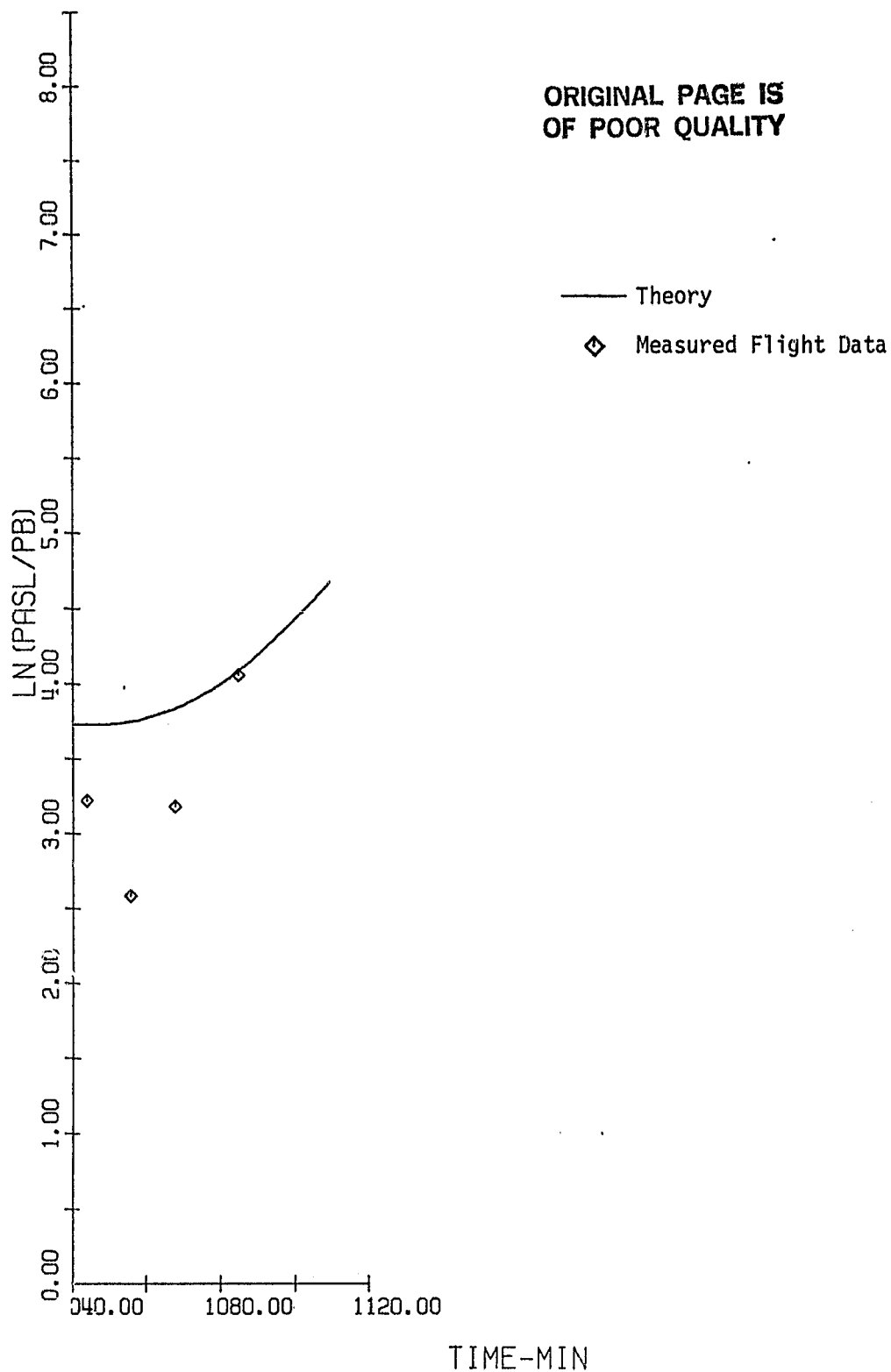


Figure 3.B. (continued) Pressure Trajectory for Flight 167N (66375 m³
balloon launched 1135 CDT, 24 July, 1980)