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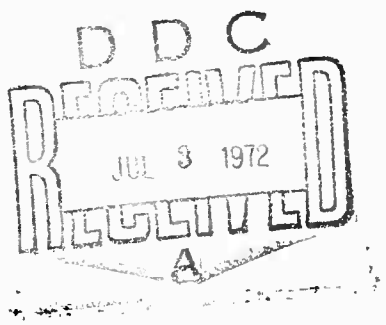
USER'S MANUAL

AEROTHERM GRAPHITE SURFACE KINETICS COMPUTER PROGRAM

Volume II - Fortran Variables, Flow Charts, and Program Listings

January 1972



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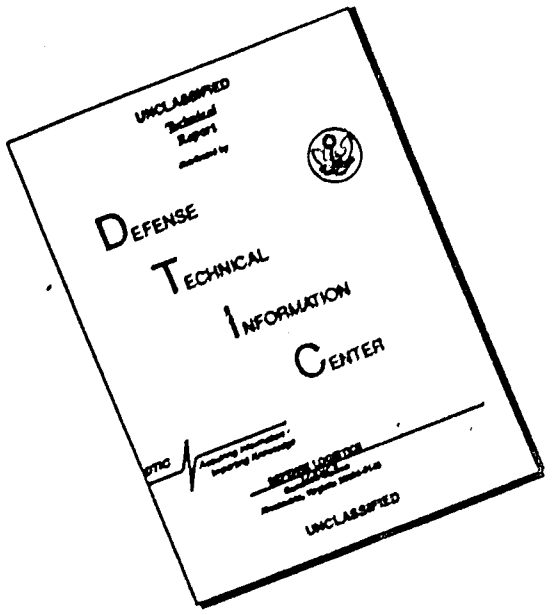

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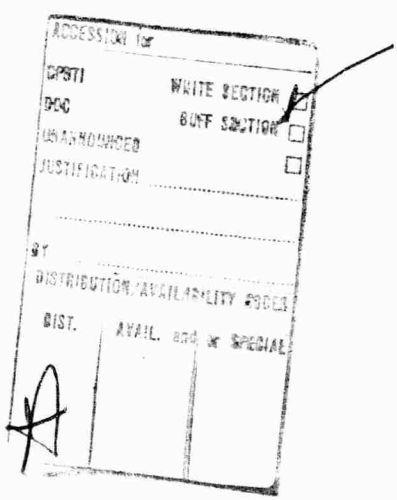

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13. ABSTRACT

A Fortran IV computer code is described which computes thermochemical ablation rates of pyrolytic graphite surfaces, as a function of surface temperature and pressure, assuming all heterogeneous reactions at the surface are kinetically controlled. The calculation of the chemical state at the surface utilizes a film coefficient model which accounts for the unequal diffusion of species. All homogeneous reactions between gas-phase species adjacent to the surface are assumed to be in equilibrium. The specific surface reactions which are taken to be kinetically controlled include the reactions of condensed-phase carbon with water vapor, carbon dioxide, and hydrogen. Several options are available for computation of the boundary-layer edge state required in the diffusion model, including isentropic expansion or compression and normal or oblique shock wave calculation procedures.

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USER'S MANUAL

AEROTHERM GRAPHITE SURFACE KINETICS COMPUTER PROGRAM

VOLUME II

FORTRAN VARIABLES, FLOW CHARTS, AND PROGRAM LISTINGS

Prepared under the Sponsorship of

Air Force Rocket Propulsion Laboratory
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Distribution Unlimited

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FOREWORD

This report is one of two computer program user's manuals prepared by Aerotherm Division of Acurex Corporation under USAF Contract F04611-69-C-0081. Included herein is Volume II of the manual for the Aerotherm Graphite Surface Kinetics (GASKET) computer code. This volume presents definitions of Fortran variables, flow charts, and program listings. The work was administered under the direction of the Air Force Rocket Propulsion Laboratory with Mr. Robert J. Schoner as the Project Officer.

Mr. John W. Schaefer was the Program Manager and Mr. Mitchell R. Wool was Program Engineer. The GASKET code was developed by Dr. Kimble J. Clark.

This technical report has been reviewed and is approved.

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Chief, Technology Division

ABSTRACT

A Fortran IV computer code is described which computes thermochemical ablation rates of pyrolytic graphite surfaces, as a function of surface temperature and pressure, assuming all heterogeneous reactions at the surface are kinetically controlled. The calculation of the chemical state at the surface utilizes a film coefficient model which accounts for the unequal diffusion of species. All homogeneous reactions between gas-phase species adjacent to the surface are assumed to be in equilibrium. The specific surface reactions which are taken to be kinetically controlled include the reactions of condensed-phase carbon with water vapor, carbon dioxide, and hydrogen. Several options are available for computation of the boundary-layer edge state required in the diffusion model, including isentropic expansion or compression and normal or oblique shock wave calculation procedures.

This computer code is designated as the Aerotherm Graphite Surface Kinetics (GASKET) program and provides surface mass balance quantities needed for ablation predictions by the Aerotherm Charring Material Ablation (CMA) code or the Aerotherm Axisymmetric Transient Heating and Material Ablation (ASTHMA) code.

Volume I of this report contains descriptions of the fundamental physical events modeled, the mathematical equations solved, the information required for input, and the results output by the computer code. An input (card format) user's guide is provided along with sample input and output listings to enable an unfamiliar user to successfully operate the code and understand the results. Volume II of this report, presented herein, contains supplemental information on the specific Fortran IV routines. Included are program listings, flow charts, and definitions of Fortran variables.

TABLE OF CONTENTS

TABLE OF CONTENTS (Concluded)

SECTION 1

INTRODUCTION

The computer program described in this user's manual is the Aerotherm Graphite Surface Kinetics (GASKET) computer program. This code was developed from an earlier Aerotherm computer program, the Equilibrium Surface Thermochemistry (EST) computer program, and was designed to solve the specific problem of kinetically controlled graphite ablation using a very simplified form of input data.

The purpose of Volume I of this user's manual was to enable an unfamilar user to affectively utilize the GASKET program. It contained a general description of the problem the GASKET program solves, an input data deck preparation guide, and sample problem input and output. Volume II of this manual, included herein, contains the following additional program documentation:

- Definitions of all Fortran variables used
- Flow charts of program logic for each Fortran routine
- Listings of Fortran IV source decks
- Listings of the diffusion factor data and equilibrium thermochemical data built into the program

These are given in Sections 2, 3, 4 and 5, respectively. Three other documents of potential value to a reader desiring a more detailed exposition of the theoretical fundamentals of the GASKET program are References 1, 2, and 3.

SECTION 2

FORTRAN VARIABLE NAMES

The names and definitions of all Fortran variables used in the Aerotherm Graphite Surface Kinetics (GASKET) computer program are given in this section. Since the GASKET code is divided into many relatively small routines, the majority of all variables are included in common statements. These variables are defined first. In addition to the names and definitions of each variable, an abbreviated name of each routine in which each variable is used is given. The key relating the abbreviations to the names of the various routines is given below.

The remainder of the Fortran variables not appearing in common statements are presented for the specific routine in which they are utilized. The order corresponds to the order shown in the following key to routine identification.

KEY TO ROUTINE IDENTIFICATION

A	ACE	MAIN ROUTINE
AF	AFMAT	CONVERGENCE CONTROL
AL	ALPST	MASS BALANCE INITIALIZATIONS PERFORMED
B	BELCH	ESTABLISH ELEMENT/BASE SPECIES CORRESPONDENCE
C	CRECT	PERFORMS NECESSARY CORRECTIONS
IM	IMELM	INPUT OF ELEMENTAL DATA
IN	INPUT	GENERATION OF THERMOCHEMICAL DATA
KT	KINET	ADDS KINETIC RATE TERMS TO MASS BALANCE EQUATIONS
KN	KININ	INPUTS CONTROL CARD
M1	MAT1	SETS UP BASE SPECIES MASS BALANCE EQUATIONS
M2	MAT2	SETS UP NON-BASE EQUATIONS
M3	MAT3	SETS UP CONDENSED SPECIES EQUATIONS
O	OUTPT	PUTPUTS THERMODYNAMIC PROPERTIES, SPECIES MOLE FRACTIONS, AND PUNCH CARDS
P	PROPS	CALCULATES AND OUTPUTS K AND Z MASS FRACTIONS, Z DEPENDENT ENTHALPIES AND DERIVATIVE THERMODYNAMIC PROPERTIES
R	RERAY	INVERTS SOLUTION MATRIX
SC	SCALE	CHECKS THE SIZE OF CORRECTIONS AND ADJUSTS CORRECTION ARRAY
SQ	SQUEE	SQUEEZES CARD OUTPUT FORMAT TO INCLUDE OPTIONAL OUTPUT
SW	SWAP	RELOCATES THE SOLUTION MATRICES
T	THERM	CALCULATION OF SPECIES THERMODYNAMIC PROPERTIES
Z	ZIPIN	SETS INTERNAL CONTROL INTEGER ARRAYS

LIST OF FORTRAN VARIABLES APPEARING IN COMMON STATEMENTS

VARIABLE NAME	DESCRIPTION	ROUTINE(S) IN WHICH VARIABLE IS UTILIZED
AA	PRODUCT OF PRESSURE TIMES MOLECULAR WEIGHT.	A,AF,Z,T,M1,M3,SC,P,O
ACMSQ	STATIC PRESSURE SQUARED	O,P,Z
ALP(K)	INPUT MASS QUANTITY OF ELEMENTS, EQ 2S OF NASA CR-1064.	AL,M1,M3
ALPT(N)	NUMBER OF ATOMS OF ELEMENT WITH ATOMIC NUMBER JAT(N) IN A SPECIES.	IN
ATA	FIRST FOUR ALPHANUMERIC CHARACTERS IN ELEMENT NAME BEING INPUT.	B
ATB	SECOND FOUR ALPHANUMERIC CHARACTERS IN ELEMENT NAME BEING INPUT.	B
ATC	LAST FOUR ALPHANUMERIC CHARACTERS IN ELEMENT NAME BEING INPUT.	B
B(N)	ERRORS USED WITH COEFFICIENTS TO YIELD CORRECTIONS IN CHEMISTRY ITERATIONS.	A,AF,M1,M2,M3
BE(J)	TEMPORARY VALUES OF THE ERRORS IN THE MASS BALANCE EQUATIONS.	M1,M2,M3
BY	TEMPORARY VALUE OF THE LOG OF THE PARTIAL PRESSURE FOR EACH BASE SPECIES.	M1,M2
B1	SAVED VALUE OF B(1) DURING INVERSION, EQUALS SURFACE EQUILIBRIUM ERROR FOR THAT OPTION.	A,AF
C(K)	ATOMS OF ELEMENT K IN CURRENT SPECIES.	IN
CIJ(K,KK)	GRAM ATOM OF ELEMENT K IN BASE SPECIES KK.	IN,P
CMF	THE FACTOR BY WHICH ALL CORRECTIONS ARE DAMPED DURING CHEMISTRY ITERATIONS.	A,SC,C
CP(J)	SPECIFIC HEAT.	T,M1,M2,P,O
CPF	FROZEN SPECIFIC HEAT.	M1,M2,M3
CPG	FROZEN SPECIFIC HEAT OF GAS.	M1,M2,P
DKPT(M)	SUMD/RT	KT
DMCHI	NOT USED IN PRESENT VERSION OF PROGRAM	Z
DMCLO	NOT USED IN PRESENT VERSION OF PROGRAM	Z
DUM(M)	DUMMY ARRAY	KT
DUM1	LOCALLY USED DUMMY VARIABLE	A,AF,AL,T,M1,M2,SC
DUM2	LOCALLY USED DUMMY VARIABLE	T,M1,M2,C
E(N)	ERRORS IN CHEMISTRY EQUATIONS (MASS BALANCE ERRORS FOR N EQUAL TO OR LESS THAN IS*, EQUILIBRIUM ERRORS FOR N GREATER THAN IS*, WHERE IS* IS THE NUMBER OF ELEMENTS INCLUDING ELECTRON).	A,M1,M2,M3,SC,O
EAK(M)	ACTIVATION ENERGY FOR M TH KINETICALLY-CONTROLLED REACTION, SEE EQN. (46).	KT,T
EB(K)	MAGNITUDE OF LARGEST CONTRIBUTION TO K TH MASS BALANCE.	M1,M2,M3,SC
EBL(K)	MINIMUM CONTRIBUTION ACCEPTED TO K TH MASS BALANCE, EB/(10**8).	M1,M2,M3
EL	MAXIMUM EQUILIBRIUM ERROR.	A,AF,M1,M2,M3

LIST OF FORTRAN VARIABLES APPEARING IN COMMON STATEMENTS

VARIABLE NAME	DESCRIPTION	ROUTINE(S) IN WHICH VARIABLE IS UTILIZED
ENL	MAXIMUM MASS BALANCE ERROR.	A•AP•M3
EP	ERROR IN OVERALL PRESSURE BALANCE.	M1•M2•M3
EXK(M)	TEMPERATURE EXPONENT FOR M TH KINETICALLY-CONTROLLED REACTION, SEE EQN.(45).	KT•T
FAMA(I)	FIRST FOUR CHARACTERS OF BASE SPECIES CHEMICAL SYMBOL FOR EACH ELEMENT.	B
FAM B(I)	LAST FOUR CHARACTERS OF BASE SPECIES CHEMICAL SYMBOL FOR EACH ELEMENT.	B
FAMOA(J)	FIRST FOUR ALPHAMERIC CHARACTERS FOR THE CHEMICAL SYMBOL OF THE J TH SPECIES.	IN•F•AL•SC•O
FAMOB(J)	LAST FOUR ALPHANUMERIC CHARACTERS FOR THE CHEMICAL SYMBOL OF THE J TH SPECIES.	IN•O•AL•O
FF(J)	DIFFUSION FACTOR INTRODUCED BY THE APPROXIMATION FOR DIFFUSION COEFFICIENTS BY EQ 19 OF NASA CR-1062.	Z•IN•AL•T•M1•M2•C•P•O
FFA	EXPONENT ON MOLECULAR WEIGHT CORRELATION OF DIFFUSION FACTORS.	IN•AL
FFF	RATIO OF GAS MOLECULAR WEIGHT TO VMU2.	T•M1•M2•C
FFIN(J)	VALUE OF THE DIFFUSION FACTOR OF THE J TH INPUT SPECIES.	IN•AL
FKF(M)	PREEXPONENTIAL FACTOR FOR M TH KINETICALLY-CONTROLLED REACTION, SEE EQN. (46).	KT•O•T
FLIO	FRACTION OF A SPECIES WHICH IS LIQUID.	A•T•M3•O
FNU(K)	TEMPORARY VALUE OF VMU(J,K) FOR CURRENT VALUE OF J.	M2
GAM	ISENTROPIC EXPONENT	O•P•Z
GAMER	INPUT MASS FRACTION/Z FRACTION WEIGHTING FACTOR EXPONENT.	KN•Z
GAMEX	UNEQUAL DIFFUSION EXPONENT ON DIFFUSION FACTORS.	Z•IN•AL•P•O
GAMF(K)	DEFINED BY EQ 79 OF NASA CR-1064.	AL•M1•M2
GAMH(I)	DEFINED BY EQN.(80) OF NASA CR-1064.	M1•M2•M3
GAMK(I,J)	DEFINED BY EQN. (81) OF NASA CR-1064.	M1
H(J)	ENTHALPY OF THE J TH SPECIES.	T•M1•M2•P•O
HCH	SAVED VALUE OF MIXTURE TOTAL ENTHALPY.	O•P•Z
HG	GAS ENTHALPY	O
HIP	ENTHALPY INPUT.	Z•M3•O
HMELT	ENTHALPY OF FUSION FOR SPECIES WHICH IS CURRENTLY CHANGING PHASE (SOLID/LIQUID).	T•M3•O
HOS	ENTHALPY OF SPECIES IN CLOSED SYSTEM ASSIGNED ENTHALPY SOLUTION.	M1•M2
IB(K)	INDEX ON SPECIES WITH LARGEST CONTRIBUTION TO K TH MASS BALANCE. SUBSEQUENTLY ORDERED ON IB WITH DUPLICATES SET TO 1000.	M1•M2•SC•C

LIST OF FORTRAN VARIABLES APPEARING IN COMMON STATEMENTS

VARIABLE NAME	DESCRIPTION	ROUTINE(S) IN WHICH VARIABLE IS UTILIZED
IBC(J)	CONTROL FLAG FOR BASE SPECIES IDENTICAL TO IFC(J) EXCEPT DURING SEARCH FOR SURFACE SPECIES IN SURFACE EQUILIBRIUM OPTION.	T,MI,M2,SC
IC(K)	NEGATIVE INDEX OF ELEMENT CORRESPONDING TO K TH BASE SPECIES.	B
IDC	UNITY ALWAYS. UNUSED IN PRESENT VERSION OF PROGRAM.	ID
IER	EQUATION NUMBER TO REPRESENT NEWLY APPEARING CONDENSED SPECIES.	AF,M2,SC
IFC(J)	CONTROL FLAG (0=GAS, -1= NONPRESENT CONDENSED, +1= PRESENT CONDENSED. PRIOR FLAGS DECREMENTED BY 3 IF SPECIES CONTAINS NONPRESENT ELEMENT OR INCREMENTED BY 3 IF IT IS A BASE SPECIES REPRESENTING A NONPRESENT ELEMENT).	A,IN,AL,T,MI,M2,M3,SC,C,P,O
IFCJC	CONTROL FLAG FOR THE CURRENT SURFACE SPECIES.	MI,M2,M3
IFL	HAS NO CURRENT FUNCTION	
IFRZ	CONTROL FLAG INDICATING FROZEN COMPOSITION CALCULATION.	A,Z,O
II	INDEX USED TO COUNT SPECIES NOT CONSIDERED AS BASE SPECIES.	Z,IN
IL	INDEX ON FIRST CHEMISTRY EQUATION TO BE SOLVED =1 FOR UNKNOWN T AND 2 FOR KNOWN T.	Z,AF,M3
IM(K)	ROW AND COLUMN INDEX IN INVERSION OF CIJ TO UM.	IN,B
IN	NUMBER OF EQUATIONS BEING SOLVED (HAS THE VALUE OF THE LOCAL VARIABLE ISPQ IF TEMPERATURE IS UNKNOWN OR ISPQ-1 IF TEMPERATURE IS KNOWN).	E,AF,M3
IOAT(N)	INDEX OF N TH OMITTED ELEMENT.	AL
IP	FLAG INDICATING THE IMPORTANCE OF EACH SPECIES IN THE MASS BALANCE	MI,M2,SC,C
IR(K)	NEGATIVE INDEX OF BASE SPECIES CORRESPONDING TO ELEMTNT K.	B,AL,MI,M2
IRE	INDEX ON NEWLY APPEARING CONDENSED SPECIES.	AF,M2,M3,SC,D
IS	NUMBER OF ELEMENTS INCLUDING ELECTRON.	A,IM,IN,B,AL,T,MI,M2,M3,SC,C,P
ISP	NUMBER OF ELEMENTS INCLUDING ELECTRON PLUS ONE.	IM,B,AL,M2
ISPQ	ISP2 + NUMBER OF PRESENT CONDENSED SPECIES.	A,AF,MI,M2,M3,SC
ISP2	NUMBER OF ELEMENTS INCLUDING ELECTRON PLUS TWO.	A,MI,M2,M3
IT	VALUE OF ITS AT CONVERGENCE.	A,D
ITS	COUNTER FOR CHEMISTRY ITERATIONS.	A,AF,Z,T,MI,M2,M3,P,O
IXC	CURRENT INDEX OF B PRIME CHAR ARRAY.	Z
IXG	NOT USED IN PRESENT VERSION OF PROGRAM	Z
J	INDEX USED TO COUNT THE CANDIDATE BASE SPECIES.	Z,IN,B
JAN	TAPE UNIT NUMBER WHERE THERMOCHEMICAL SPECIES DATA ARE STORED.	A,IN
JAT(N)	ATOMIC NUMBER OF AN ELEMENT WHICH CONTAINS ALPT(N) ATOMS IN A SPECIE.	IN
J	INDEX ON SURFACE CONDENSED SPECIES.	A,AF,IN,MI,M2,M3,P

LIST OF FORTRAN VARIABLES APPEARING IN COMMON STATEMENTS

VARIABLE NAME	DESCRIPTION	ROUTINE(S) IN WHICH VARIABLE IS UTILIZED
JAN(N)	SPECIES INDEX OF N TH CANDIDATE CONDENSED SPECIES.	M2,M3
KAT(K)	ATOMIC NUMBER IDENTIFIER OF THE K TH ELEMENT INPUT.	IN,IN,AL,M1,M2,P
KIN	NUMBER OF TAPE FROM WHICH DATA IS READ.	A,Z,IN,IN,AL
KK	TEMPORARY VALUE OF SPECIES POSITION INDEX (I.E. J TH SPECIES).	IN
KKJ	FLAG DESIGNATING WHETHER PRESSURE OR MACH NUMBER IS USED IN ISENTROPIC EXPANSION.	A
KKA	FLAG FOR CARD OUTPUT FORMAT CONTROL.	Z,O
KPHA(N)	PHASE INDEX FOR SPECIES, 1 = GAS, 2 = SOLID, 3 = LIQUID.	IN
KOUT	NUMBER OF TAPE ONTO WHICH DATA IS WRITTEN.	A,AF,Z,IN,IN,B,AL,T,M1,SC,P,O
KR(N)	CONTROL INTEGER ARRAY	A,AF,Z,IN,IN,AL,T,M1,M2,M3,SC,C,P,O
KRALP	CONTROL FLAG WHICH INDICATES THE NEED FOR MASS BALANCE INITIALIZATION.	A,Z,T
KRK(I)	INPUT CONTROL INTEGER ARRAY.	IN,KT,KN,O,T
KRZZ	CONTROL FLAG CALLING LOGIC WHICH INSERTS B PRIME VALUES IN MATRIX TO REDUCE TEMPERATURE INCREMENTS IN B PRIME MATRIX.	Z
LAMI	INTEGERS USED TO ESTABLISH ELEMENT BASE SPECIES CORRESPONDENCE.	I,B,AL
LIM(I,J)	WORKING MATRIX FOR BASE SPECIES-ELEMENT CORRESPONDENCE EVALUATION.	B,C
LL(K)	ARRAY OF FLAGS DESIGNATING WHICH KINETIC REACTIONS ARE CONTROLLING, SEE SECTION 2.2 OF NASA CR-1064.	KT
MA(M)	ARRAY OF IDENTIFICATION NUMBERS FOR THE KINETICALLY-CONTROLLED REACTIONS.	KT
MELT	INDEX ON PHASE CHANGING SPECIES.	I,M3,O
MODE	STORED VALUE FOR KK(I).	A,AF,Z,T,M1,M2,M3
MOL	UNUSED VARIABLE IN PRESENT VERSION OF PROGRAM.	
MT	NUMBER OF KINETICALLY-CONTROLLED REACTIONS.	KT,O,T,Z
MX	NUMBER OF B PRIME ENTRIES INSERTED IN B PRIME MATRIX TO DECREASE TEMPERATURE INCREMENTS.	Z
N	NUMBER OF SPECIES.	AF,Z,IN,B,AL,T,M2,SC,C,P,O
NAB	UNUSED VARIABLE IN PRESENT VERSION OF PROGRAM.	
NCC	COUNTER WHICH IDENTIFIES CALCULATION NUMBER IN THE SEQUENCE OF STATE CALCULATIONS ASSOCIATED WITH A GIVEN PROBLEM.	A,IN,IN,KN
NCV	NONCONVERGENCE FLAG, 0=CONVERGENCE, 1=NONCONVERGENCE.	A,AF,Z,AL,T,P,O
NFF	NUMBER OF SPECIES FOR WHICH DIFFUSION FACTORS, FF(J), ARE TO BE READ IN.	Z,IN,AL
NFIA(J)	FIRST FOUR ALPHANUMERIC CHARACTERS IN THE CHEMICAL SYMBOL OF SPECIES FOR WHICH DIFFUSION FACTOR, FF(J) IS BEING READ IN.	IN,AL

LIST OF FORTRAN VARIABLES APPEARING IN COMMON STATEMENTS

VARIABLE NAME	DESCRIPTION	ROUTINE(S) IN WHICH VARIABLE IS UTILIZED
NPIB(2)	EAST FOUR ALPHANUMERIC CHARACTERS IN THE CHEMICAL SYMBOL OF SPECIES FOR WHICH DIFFUSION FACTOR, FF(J) IS BEING READ IN.	IN,AL
NOAT	CURRENT NUMBER OF OMITTED ELEMENTS.	Z,AL
NOATO	OMITTED ELEMENTS IN PREVIOUS SOLUTION.	AL
NO	TRANSFER VECTOR ON RETURN FROM ASMAT TO EST	A,AF
NXC	NOT USED IN PRESENT VERSION OF PROGRAM	Z
NXG	NOT USED IN PRESENT VERSION OF PROGRAM	Z
P	PRESSURE	Z,IN,AL,T,M1,M3,SC,P,O
PCH	SAVED CHAMBER PRESSURE	O,Z
PKP(M)	EXPONENTIAL OF SUMP-SUMR.	KT
PKR(M)	EXPONENTIAL OF SUMR.	KT
PMR(M)	PRESSURE TIMES MOLECULAR WEIGHT TIMES REACTION RATE COEFFICIENT FOR M TH KINETIC REACTION.	KT
PNU(I,M)	PRODUCT STOICHIOMETRIC COEFFICIENT FOR I TH BASE SPECIES AND M TH KINETIC REACTION, SEE EQN. (44).	KT
PNUS(K)	SUMMATION VNU(J,K)*V#(J) OVER ALL GASES J.	T,M1,M2,SC,C
PR(I)	STATIC PRESSURE	KN,O,P,Z
RA(N)	HEAT OF FORMATION OF CURRENT MOLECULE AT 298 DEG. K FROM JANAF BASE STATE, CAL/MOLE.	IN
RAT(M)	THE MAXIMUM OF THE TWO VARIABLES PKP(M) AND PKR(M).	KT
RB(J,N)	THERMOCHEMICAL DATA CONSTANT, ENTHALPY AT 3000 DEG. K FOR THE J TH SPECIES.	IN,T
RC(J,N)	THERMOCHEMICAL DATA CONSTANT IN SPECIFIC HEAT CURVE FIT EQUATION FOR J TH SPECIES (SEE CARD SET 6 OF INPUT GUIDE).	IN,T
RD(J,N)	THERMOCHEMICAL DATA CONSTANT IN SPECIFIC HEAT CURVE FIT EQUATION FOR J TH SPECIES (SEE CARD SET 6 OF INPUT GUIDE).	IN,T
RE(J,N)	THERMOCHEMICAL DATA CONSTANT IN SPECIFIC HEAT CURVE FIT EQUATION FOR J TH SPECIES (SEE CARD SET 6 OF INPUT GUIDE).	IN,T
REFM	REFERENCE MOLECULAR WEIGHT IN DIFFUSION FACTOR CORRELATION, EITHER INPUT OR ASSIGNED INTERNALLY.	IN,AL
RF(J,N)	THERMOCHEMICAL DATA CONSTANT IN SPECIFIC HEAT CURVE FIT EQUATION FOR J TH SPECIES (SEE CARD SET 6 OF INPUT GUIDE).	IN,T
RHO	MIXTURE DENSITY	O,P,Z
RMU(I,M)	REACTANT STOICHIOMETRIC COEFFICIENT FOR I TH BASE SPECIES AND M TH KINETIC REACTION, SEE EQN. (44).	KT,T
ROUCM	INPUT MASS TRANSFER COEFFICIENT.	KN,O,T
RV	# PRIME	M1,M2,SC

LIST OF FORTRAN VARIABLES
APPEARING IN COMMON STATEMENTS

VARIABLE NAME	DESCRIPTION	ROUTINE(S) IN WHICH VARIABLE IS UTILIZED
SA1	SHOCK ANGLE RELATIVE TO UPSTREAM VELOCITY VECTOR. SEE SECTION 2.1.3.	O
SA2	SHOCK ANGLE RELATIVE TO DOWNSTREAM VELOCITY VECTOR. SEE SECTION 2.1.3.	O
SBI(J)	ENTROPY OF THE J TH SPECIES.	T,O
SCH	SAVED VALUE OF MIXTURE TOTAL ENTROPY.	O,Z
SM1	STATIC ENTHALPY UPSTREAM OF SHOCK WAVE.	O,Z
SIP	CURRENT SYSTEMS ENTROPY.	Z,O
SLA(N,NN)	TEMPORARY STORAGE LOCATIONS FOR MATRIX A(N,NN).	A,AF,SW
SLAM(K)	DEFINED BY EQ 83 OF NASA CR-1064.	T,M1,M2,SC,C
SLB(N)	TEMPORARY STORAGE LOCATION FOR VECTOR B(N).	A,AF,SW
SMELT	ENTROPY OF FUSION FOR SPECIES WHICH IS CURRENTLY CHANGING PHASE.	T,O
SORCE(N)	THIRTY ALPHANUMERIC CHARACTERS GIVING THE SOURCE OF THE THERMOCHEMICAL DATA FOR THE CURRENT SPECIES.	IN
SPI	STATIC PRESSURE UPSTREAM OF SHOCKWAVE.	O,Z
SQMAX	MACH NUMBER SQUARED	O,P,Z
SR1	DENSITY UPSTREAM OF SHOCKWAVE.	O,Z
SUMC	SUMMATION OF VN(J) FOR ALL CONDENSED SPECIES.	T,M1,M2
SUML	LOG (SUMN/P)	T,M1,M2
SUMN	SUMMATION OF PARTIAL PRESSURES FOR ALL GAS PHASE SPECIES.	T,M1,M2
SV1	VELOCITY UPSTREAM OF SHOCK WAVE.	O,Z
SVA	SECOND TERM ON R.H.S. OF EQN. (14) TIMES DOWNSTREAM DENSITY.	M3,Z
SVB	SVB=2./1.9869	M3,Z
SVC	TERM RELATED TO CONSERVATION OF ENERGY ACROSS A SHOCKWAVE,EQN.(13)	M3,Z
SVD	STATIC PRESSURE DOWNSTREAM OF SHOCKWAVE.	M3,Z
T	STATIC TEMPERATURE IN DEG K.	A,AF,Z,T,M3,SC,P,O
TAU(K,KK)	INTERMEDIATE ARRAY USED IN FORMING UM.	IN,O
TBT	TEMPERATURE BELOW WHICH NO ADDITIONAL NON-ABLATING SURFACE CALCULATIONS WILL BE PERFORMED.	Z
TC(J)	-D LOG KP/D LOG T FOR FORMATION REACTION OF J TH SPECIES.	T,M2,SC,O
TF(I)	FAIL TEMPERATURE OF SPECIES J.	AF,AL,C,KN,M1,M2
TH1	NOT USED IN PRESENT VERSION OF PROGRAM	Z
TILE	TEN ALPHANUMERIC CHARACTERS USED FOR PROBLEM IDENTIFICATION.	Z,P,O
TK(K,N)	GRAM ATOMS OF ELEMENT K PER UNIT MASS OF COMPONENT N.	IN,B,AL

LIST OF FORTRAN VARIABLES APPEARING IN COMMON STATEMENTS

VARIABLE NAME	DESCRIPTION	ROUTINE(S) IN WHICH VARIABLE IS UTILIZED
TLO	NOT USED IN PRESENT VERSION OF PROGRAM	Z
TMAX	MAXIMUM TEMPERATURE ALLOWED FOR CURRENT ITERATION.	AF,Z,T,M3,SC
TMIN	MINIMUM TEMPERATURE ALLOWED FOR CURRENT ITERATION.	AF,Z,T,M3,SC
TTMAX	SAVED VALUE OF MAXIMUM ALLOWED TEMPERATURE FOR THIS SOLUTION.	AF,T,M3
TTMIN	SAVED VALUE OF MINIMUM ALLOWED TEMPERATURE FOR THIS SOLUTION.	AF,T,M3
TQ(K,N)	GRAM ATOMS OF BASE SPECIES K PER UNIT MASS OF COMPONENT N(SEE W(N) FOR DEFINITION OF COMPONENTS).	IN,B,AL
TU(J,N)	UPPER TEMPERATURE OF TEMPERATURE RANGE FOR INPUTING THERMODYNAMIC PROPERTY DATA FOR SPECIES J. N=1 OR 2 FOR LOWER AND UPPER TEMPERATURE RANGES, RESPECTIVELY.	IN,T
UM(K,KK)	MOLECULES OF BASE SPECIES K IN ELEMENT KK.	IN,IN,B
VA	TEMPORARY VALUE OF VN(J)/FF(J).	IN,AL,T,M1,M2,SC,C,P,O
VEL	FLOW VELOCITY	O,Z
VINT	INITIAL GUESS OF SPECIES PARTIAL PRESSURE = P*(10**-6).	IN
VISC	MIXTURE VISCOSITY	
VLAM(I,J)	LAMBDA,DEFINED IN EQN.(83) OF NASA CR-1064.	C,M2,T
VLNK(J)	LOG KP FOR FORMATION REACTION OF J TH SPECIES.	I,M2,O
VMACH	MACH NUMBER	O
VMU2	COEFFICIENT MU2 DEFINED IN EQ 22 OF NASA CR-1062.	P
VN(J)	PARTIAL PRESSURE OF THE J TH SPECIES.	AF,IN,AL,T,M1,M2,M3,SC,C,P,O
VNU(J,K)	STIOCHIOMETRIC COEFFICIENT ON K TH BASE SPECIES IN FORMATION OF J TH SPECIES.	IN,AL,T,M2,M3,SC,C,P
W(N)	COMPONENT MASS FLUX AT WALL; W(1) IS EDGE GAS; W(2) IS UNUSED; W(3) IS SURFACE MATERIAL, OR RELATIVE COMPONENT MASSES FOR CLOSED SYSTEM CALCULATIONS	Z,AL,T,SC,O
WALJP(I)	UNUSED VARIABLE IN PRESENT VERSION OF PROGRAM.	
WAT(K)	ATOMIC WEIGHT OF K TH ELEMENT.	IN,IN,P
WM	MOLECULAR WEIGHT OF MIXTURE.	Z,T,P,O
WR(I)	INTERNAL ARRAY SPECIFYING RELATIVE AMOUNT OF COMPONENTS 1,2, AND 3.	KN,Z
WS	SURFACE MATERIAL MASS RATES	Z,AL,T,M1
WTG	PRESSURE * GAS MOLECULAR WEIGHT.	AF,T,M1,M2,SC,C,O
WTL	SUMMATION OF VN(J) * WTM(J) FOR ALL CONDENSED SPECIES.	AF,T,M1,M2,SC,C,O
WTM(J)	MOLECULAR WEIGHT OF SPECIES J.	IN,AL,T,M1,M2,SC,C,P,O
X(N)	CORRECTIONS OF NONLINEAR VARIABLES IN CHEMISTRY SOLUTION.	AF,M3,SC

LIST OF FORTRAN VARIABLES
APPEARING IN COMMON STATEMENTS

VARIABLE NAME	DESCRIPTION	ROUTINE(S) IN WHICH VARIABLE IS UTILIZED
XC	NOT USED IN PRESENT VERSION OF PROGRAM	Z
XO	NOT USED IN PRESENT VERSION OF PROGRAM	Z
Y(J)	NATURAL LOG OF PARTIAL PRESSURE (=0 FOR PRESENT CONDENSED SPECIES)	IN,AL,T,MI,M2,SC,CTO
YINT	LOG OF VINT.	IN
Z	INPUT THERMODYNAMIC STATE VARIABLE.	KN
ZKE(K)	BOUNDARY LAYER EDGE Z MASS FRACTION.	AL

LIST OF FORTRAN VARIABLES
APPEARING IN
MAIN ROUTINE ACE

VARIABLE NAME	DESCRIPTION
I	LOOP INDEX.
ICT	CYCLE COUNT ON POST ITERATION MODIFICATION TO INVERSION SOLUTION.
IG	FLAG CALLING FOR DEBUG OUTPUT FROM SUBROUTINE RERAY.
IT	PERFORMS NO FUNCTION.
ITT	TEMPORARILY SAVED VALUE OF THE VARIABLE IT.
IQI	TEMPORARY ALTERNATE VALUE OF IQQ DEPENDING ON POST ITERATION MODIFICATIONS TO INVERSION SOLUTION.
IQQ	DEBUG (=2) AND NONCONVERGENT (=1) FLAG ON CALL TO AND RETURN FROM RERAY, RESPECTIVELY.
JJC	TEMPORARILY SAVED VALUE OF THE VARIABLE JC.
MOE	FLAG SET IN ACE AND USED IN CRECT. (ZERO RESULTS IN EMPHASIZING EQUILIBRIUM EQUATIONS DURING CONVERGENCE, ONE RESULTS IN EMPHASIZING MASS BALANCES).

LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE AFMAT

VARIABLE NAME	DESCRIPTION
DTD	DOWNWARD TEMPERATURE STEP USED IN SEEKING SURFACE EQUILIBRIUM SOLUTION.
DTU	UPWARD TEMPERATURE STEP USED IN SEEKING SURFACE EQUILIBRIUM SOLUTION.
I	LOOP INDEX.
XI	TEMPORARY VALUE OF X(I).

LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE XLPST

VARIABLE NAME	DESCRIPTION
ALPH	TEMPORARY VALUE FOR THE K TH ELEMENT OF THE SUMMATION W(N) * TR(K,N), WHERE N IS COMPONENTS 1, 2 AND 3.
FFAD	VARIABLE ASSIGNED IN A DATA STATEMENT TO THE CHARACTERS FFA. USED TO LOCATE INPUT VALUE OF FFA.
I	LOOP INDEX.
IK	LOOP INDEX.
INF	LOWER LIMIT INDEX OF THE DIFFUSION FACTOR SET TO BE READ, EQUAL TO I PLUS THE TOTAL NUMBER PREVIOUSLY READ.
I1	IS ALPHANUMERIC VARIABLE.
I2	IS ALPHANUMERIC VARIABLE.
I3	ASSIGNED EQUAL TO I5 OR I6 DEPENDING ON OUTPUT LABEL DESIRED.
I4	ASSIGNED EQUAL TO I5 OR I7 DEPENDING ON OUTPUT LABEL DESIRED.
I5	SET EQUAL TO PH IN DATA STATEMENT FOR LABELING OF OUTPUT DIFFUSION FACTORS.
I6	SET EQUAL TO PX * N IN DATA STATEMENT FOR LABELING OF OUTPUT DIFFUSION FACTORS.
I7	SET EQUAL TO PHEW IN DATA STATEMENT FOR LABELING OF OUTPUT DIFFUSION FACTORS.
JL	LOCAL INDEX USED IN DIFFUSION FACTOR INPUT LOGIC.
K	LOOP INDEX
L	LOOP INDEX.
LAMT	LOCAL VARIABLE.
NP	N+1
PIN	INITIAL PARTIAL PRESSURE GUESS = P/10.
PLOG	ALOG OF PIN.
PMU2	VN(J) * WTM(J)/FF(J) SUMMED OVER ALL SPECIES N= VMU2 * P.
REFD	THE FOUR CHARACTERS REFM ASSIGNED IN A DATA STATEMENT FOR OUTPUT LABELING.
TEST	MASS BALANCE CLOSURE CRITERIA.
TFMAX	MAXIMUM FAIL TEMPERATUE OF CANDIDATE SURFACE SPECIES.
YC	INITIAL VALUE OF Y(J).

LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE SOLCH

VARIABLE NAME	DESCRIPTION
I	LOOP INDEX.
IG	ELIMINATION INDEX IN BASE SPECIES - ELEMENT CORRESPONDENCE LOGIC.
IMI	LOCAL INDEX.
IMJ	TEMPORARY VALUE OF IMIJ.
IZ	LOOP INDEX.
JM	TEMPORARY COMPUTED INDEX FOR ARRAY IM.
K	LOOP INDEX.
L	LOOP INDEX.
LAMD	BINARY BIT DIVISOR
LAMT	LOCAL VARIABLE
UGM	NORMALIZING FACTOR IN GAUSSIAN ELIMINATION.
V	LOCAL VARIABLE.

LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE CHECT

VARIABLE NAME	DESCRIPTION
DYI	VALUE OF DY FOR THE J TH SPECIES DURING LOOP ON THAT SPECIES.
I,IMK	LOOP INDICES.
LIM	LOOP LIMIT = N (TOTAL NUMBER OF SPECIES).
M	LOCAL INDEX EQUAL TO IB(N).
MI	COUNT ON PRINCIPAL SPECIES AFTER ORDERING ON IB.

LIST OF FORTRAN VARIABLES APPEARING IN SUBROUTINE IMELH

VARIABLE NAME	DESCRIPTION
AO	ALPHANUMERIC VARIABLE ' HOT'
AG	ALPHANUMERIC VARIABLE ' GRA'.
ALPTO(I,J)	VALUE OF ALPT(I) STORED IN DATX FOR J TH SPECIE.
AMOAD(J)	VALUE OF AMOA STORED IN DATX FOR J TH SPECIE.
AMOBD(J)	VALUE OF AMOB STORED IN DATX FOR J TH SPECIE.
ATAS(I)	SAVED VALUE OF ATA(I).
ATBS(I)	SAVED VALUE OF ATB(I).
ATCS(I)	SAVED VALUE OF ATC(I).
BD	ALPHANUMERIC VARIABLE ' ORY'.
BG	ALPHANUMERIC VARIABLE 'PHIT'.
CO	ALPHNUMERIC VARIABLE ' ICE'.
CG	ALPHANUMERIC VARIABLE 'E '.
FFIND(I)	ARRAY FOR FFIN(I) STORED IN DATX.
I	LOOP INDEX ON ELEMENT.
ICAR	INDEX DESIGNATING POSTION OF ELEMENT CARBON IN INPUT ELEMENTAL COMPOSITION ARRAY.
IOX	INDEX DESIGNATING POSTION OF ELEMENT OXYGEN IN INPUT ELEMENTAL COMPOSITION ARRAY.
ISS	SAVED VALUE OF IS AFTER ADDITION OF FICTITIOUS ELEMENTS GRAPHITE AND HOT DRY ICE.
J	LOOP INDEX ON ELEMENTS.
JATD(I,J)	VALUE OF JAT(I) STORED IN DATX FOR J TH SPECIE.
M	LOOP INDEX ON COMPONENTS OR ELEMENTS.
L	LOOP INDEX ON COMPONENTS.

LIST OF FORTRAN VARIABLES APPEARING IN SUBROUTINE INPUT

VARIABLE NAME	DESCRIPTION
ANOA	TEMPORARY LOCATION OF THE FIRST FOUR CHARACTERS OF A SPECIES CHEMICAL NAME. LATER ASSIGNED TO FAMOA FOR EACH SPECIES.
ANOB	TEMPORARY LOCATION OF THE LAST FOUR CHARACTERS OF A SPECIES CHEMICAL NAME. LATER ASSIGNED TO FAMOB FOR EACH SPECIES.
BLANK	FOUR BLANK CHARACTERS ASSIGNED TO THIS VARIABLE. USED FOR OUTPUT IF NO OTHER SURFACE SPECIES IS AVAILABLE. ASSIGNED TO FAMOB(NM).
CHAR	THE FOUR CHARACTERS CALLED 'CHAR' ARE ASSIGNED TO THIS VARIABLE AND USED FOR OUTPUT IF NO OTHER SURFACE SPECIES IS AVAILABLE. THEY ARE ASSIGNED TO FAMOA(NM).
I	LOOP INDEX.
IML	TEMPORARY VALUE OF IM(L).
INF	LOWER LIMIT ON THE NUMBER OF DIFFUSION FACTORS TO BE READ IN ANY ONE PASS. EQUAL TO 1 PLUS THE TOTAL NUMBER PREVIOUSLY READ.
JM	J-1 WHERE J IS THE BASE SPECIES COUNT.
K	LOOP INDEX.
KKK	TEMPORARY VALUE OF SPECIES POSTION INDEX (I.E. J TH SPECIES).
KPHAD(I,J)	VALUE OF KPHA(I) STORED IN DATA FOR J TH SPECIE.
L	LOOP INDEX.
LAMKK	TEMPORARY VALUE OF LAMI(KK)
NEX	NUMBER OF EXCESS SPECIES (SPECIES LIMIT IS 179).
NFIA(I)	ARRAY FOR NFIA(I) STORED IN DATA.
NFIB(I)	ARRAY FOR NFIB(I) STORED IN DATA.
NJ,N	LOOP INDEX
RAD(I,J)	VALUE OF RA(I) STORED IN DATA FOR J TH SPECIE.
RBD(I,J)	VALUE OF RB(K,I) STORED IN DATA FOR J TH SPECIE.
RCD(I,J)	VALUE OF RC(K,I) STORED IN DATA FOR J TH SPECIE.
RDD(I,J)	VALUE OF RD(K,I) STORED IN DATA FOR J TH SPECIE.
RED(I,J)	VALUE OF RE(K,I) STORED IN DATA FOR J TH SPECIE.
RFD(I,J)	VALUE OF RF(K,I) STORED IN DATA FOR J TH SPECIE.
SORCD(I,J)	VALUE OF SORCE(I) STORED IN DATA FOR J TH SPECIE.
TUD(I,J)	VALUE OF TU(K,I) STORED IN DATA FOR J TH SPECIE.
UGH	NORMALIZING FACTOR IN GAUSSIAN ELIMINATION.
WT	TEMPORARY VALUE OF A SPECIES MOLECULAR WEIGHT. ASSIGNED TO WTM FOR EACH SPECIES.
YC	INITIAL VALUE OF Y(J).

LIST OF FORTRAN VARIABLES APPEARING IN SUBROUTINE KINET

VARIABLE NAME	DESCRIPTION
AR	EXEL/(EXEL-1.)-1./ELK. WEIGHTING FACTOR IN LINEARIZING EQUILIBRIUM ASPECT OF KINETICALLY CONTROLLED MASS BALANCE.
ELK	NATURAL LOGARITHM OF EXEL.
EXEL	(PKR(M)+1.E-36)/(PKP(M)+1.E-36) RATIO OF FORWARD TO REVERSE DRIVING POTENTIAL IN KINETIC EQUATIONS.
FFX(M)	SECOND BRACKETED QUANTITY IN EQN. (47), FOR M TH KINETIC REACTION.
FKK(I,J)	INHIBITING SPECIE PARTIAL PRESSURE COEFFICIENT FOR I TH BASE SPECIE AND J TH KINETIC REACTION, SEE EQN. (47).
HHCL	ALPHANUMERIC QUANTITY REPRESENTING THE REACTION INHIBITING SPECIE 'CLH'.
HHF	ALPHANUMERIC QUANTITY REPRESENTING THE REACTION INHIBITING SPECIE 'FH'.
I	LOOP INDEX
I1	LOWER LIMIT ON DO-LOOP, EQUAL TO I OR L.
I2	UPPER LIMIT ON DO-LOOP, EQUAL TO IS OR L.
J	LOOP INDEX
K	FLAG, EQUAL TO 0 OR MA(M) , LOOP INDEX.
KR7	SAVED VALUE OF KR(7).
L	LOOP INDEX
M	LOOP INDEX
MT	MA(K)
MM	LOOP INDEX
MP	MM+1
PPX(M)	FIRST BRACKETED QUANTITY IN EQN.(47), FOR M TH KINETIC REACTION.
PRMU(I,M)	PMU(I,M)-RMU(I,M)
PSI(I,J)	INHIBITING SPECIE PARTIAL PRESSURE COEFFICIENT FOR THE I TH BASE SPECIE AND J TH KINETIC REACTION, SEE EQN. (47).
RT	1.9869*T
SUMD	SUMMATION OVER BASE SPECIES OF PRMU(I,M)*PHI(I), SEE NASA CR-1064.
SUMK	SUMMATION OVER BASE SPECIES OF PRMU(I,M)*VLNK(I), SEE NASA CR-1064.
SUMP	SUMMATION OVER BASE SPECIES OF PMU(I,M)*Y(I), SEE NASA CR-1064.
SUMR	SUMMATION OVER BASE SPECIES OF RMU(I,M)*Y(I), SEE NASA CR-1064.
VK1	PKR(M)-PKP(M)
VK2	AA TIMES THE REACTION RATE COEFFICIENT DEFINED BY EQN.(46).

LIST OF FORTRAN VARIABLES APPEARING IN SUBROUTINE KINEN

VARIABLE NAME	DESCRIPTION
I	LOOP INDEX
J	LOOP INDEX
K	LOOP INDEX
KRA(I,J)	SEQUENCE OF INTERNAL CONTROL INTEGER ARRAYS-SEE KR(I).
KRKS	SAVED VALUE OF KRA(3,J) WHICH CONTROLS HOW THERMOCHEMICAL DATA IS GENERATED.
KRKSS	SAVED VALUE OF KRA(3,J) WHICH CONTROLS HOW THERCHEMICAL DATA IS GENERATED.
KTC	NO. FROZEN-EDGE TEMPERATURES PLUS NO. SURFACE TEMPERATURES PLUS SEVEN.
KTF	NUMBER OF ENTRIES IN FROZEN-EDGE TEMPERATURE ARRAY.
KTS	NUMBER OF ENTRIES IN SURFACE TEMPERATURE ARRAY.
NCT	NUMBER OF STATE CALCULATIONS REQUIRED TO DETERMINE THE EDGE STATE.
NCT1	NCT+1
NCT2	NCT+KTF
NCT3	NCT2+1 OR NCT+1
NCT4	NCT2+KTS OR NCT+KTS
NCT5	NCT3+1
NS	TOTAL NUMBER OF CANDIATE GAS-PHASE SPECIES PLUS CONDENSED-PHASE CARBON
PC	IDEAL CHAMBER PRESSURE, SPECIFIED WITH PROPELLANT FLAME TEMPERATURE.
PRA(I)	SEQUENCE OF PRESSURES USED IN STATE CALCULATIONS.
TFA(I)	ARRAY OF FROZEN-EDGE TEMPERATURES.
TSA(I)	ARRAY OF SURFACE TEMPERATURES.
WPA(I,J)	SEQUENCE OF INTERNAL VARIABLES DESIGNATING RELATIVE AMOUNTS OF COMPONENTS 1,2, AND 3.
ZA(I)	SEQUENCE OF THERMODYNAMIC VARIABLES (TEMPERATURE, ENTHALPY) USED IN STATE CALCULATIONS.
ZE	INPUT THERMODYNAMIC VARIABLE, PERTAINING TO CHAMBER, SHOCKWAVE, OR BOUNDARY LAYER EDGE.

LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE MATI

VARIABLE NAME	DESCRIPTION
BJC	VALUE OF Y(J) WHEN J IS A BASE SPECIES CURRENTLY BEING CONSIDERED AS A SURFACE SPECIES.
I,IK,K	LOOP INDICES.
JCS	SAVED VALUE OF JC.
WSS	SAVED VALUE OF WS.

LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE MAT2

VARIABLE NAME	DESCRIPTION
ABSVA	ABSOLUTE VALUE OF CONTRIBUTION OF A SPECIES TO A MASS BALANCE.
BJC	FOR NON-BASE SURFACE SPECIES BJC IS IDENTICAL TO E(JC).
EAB	ABSOLUTE VALUE OF EQUILIBRIUM ERROR FOR A SPECIES.
EFA	ABSOLUTE ERROR OF CONDENSED SPECIES BEING INTRODUCED DURING CURRENT ITERATION.
FFJ	LOCALLY DEFINED VARIABLE.
I,J,IK	LOOP INDICES.
IE	EQUATION INDEX FOR CONDENSED SPECIES.
IO	FOR EACH NON-BASE GASEOUS SPECIES INITIALIZED TO ZERO, SET TO UNITY IF SPECIES IS SIGNIFICANT IN ANY MASS BALANCE.
K,KI	LOOP INDICES.
LIM	LOOP LIMIT = N (NUMBER OF SPECIES).
VP	LOCALLY DEFINED VARIABLE.
WTR	FOR PRESENT NON-BASE SPECIES AND CERTAIN NON PRESENT SPECIES (THOSE CONSIDERED AS POSSIBLE SURFACE SPECIES), WTR = SPECIES MOLECULAR WEIGHT/GAS PHASE MOLECULAR WEIGHT.

LIST OF FORTRAN VARIABLES APPEARING IN SUBROUTINE MAT3

VARIABLE NAME	DESCRIPTION
ABER	ABSOLUTE VALUE OF RATIO OF A MASS BALANCE ERROR TO LARGEST TERM IN THAT MASS BALANCE.
ARII	SAVED VALUE OF A(K,J).
CPA	LOCALLY DEFINED VARIABLE.
DIV	SELECTED VALUE OF A(K,J) USED FOR NORMALIZING A(M,N).
ENS	ERROR IN ENTHALPY FOR ASSIGNED ENTHALPY SOLUTION.
ER	ERROR IN MASS BALANCE RELATION.
I,IE,K	LOOP INDICES.
ISP3	NUMBER OF ELEMENTS INCLUDING THE ELECTRON PLUS THREE.
IV	LOOP INDEX
J	LOCALLY DEFINED INDEX.
JM	LOOP INDEX
JZ	VARIABLE IN UNUSED PORTION OF CURRENT PROGRAM VERSION.
KX	VARIABLE IN UNUSED PORTION OF CURRENT PROGRAM VERSION.
KZ	VARIABLE IN UNUSED PORTION OF CURRENT PROGRAM VERSION.
L(I)	VARIABLE IN UNUSED PORTION OF CURRENT PROGRAM VERSION.
M	VARIABLE IN UNUSED PORTION OF CURRENT PROGRAM VERSION.
NFM	NUMBER OF SIGNIFICANT SPECIES PLUS NUMBER OF NON PRESENT ELEMENTS.
SHMLT	ENTHALPY OF FUSION OF A SPECIES IF TEMPERATURE EQUALS FUSION TEMPERATURE OF THAT SPECIES.
TEST	VARIABLE IN UNUSED PORTION OF CURRENT PROGRAM VERSION.

LIST OF FORTRAN VARIABLES APPEARING IN SUBROUTINE OUTPT

VARIABLE NAME	DESCRIPTION
BPRM	TEMPORARY VALUE OF B PRIME CHAR.
FAF	VALUE OF DIFFUSION EXPONENT (GAMEX) PUNCHED OUT ON CARDS.
FLUX	VEL*RHO, MASS FLUX,LBM/FT2 SEC
FSOL	FRACTION OF CONDENSED PHASE SPECIES WHICH IS SOLID, EQUAL TO 1-FLIQ.
GAME	GAM/(GAM-1.)
HAP	SYSTEM ENTHALPY IN BTU/LBM.
HMM	MCH*1.8
HPS	0.01 ALWAYS,UNUSED IN PRESENT VERSION OF ROUTINE.
HTPP	HG/1.8
HKIN	(MCH-HTPP)*1.8, KINETIC ENTHALPY.
HL	ENTHALPY OF LIQUIDS ONLY, BTU/LB.
HTIL	ENTHALPY BASED ON ZY MASS FRACTIONS (INCLUDES GAMEX DEPENDENCE).
I,J	LOOP INDICES.
IO	INTEGER ARRAY FOR COMPRESSED PUNCHED CARD OUTPUT FORMAT.
KR1	IDENTIFICATION NUMBER FOR PUNCHED CARD OUTPUT.
KR8	SAVED VALUE OF KR(8).
KSC	FLAG USED ON PUNCHED CARD OUTPUT.
L	LOOP INDEX
M	LOOP INDEX
PMU2	PRESSURE TIMES MU2 OF EQ 22 OF NASA CR-1062
RHOG	DENSITY OF GAS PHASE SYSTEM, LBM/FT**3.
SHI	STATIC ENTHALPY UPSTREAM OF SHOCK WAVE.
SHI	SHOCK ANGLE IN DEGREES.
SI	ENTROPY OF GAS PHASE SPECIES, CAL/GM DEG.K.
SHIP	(P**SYSTEM ENTHALPY), SAVED DURING OUTPUT CALCULATIONS.
SL	ENTROPY OF LIQUIDS, CAL/GM DEG.K.
SPL	SUMMATION OF VN(J) FOR CONDENSED SPECIES
SSIP	SYSTEM ENTROPY SAVED DURING OUTPUT CALCULATIONS, CAL/GM DEG.K.
TIME	VALUE OF TIME SINCE LAST CALL OF ETIME.
TT	SYSTEM TEMPERATURE, DEG. R.

LIST OF FORTRAN VARIABLES APPEARING IN SUBROUTINE OUTPT

VARIABLE NAME	DESCRIPTION
VELSQ	SQUARE OF FLOW VELOCITY FROM ISENTROPIC EXPANSION OR SHOCK CALCULATIONS.
VKIN	UNUSED VARIABLE IN COMPRESSED CARD FORMAT.
WMG	MOLECULAR WEIGHT OF GAS PHASE SYSTEM.
WML	MOLECULAR WEIGHT OF LIQUIDS, NOT USED IN PRESENT VERSION OF PROGRAM
WSD	AMAX1(WS*W(3)*BPR,1.E-30) PARAMETER USED TO AVOID DIVISION BY ZERO IN CALCULATION OF MIP.
WTLS	SAVED VALUE OF THE SUMMATION VN(J) * WTM(J) OVER ALL CONDENSED SPECIES.
WTM	MASS OF CONDENSED / MASS OF GAS IN SYSTEM.

LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE PROPS

VARIABLE NAME	DESCRIPTION
AISTR	1.1 S ALWAYS. SEE NASA CR-1063.
ALF	DERIVATIVE OF THE LOG MOLECULAR WEIGHT WITH RESPECT TO LOG TEMPERATURE AT CONSTANT PRESSURE.
AMUS	VN(J)*WTM(J)/(FF(J)*(WDZ-VN(J)*FF(J)*WD7)) SUMMED OVER ALL SPECIES J.
BETA	DERIVATIVE OF LOG MOLECULAR WEIGHT WITH RESPECT TO LOG PRESSURE AT CONSTANT TEMPERATURE.
CAPC(I)	1.0 ALWAYS,UNUSED IN CURRENT VERSION OF ROUTINE.
CEJ	VNU(I,K)*CIJ(J,K) SUMMED OVER ALL BASE SPECIES.
CPHAM(I)	CPI ALWAYS. UNUSED IN CURRENT VERSION OF ROUTINE.
CPE	SPECIFIC HEAT FOR ELECTRON.
CPGPM	SUMMATION OF VN(I)*CP(I) OVER ALL GAS-PHASE SPECIES.
CPTIL	PROPERTY OF THE GAS MIXTURE WHICH REDUCES TO CPF FOR EQUAL COEFFICIENTS. SEE EQ 26 OF NASA CR-1062.
CSP	SPECIFIC HEAT OF THE EQUILIBRIUM MIXTURE.
DRAM	5.16E-04*SQRT(T)/(OMEGA*P)*REFERENCE DIFFUSION COEFFICIENT INTRODUCED IN APPROXIMATION FOR UNEQUAL DIFFUSION COEFFIENTS.
FFI	TEMPORARY VALUE OF DIFFUSION FACTOR FOR A SPECIES (GAMEX DEPENDENCE REMOVED).
GAME	GAM-1.
GAMP	RATIO OF SPECIFIC HEATS (ISENTROPIC EXPONENT).
HF	STATIC ENTHALPY OF GAS AT BOUNDARY-LAYER EDGE.
HMW	TOTAL SYSTEM ENTHALPY.
HTIL	PROPERTY OF THE GAS MIXTURE WHICH REDUCES TO SYSTEM ENTHALPY FOR EQUAL DIFFUSION COEFFICIENTS, See Eq. 28 OF NASA CR - 1062.
HTZ	ENTHALPY OF SYSTEM BASED ON Z* MASS FRACTION (INCLUDES GAMEX DEPENDENCE).
I,IK,IP	LOOP VARIABLES
IE	INDEX IDENTIFYING ELECTRON.
II	UNITY ALWAYS. UNUSED IN PRESENT VERSION OF ROUTINE.
ISM	IS-1
OMEGA	1.07/(T/106.)**0.159. PARAMETER USED IN TRANSPORT PROPERTY CALCULATIONS INTRODUCED IN EQN.(9),NASA CR-1063.
PMUZ	VN(J) * WTM(J)/FF(J) ** GAMEX SUMMED OVER ALL SPECIES N.
PMUI	VN(J) * FF(J) SUMMED OVER ALL GASEOUS SPECIES N. EQUALS VMUI * P.

LIST OF FORTRAN VARIABLES APPEARING IN SUBROUTINE PROPS

VARIABLE NAME	DESCRIPTION
PMU2	VN(J) * WTM(J)/FF(J) SUMMED OVER ALL SPECIES N. EQUALS VMU2 * P.
PMU6	VN(J)/(FF(J)*(WD4+VN(J)*FF(J)*WD8)) SUMMED OVER ALL SPECIES N.
PSP	((1.+GAME/2.*SQMAX)/1.+GAME/2.*ACHSQ))**(GAM/GAME)
SC	SCHMIDT NUMBER
TCOND	MIXTURE THERMAL CONDUCTIVITY
TMU3	VN(J)/FF(J) SUMMED OVER ALL SPECIES N.
TT	STATIC TEMPERATURE IN DEGREES RANKINE.
VR	LOCALLY DEFINED VARIABLE.
VC	VN(I)*FFI
VI(K)	ELEMENTAL MASS FRACTION OF K TH ELEMENT.
VK(K)	MASS FRACTION OF K TH BASE SPECIES.
VMU	MIXTURE VISCOSITY
VMU1	COEFFICIENT MU1 DEFINED IN EQ. 22 OF NASA CR-1062.
VMU3	PROPERTY OF THE GAS MIXTURE WHICH REDUCES TO 1/WM FOR EQUAL DIFFUSION COEFFICIENTS, EQN. (28) NASA CR-1062.
VMU6	CONTRIBUTION TO MIXTURE THERMAL CONDUCTIVITY GIVEN BY (PMU6* (PTIL/1.9869-2.5*TMU3)/P.
VMU12	PRODUCT OF THE TWO COEFFICIENTS MU1 AND MU2 DEFINED IN EQN. (22) OF NASA CR-1062.
WD2	1.2 *A STAR/PMU1
WD4	.2W4*WD2
WD5	0.32*ATSTAR/PMU1
WD7	WD2/PMU1=WD2
WD8	WD4/PMU1=WD5
WD7	CONSTANT 1.385 WHICH ENTERS INTO CALCULATION OF MIXTURE TRANSPORT PROPERTIES.
WTE	WTM(I) FOR THE ELECTRON.
ZI(K)	QUANTITY FOR ELEMENT K WHICH IS INTRODUCED AS A RESULT OF THE APPROXIMATION FOR BINARY DIFFUSION COEFFICIENTS AND REDUCES TO VI(K) FOR EQUAL DIFFUSION COEFFICIENTS, SEE EQ 15 OF NASA CR-1062.
ZK(K)	QUANTITY FOR BASE SPECIES WHICH IS INTRODUCED AS A RESULT OF THE APPROXIMATION FOR BINARY DIFFUSION COEFFICIENTS AND REDUCES TO VK(K) FOR EQUAL DIFFUSION COEFFICIENTS, SEE EQ 25 OF NASA CR-1062.

LIST OF FORTRAN VARIABLES APPEARING IN SUBROUTINE MERAT

VARIABLE NAME	DESCRIPTION
C	MATRIX TO BE INVERTED.
D	SET OF CONSTANT VECTORS CONVERTED TO SOLUTION VECTORS.
DIV	ROW NORMALIZING FACTOR IN GAUSSIAN ELIMINATION.
DIVC	PRODUCT OF DIV AND ELEMENT OF ROW.
I,II,J	LOOP INDICES.
IS	FLAG IN ARGUMENT TO CONTROL DEBUG OUTPUT OR NONCONVERGENCE FLAG RETURN.
IX	FLAG USED IN DIAGNOSTIC OUTPUT.
JJ,M	LOOP INDICES.
K	TEMPORARY VALUE OF L.
KOUT	PRINTED OUTPUT TAPE DESIGNATION.
L(N)	INDEX OF COLUMNS DURING INVERSION.
LL(N)	ROW INDEX OF PIVOT FOR N TH COLUMN.
LLL(N)	COLUMN INDEX OF PIVOT FOR N TH ROW.
LS	INDEX USED TO REARRANGE COLUMNS.
M	LOOP INDEX
N	NUMBER OF ROWS IN C.
NM	N-1.
NN	NUMBER OF WHICH COLUMNS EXCEED ROWS IN C.
NP	N+NN.
N1	N+1.
NNN	NUMBER OF COLUMN VECTORS IN D.
S(N)	LARGEST CONTRIBUTION TO TERM IN N TH COLUMN.
SD(N)	RATIO OF RESIDUAL TERM IN N TH COLUMN TO S(N).

LIST OF FORTRAN VARIABLES APPEARING IN SUBROUTINE SCALE

VARIABLE NAME	DESCRIPTION
ABX	ABSOLUTE VALUE OF LOG CORRECTION ON TEMPERATURE.
BULP	ALOG (BUMP).
BUMP	MAXIMUM VN PERMITTED AFTER ONE ITERATION OF ANY SPECIES PREVIOUSLY LESS THAN DUMP
CLIM	CONSTRAINT PARAMETER RELATED TO TOTAL ABLATION RATE.
CLIP	ABS(CLIM/WTN(I))
CMFF	THE VALUE OF CMF AFTER CONSIDERATION OF CONSTRAINTS ON THE CORRECTION TO THE PARTIAL PRESSURE OF THE J TH SPECIES.
DTM	LIMIT VALUE OF DELTA (1./T).
DUMP	P*(10**-7). LIMIT PRESSURE IN CONTROLLING DAMPING OF SOLUTION.
DWTG	CORRECTION TO GAS MOLECULAR WEIGHT.
DWTL	CORRECTION TO CONDENSED-PHASE MOLECULAR WEIGHT.
DYI	VALUE OF DY FOR THE J TH SPECIES DURING LOOP ON THAT SPECIES.
I,IK,J,K	LOOP INDICES.
JA	SAVED VALUE OF IB(J).
L	NUMBER OF ELEMENTS INCLUDING ELECTRON PLUS THE NUMBER OF NON BASE, PRESENT CONDENSED SPECIES PLUS 2.
LIM	LOOP LIMIT = N (TOTAL NUMBER OF SPECIES).
LL	ALWAYS EQUALS 1.
M	LOCAL INDEX EQUAL TO IB(N).
M1	COUNT ON PRINCIPAL SPECIES AFTER ORDERING IB.
RVL	CONSTRAINT PARAMETER RELATED TO TOTAL ABLATION RATE.
TM	MAXIMUM OR MINIMUM TEMPERATURE IF DELTA T IS POSITIVE OR NEGATIVE, RESPECTIVELY.
X1	DAMPED VALUE OF DELTA LOG T.

LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE SUBP

VARIABLE NAME	DESCRIPTION
A	OUTPUT MATRIX
B	OUTPUT VECTOR
I,J	LOOP INDICES
SLA	INPUT MATRIX
SLB	INPUT VECTOR

LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE SQUEE

VARIABLE NAME	DESCRIPTION
	INPUT NUMBER
A	WORKING VARIABLE FOR FINDING DIGITS TO BE SAVED
I	INTEGER ARRAY FOR ROUTINE OUTPUT
IDE	NUMBER OF COLUMNS IN FIELD
INUS	DATA ASSIGNED THE SYMBOL IN-
INS	DATA ASSIGNED THE SYMBOL IN+

LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE THERM

VARIABLE NAME	DESCRIPTION
BC(N)	IDENTICAL TO THE VARIABLE TC(J) EXCEPT N APPLIES ONLY TO THE BASE SPECIES.
BLNK	IDENTICAL TO THE VARIABLE VLNK(J) EXCEPT N APPLIES ONLY TO THE BASE SPECIES.
I	LOOP INDEX.
IK	LOOP INDEX.
IX(I)	ALPHANUMERIC ARRAY USED IN PRINTOUT OF REACTION KINETICS DATA.
IXY	ALPHANUMERIC QUANTITY USED IN PRINTOUT OF REACTION KINETICS DATA.
IV	REACTANT OR PRODUCT STOICHIOMETRIC COEFFICIENTS.
J	LOOP INDEX.
K	LOOP INDEX.
LINE(I)	PRINTOUT QUANITY SPECIFYING STOICHIOMETRIC COEFFICIENTS FOR REACTION KINETICS.
M	LOOP INDEX
PIN	PRESSURE * 1.0E-3.
RT	UNIVERSAL GAS CONSTANT * TEMPERATURE. CAL/MOLE.
TFMAX	FLAG TO INDICATE THAT AT LEAST ONE CONDENSED PHASE SPECIES IS AVAILABLE FOR SURFACE EQUILIBRIUM CALCULATIONS.
VR,VL	INTERPOLATION VALUES USED TO EVALUATE THERMODYNAMIC PROPERTIES FROM CURVE FIT CONSTANTS. BOTH ARE FUNCTIONS OF CURRENT TEMP.
VD,VE	INTERPOLATION VALUES USED TO EVALUATE THERMODYNAMIC PROPERTIES FROM CURVE FIT CONSTANTS. BOTH ARE FUNCTIONS OF CURRENT TEMP.

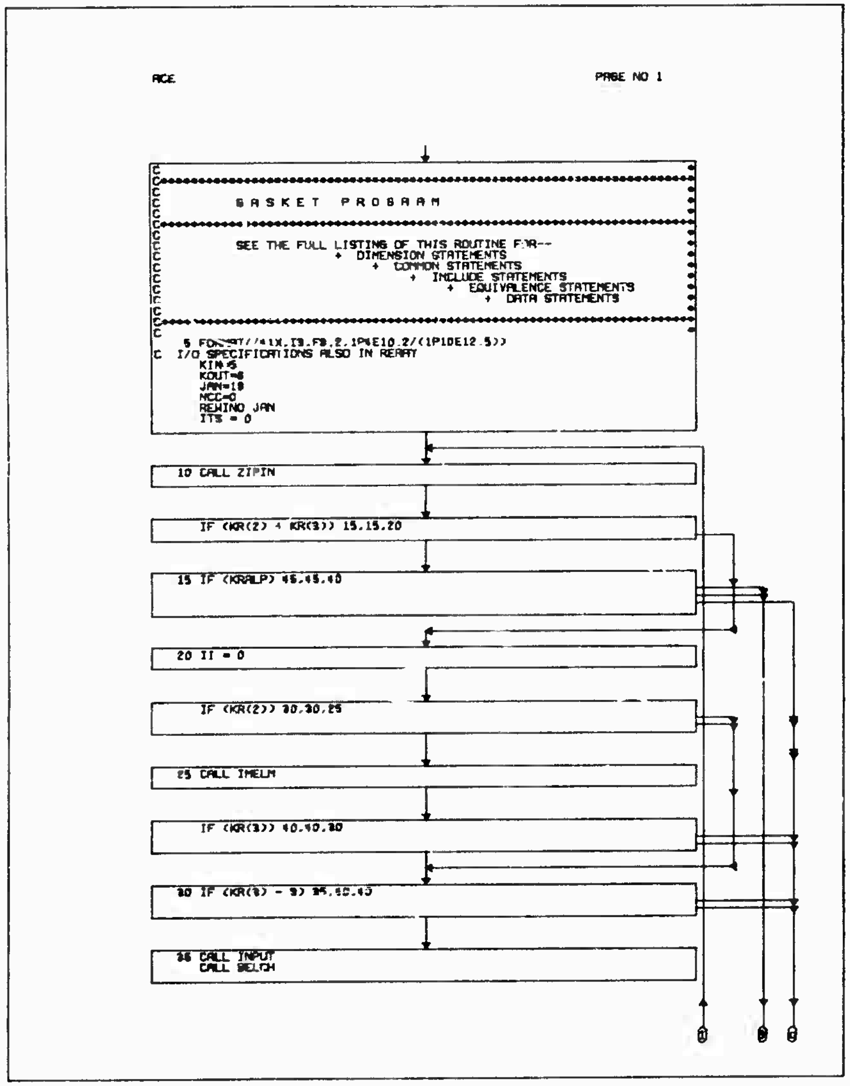
LIST OF FORTRAN VARIABLES
APPEARING IN
SUBROUTINE ZIPIN

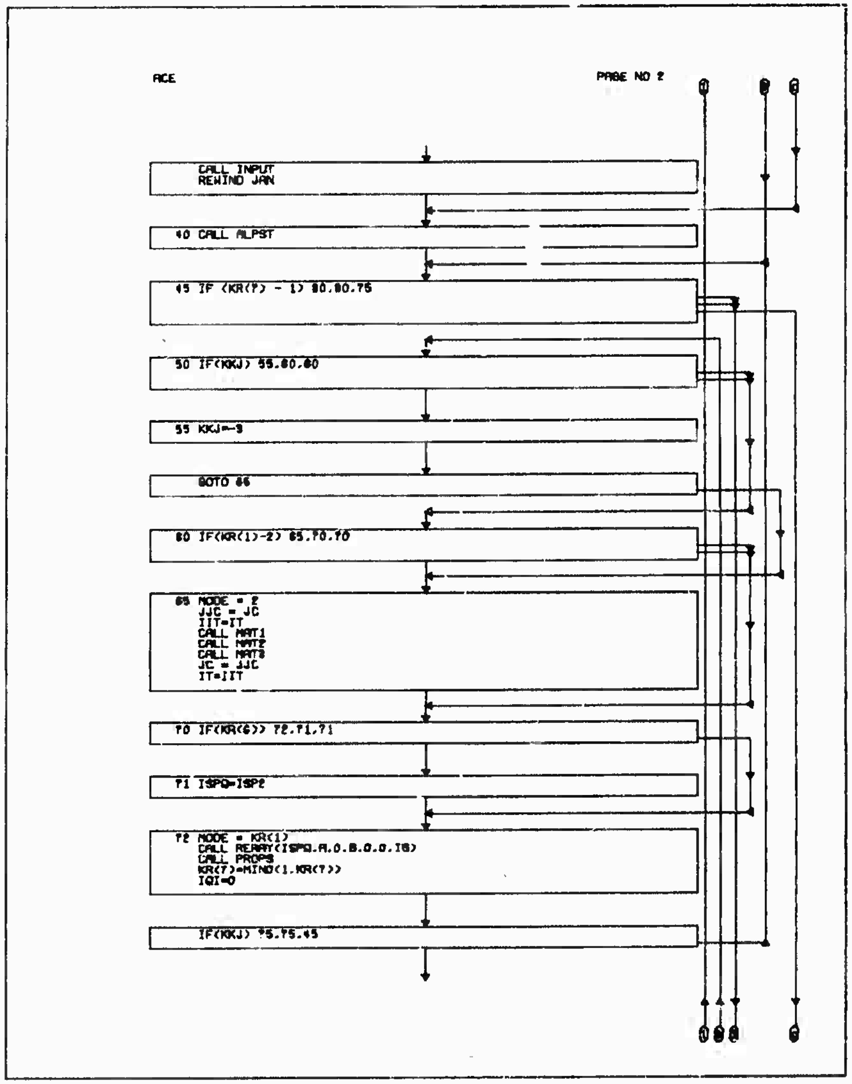
VARIABLE NAME	DESCRIPTION
GAME	GAM-1.
GAMER	TEMPORARY VALUE OF DIFFUSION EXPONENT. IF GAMER = 0 THEN GAMEX = GAMES.
HSR	INPUT STATIC ENTHALPY UPSTREAM OF SHOCKWAVE.
HTR	INPUT TOTAL ENTHALPY UPSTREAM OF SHOCKWAVE.
I	LOOP INDEX.
III	VARIABLE USED IN INTEGER LOGIC TO DISCOVER THE SMALLEST INTEGER MULTIPLIER OF 500 DEG. K.
IK	LOOP INDEX.
KR4	VALUE OF KR(4) SAVED TO COMPARE WITH SUBSEQUENTLY READ VALUE OF KR(4).
KRR	SAVED VALUE OF KR(8).
KVR	FLAG INDICATING HOW VELOCITY AND STATIC AND TOTAL ENTHALPIES ARE CALCULATED UPSTREAM OF SHOCKWAVE.
PE	TEMPORARY VALUE OF PRESSURE. IF PR NOT EQUAL TO 0. ASSIGN P = PR.
PR1	INPUT PRESSURE UPSTREAM OF SHOCKWAVE.
PSV	SAVED VALUE OF CHAMBER PRESSURE.
RECORD	240 CHARACTERS OF TITLE INFORMATION (3 CARDS).
RHOR	INPUT DENSITY UPSTREAM OF SHOCKWAVE.
UR	INPUT FLOW VELOCITY UPSTREAM OF SHOCKWAVE.
WR	TEMPORARY VALUES OF RELATIVE COMPONENT MASSES. IF WR(1) + WR(2) + WR(3) NOT EQUAL TO 0. THEN ASSIGN W = WR.
Z	TEMPORARY VALUE OF THERMODYNAMIC VARIABLE. IF Z NOT EQUAL TO 0 ASSIGN T = Z OR HIR = Z DEPENDING ON OPTION BEING EMPLOYED.

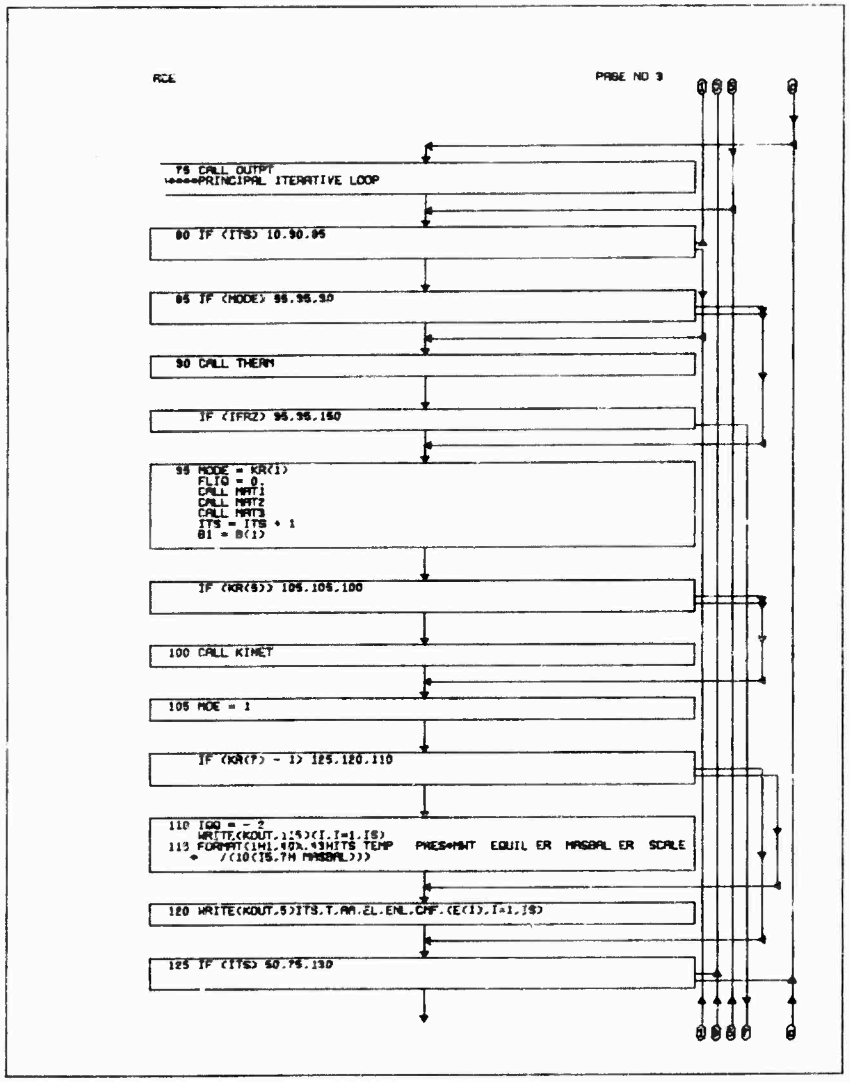
SECTION 3

FLOW CHARTS

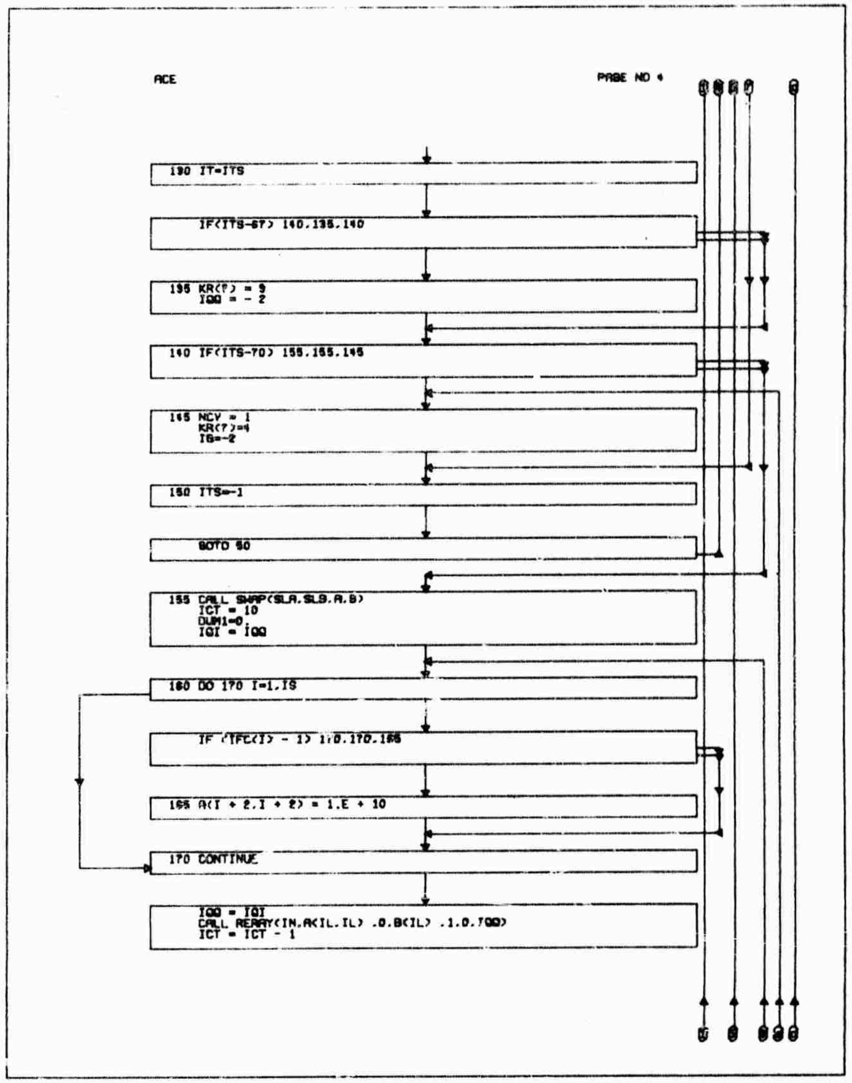
Computer generated flow charts were produced and are given in this Section. The flow charts show transfers as lines on the right edge of the figures and do-loop blocks as lines on the left edge of the figures. The order of presentation corresponds to that used in Section 2 for Fortran variable name definitions.


ACE
PAGE NO 1
B A S K E T   P R O G R A M
SEE THE FULL LISTING OF THIS ROUTINE FOR--
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
5 FORMAT(/41X,I3,F8.2,1P4E10.2/(1P10E12.5))
I/O SPECIFICATIONS ALSO IN REARY
KIN=5
KOUT=6
JAN=19
NCC=0
REWIND JAN
ITS = 0
10 CALL ZIPIN
IF (KR(2) + KR(3)) 15,15,20
15 IF (KRALP) 45,45,40
20 II = 0
IF (KR(2)) 30,30,25
25 CALL IMELM
IF (KR(3)) 40,40,30
30 IF (KR(8) - 9) 35,40,40
35 CALL INPUT
CALL BELCH

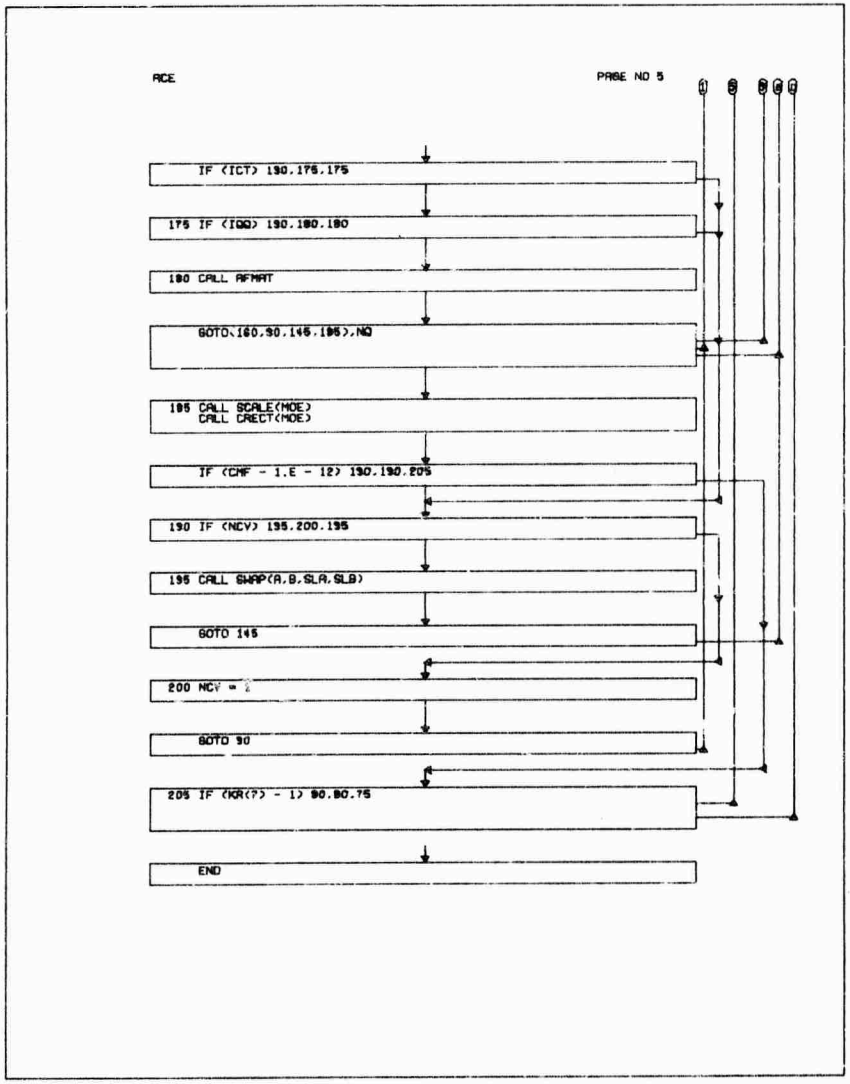

ACE
PAGE NO 2
CALL INPUT
REWIND JAN
40 CALL ALPST
45 IF (KR(7) - 1) 80,80,75
50 IF(KKJ) 55,60,60
55 KKJ=-9
GOTO 65
60 IF(KR(1)-2) 65,70,70
65 MODE = 2
JJC = JC
IIT=IT
CALL MAT1
CALL MAT2
CALL MAT3
JC = JJC
IT=IIT
70 IF(KR(6)) 72,71,71
71 ISPQ=ISP2
72 MODE = KR(1)
CALL REARY(ISPQ,A,0,B,0,0,IB)
CALL PROPS
KR(7)=MIN0(1,KR(7))
IQI=0
IF(KKJ) 75,75,45

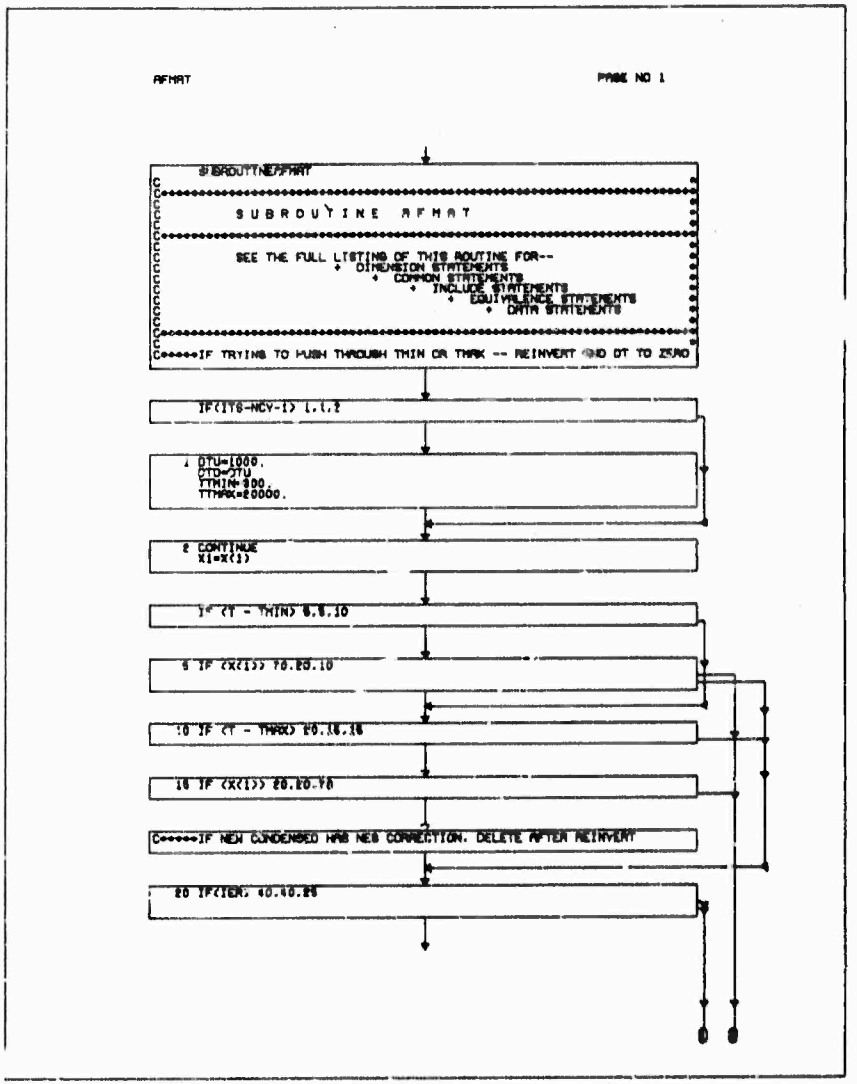


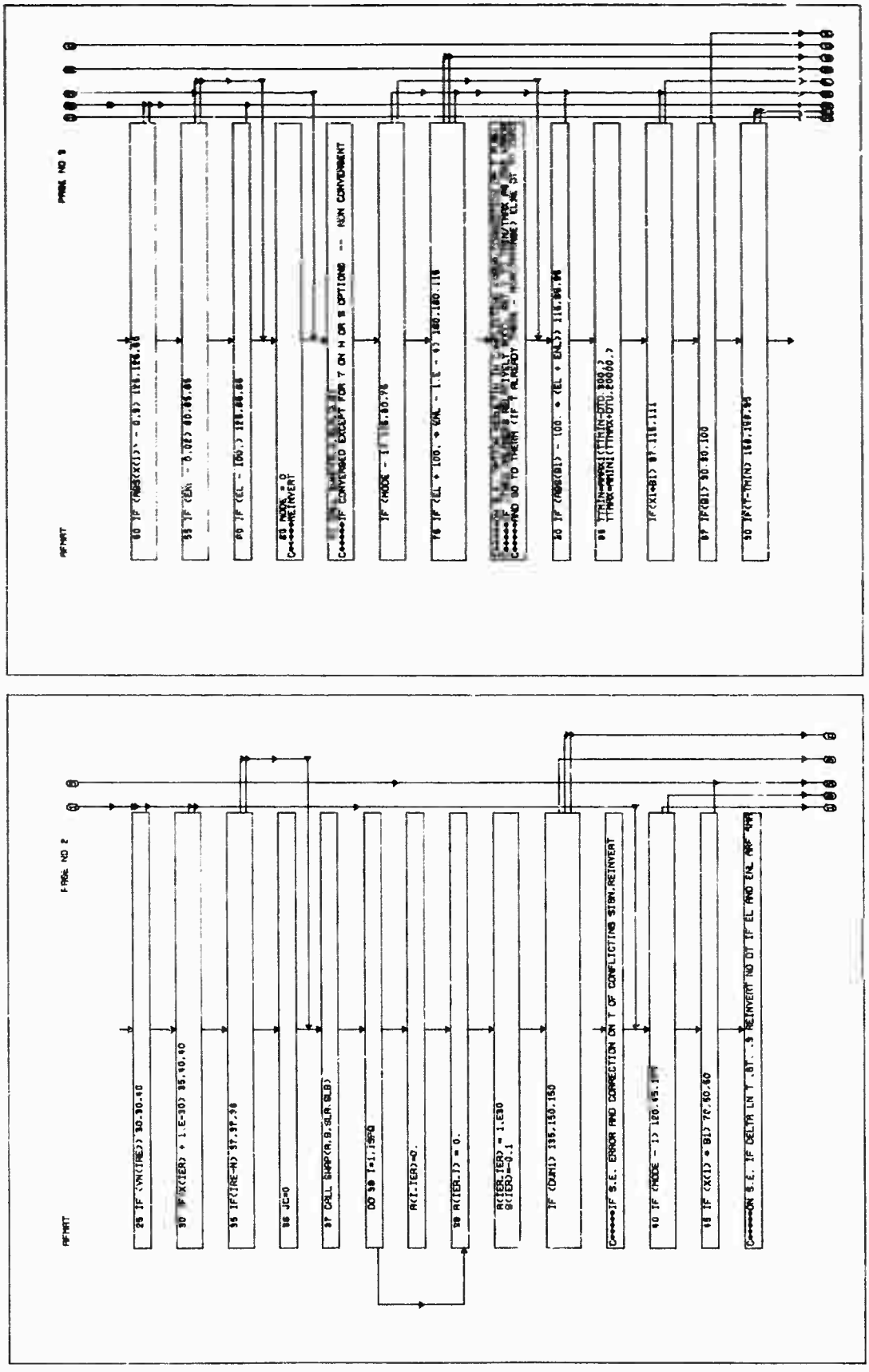
ACE
PAGE NO 3
75 CALL OUTPT
*****PRINCIPAL ITERATIVE LOOP
80 IF (ITS) 10.90.85
85 IF (MODE) 95.95.90
90 CALL THERM
IF (IFRZ) 95.95.150
95 MODE = KR(1)
FLIQ = 0.
CALL MAT1
CALL MAT2
CALL MAT3
ITS = ITS + 1
B1 = B(1)
IF (KR(5)) 105.105.100
100 CALL KINET
105 MOE = 1
IF (KR(7) - 1) 125.120.110
110 IQQ = - 2
WRITE(KOUT,115)(I,I=1,IS)
115 FORMAT(1H1,40X,43HITS TEMP PRES+MNT EQUIL ER MASBAL ER SCALE
* /(10(I5,7H MASBAL)))
120 WRITE(KOUT,5)ITS,T,AA,EL,ENL,CMF,(E(I),I=1,IS)
125 IF (ITS) 50.75.130

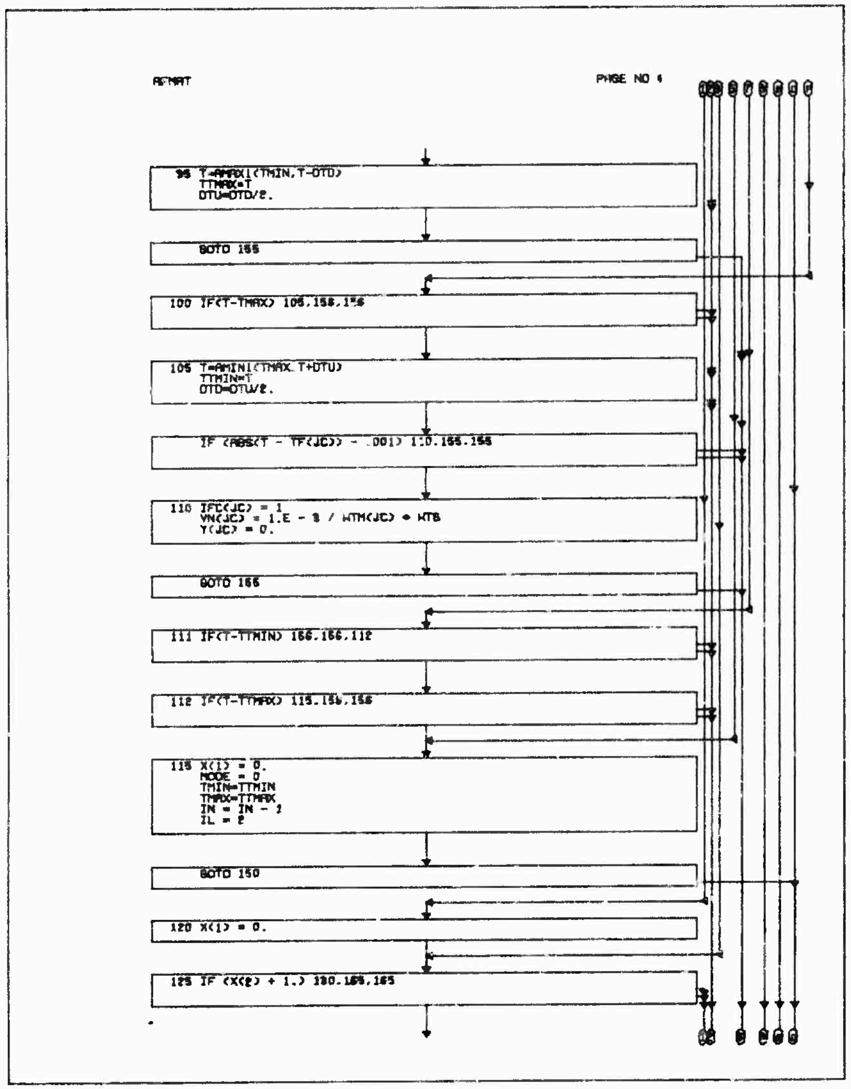


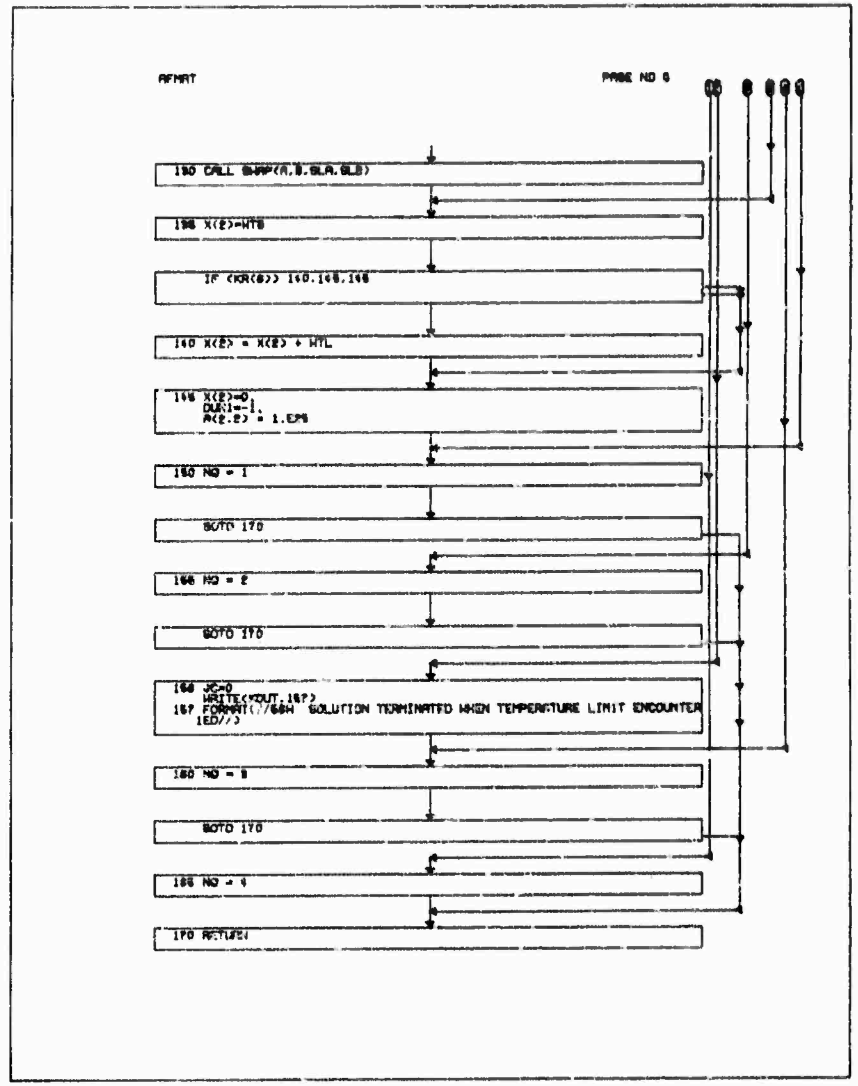
ACE
PAGE NO 4
130 IT=ITS
IF(ITS-67) 140.135.140
135 KR(7) = 9
IQQ = - 2
140 IF(ITS-70) 155.155.145
145 NCV = 1
KR(7)=4
IS=-2
150 ITS=-1
GOTO 50
155 CALL SWAP(SLA,SLB,A,B)
ICT = 10
DUM1=0.
IQI = IQQ
160 DO 170 I=1,IS
IF (TFC(I) - 1) 170.170.165
165 A(I + 2,I + 2) = 1.E + 10
170 CONTINUE
IQQ = IQI
CALL REARY(IN,A(IL,IL) ,0,B(IL) ,1,0,7QQ)
ICT = ICT - 1

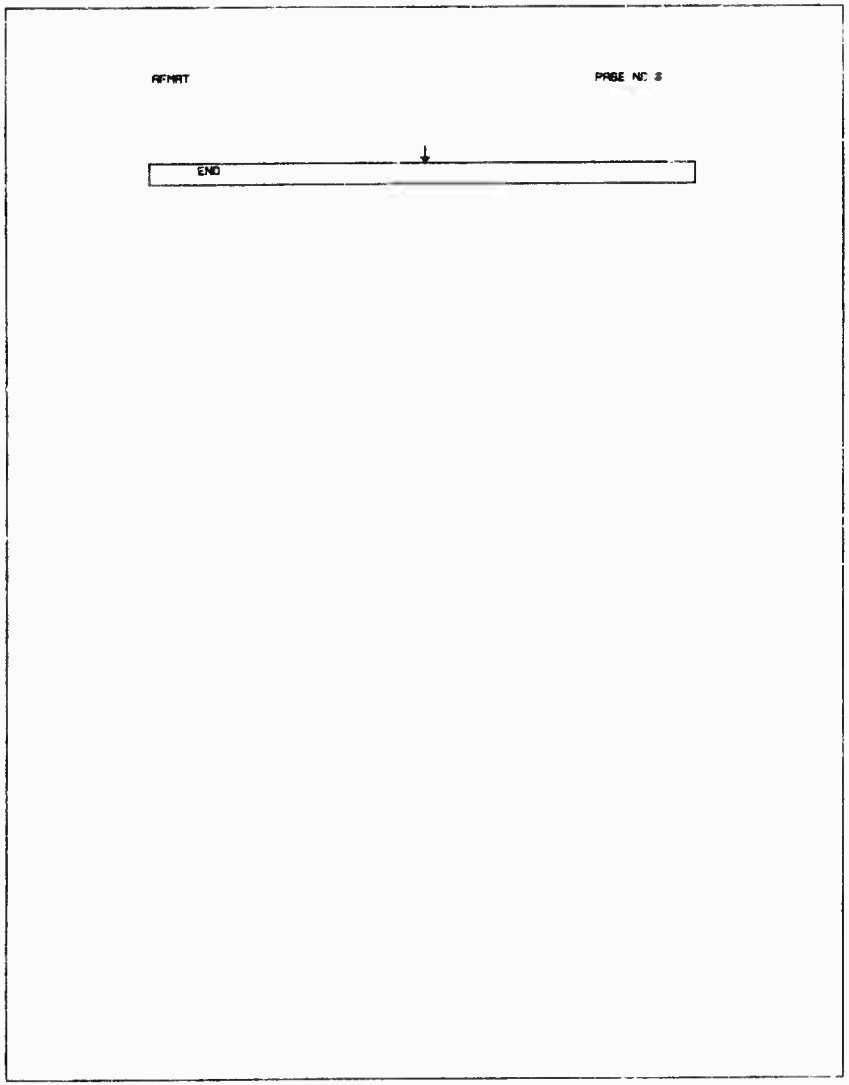

RCE
PAGE NO 5
IF (ICT) 190,175,175
175 IF (IQQ) 190,180,180
180 CALL AFMAT
GOTO(160,90,145,185),NQ
185 CALL SCALE(MOE)
CALL CRECT(MOE)
IF (CMF - 1.E - 12) 190,190,205
190 IF (NCV) 195,200,195
195 CALL SWAP(A,B,SLA,SLB)
GOTO 145
200 NCV = 1
GOTO 90
205 IF (KR(7) - 1) 90,90,75
END

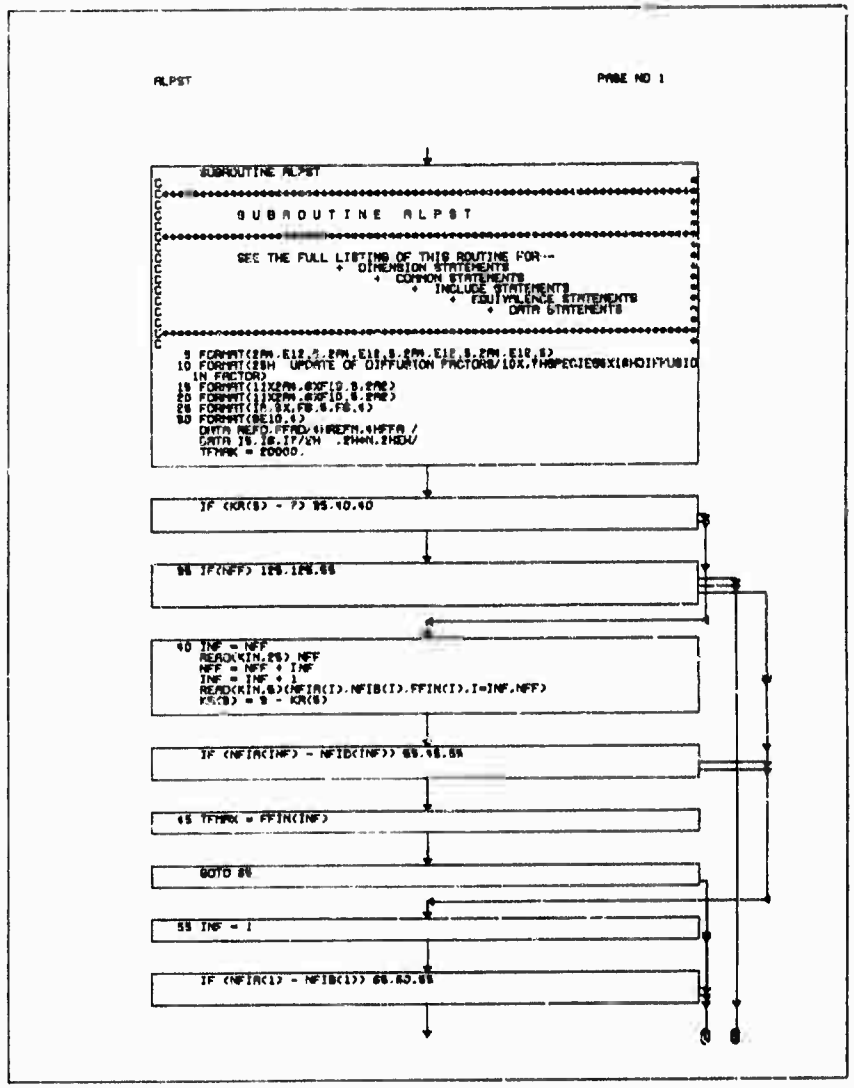

AFMAT
PAGE NO 1
SUBROUTINE AFMAT
SEE THE FULL LISTING OF THIS ROUTINE FOR--
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
C+++++IF TRYING TO PUSH THROUGH TMIN OR TMAX -- REINVERT AND DT TO ZERO
IF(ITG-NCV-1) 1,1,2
1 DTU=1000.
DTD=DTU
TTMIN=800.
TTMAX=20000.
2 CONTINUE
X1=X(1)
IF (T - TMIN) 8,8,10
5 IF (X(I)) 70,20,10
10 IF (T - TMAX) 20,16,16
16 IF (X(I)) 20,20,70
C+++++IF NEW CONDENSED HAS NEG CORRECTION, DELETE AFTER REINVERT
20 IF(IEX) 40,40,26

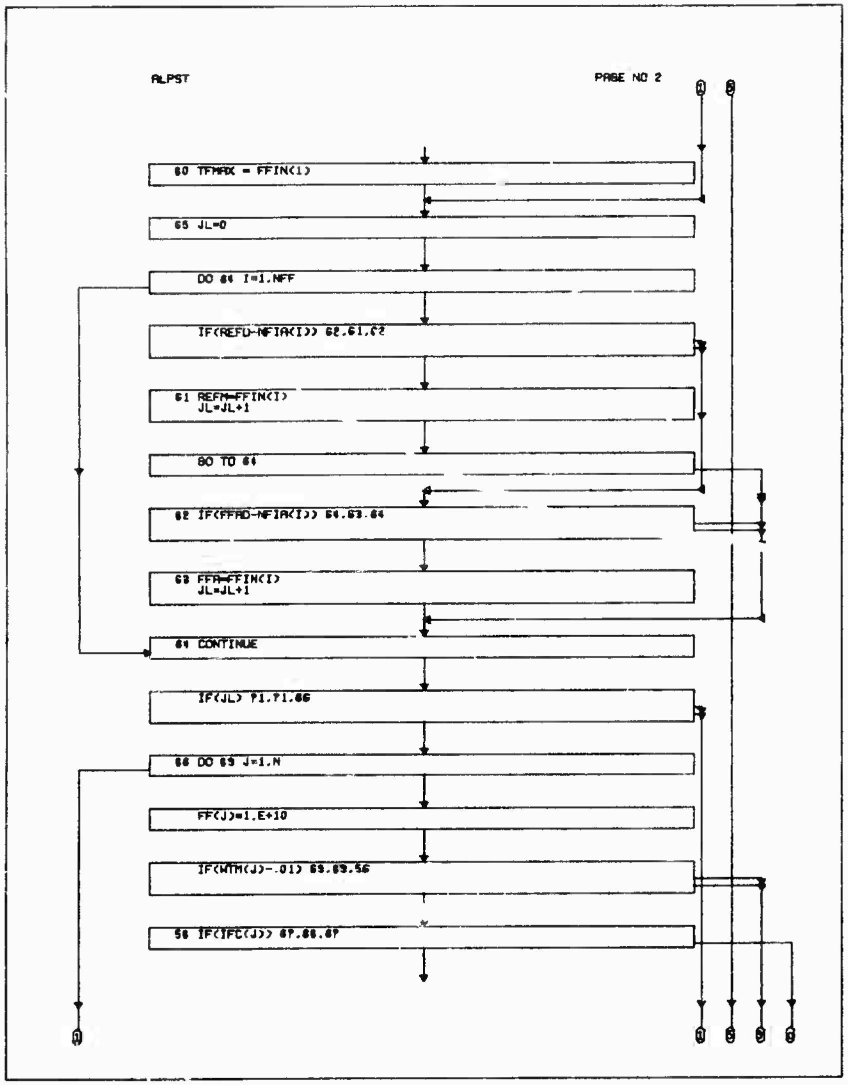


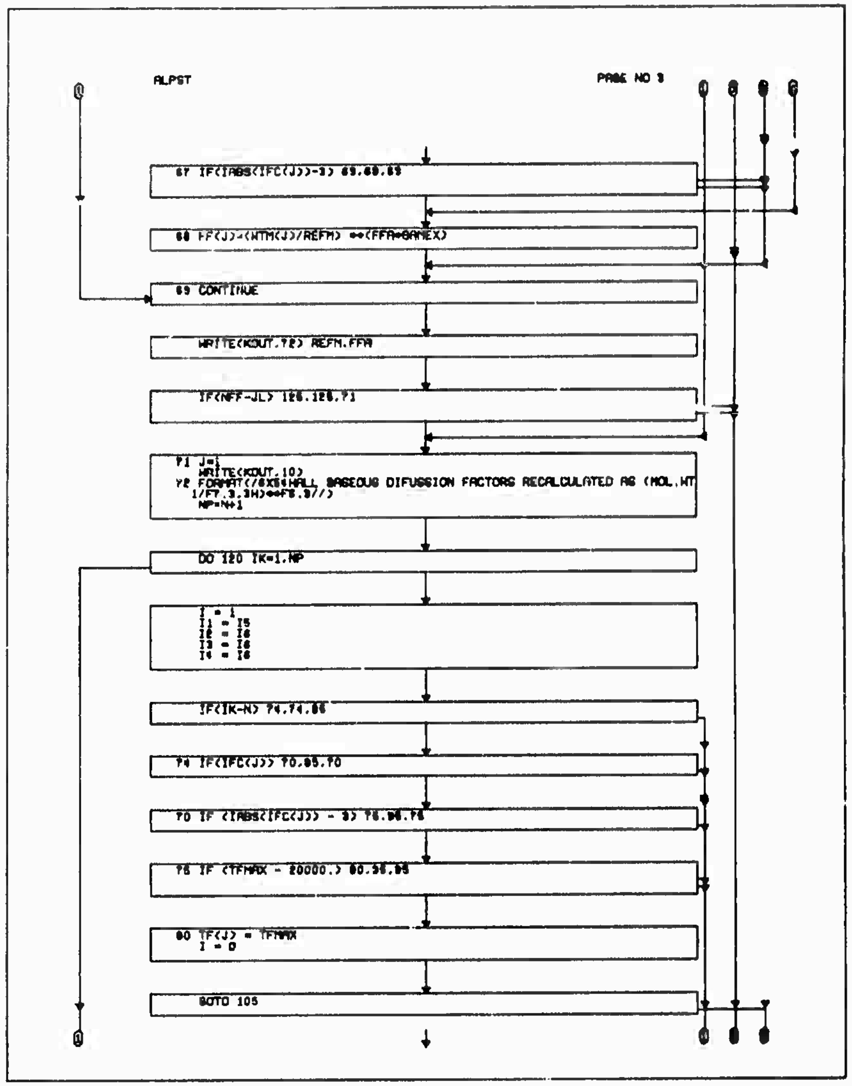

AFMAT
PAGE NO 4
95 T=AMAX1(TMIN,T-DTD)
TTMAX=T
DTU=DTD/2.
GOTO 155
100 IF(T-TMAX) 105,155,156
105 T=AMIN1(TMAX,T+DTU)
TTMIN=T
DTD=DTU/2.
IF (ABS(T - TF(JC)) - .001) 110,155,155
110 IFC(JC) = 1
VN(JC) = 1.E - 3 / WTM(JC) + HTB
Y(JC) = 0.
GOTO 155
111 IF(T-TTMIN) 156,156,112
112 IF(T-TTMAX) 115,156,156
115 X(1) = 0.
MODE = 0
TMIN=TTMIN
TMAX=TTMAX
IN = IN - 1
IL = 2
GOTO 150
120 X(1) = 0.
125 IF (X(2) + 1.) 130,165,165

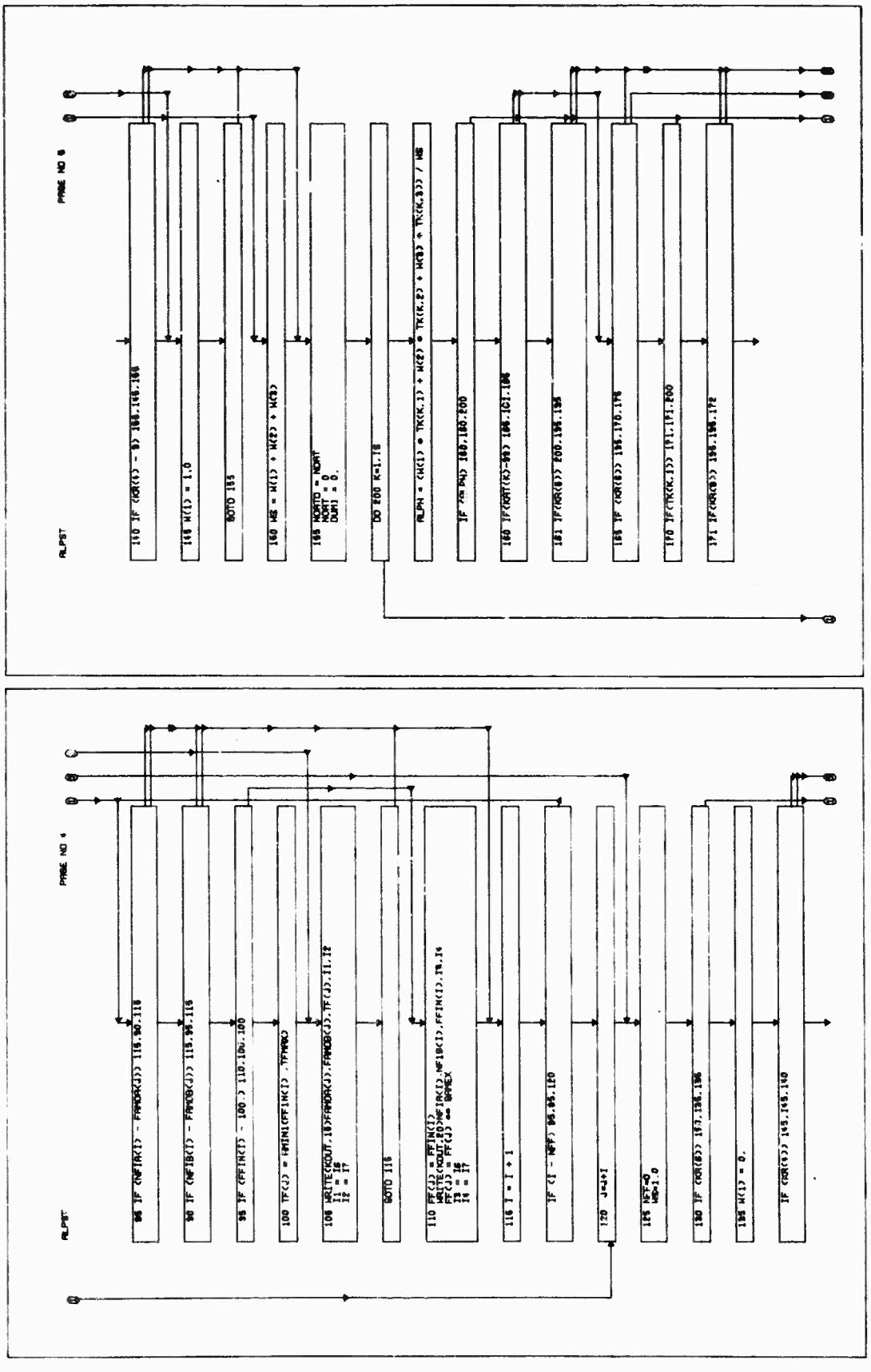

AFMAT
PAGE NO 5
130 CALL SWAP(A,B,SLA,SLB)
135 X(2)=HTB
IF (KR(8)) 140,145,145
140 X(2) = X(2) + HTL
145 X(2)=0.
DUM1=-1.
A(2,2) = 1.E15
150 NO = 1
GOTO 170
155 NO = 2
GOTO 170
156 JC=0
WRITE(KOUT,157)
157 FORMAT(//56H SOLUTION TERMINATED WHEN TEMPERATURE LIMIT ENCOUNTER
1ED//)
160 NO = 3
GOTO 170
165 NO = 4
170 RETURN

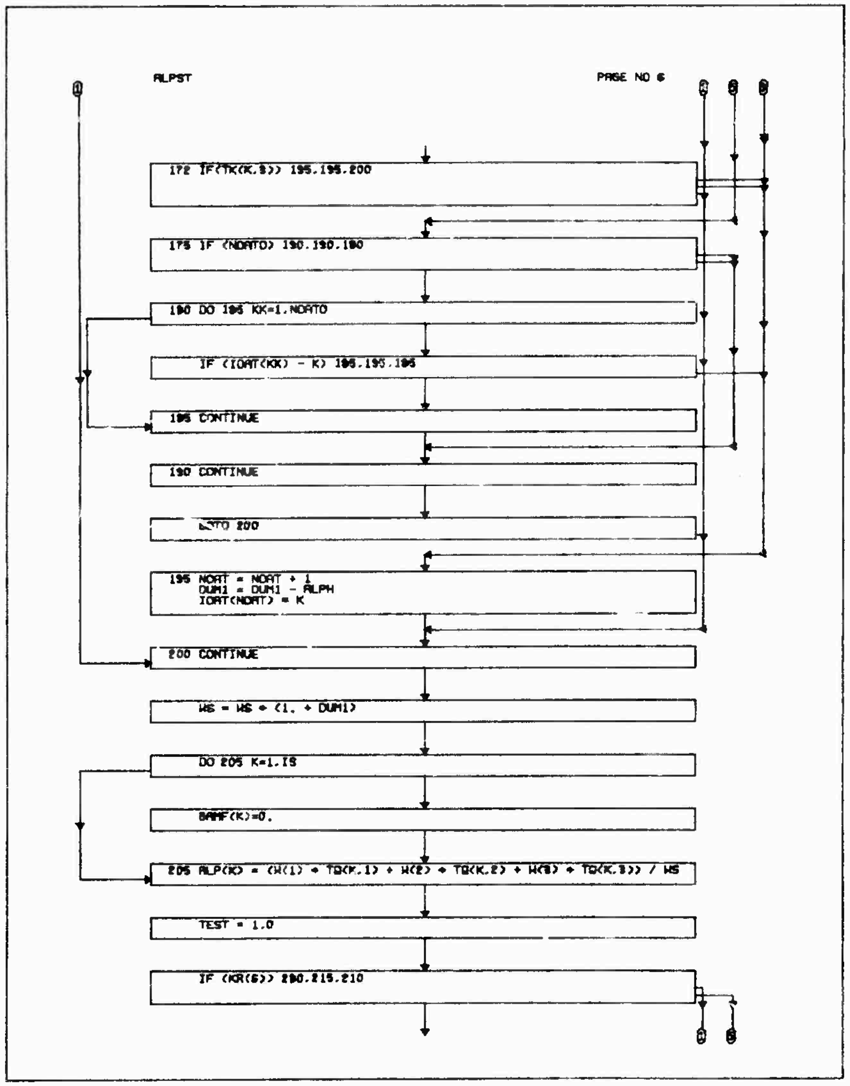

RFMAT
PAGE NO 3
END

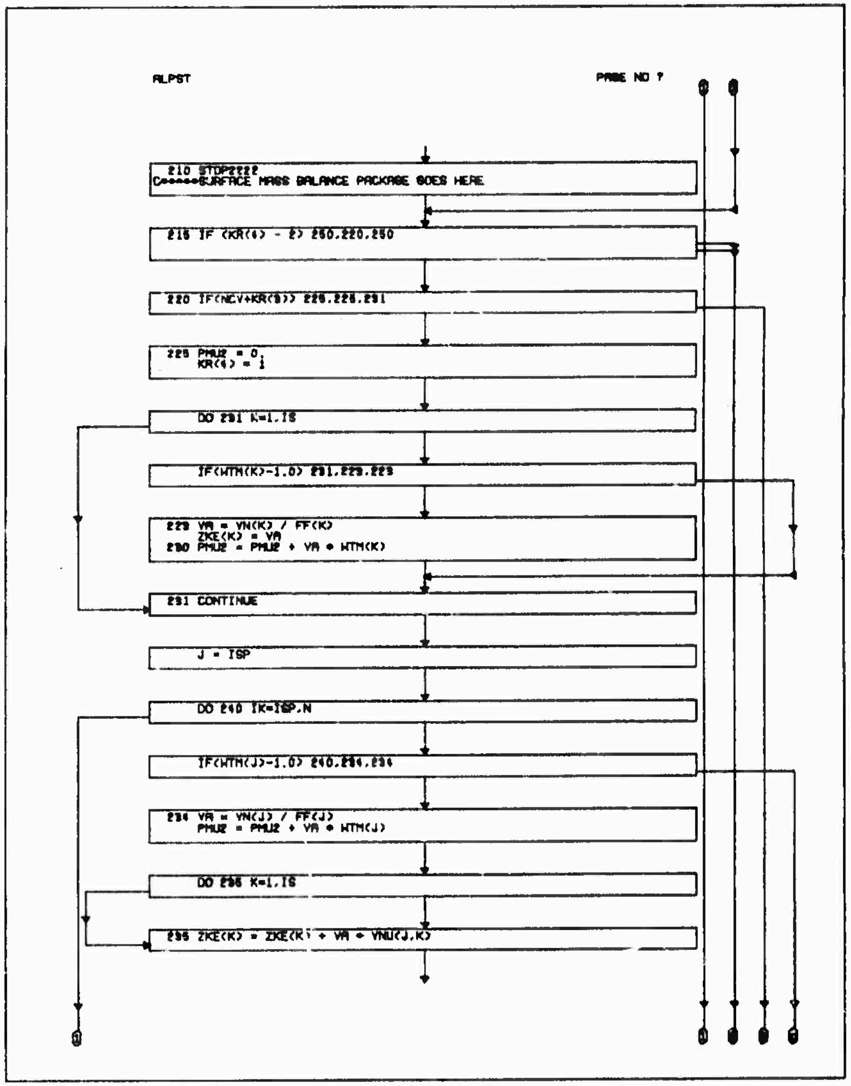

RLPST
PAGE NO 1
SUBROUTINE RLPST
SUBROUTINE RLPST
SEE THE FULL LISTING OF THIS ROUTINE FOR:-
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
9 FORMAT(2PA,E12.7,2PA,E16.8,2PA,E12.8,2PA,E16.8)
10 FORMAT(28H UPDATE OF DIFFUSION FACTORS/10X,THSPECIES8X(6HDIFFUSIO
IN FACTOR)
15 FORMAT(11X2PA,6XF10.8,2PE)
20 FORMAT(11X2PA,6XF10.8,2PE)
25 FORMAT(1P,5X,F8.6,F8.4)
30 FORMAT(8E10.4)
DATA REFD,PFRD/4HREFN,4HFFR /
DATA IS,IB,IF/4H .2HHN,2HDV/
TFMAX = 20000.
IF (KR(6) - 7) 95,40,40
95 IF(NFF) 100,100,55
40 INF = NFF
READ(KIN,25) NFF
NFF = NFF + INF
INF = INF + 1
READ(KIN,6)(NFIA(I),NFIB(I),FFIN(I),I=INF,NFF)
KR(6) = 9 - KR(6)
IF (NFIA(INF) - NFIB(INF)) 65,45,55
45 TFMAX = FFIN(INF)
GOTO 85
55 INF = 1
IF (NFIA(1) - NFIB(1)) 60,60,65

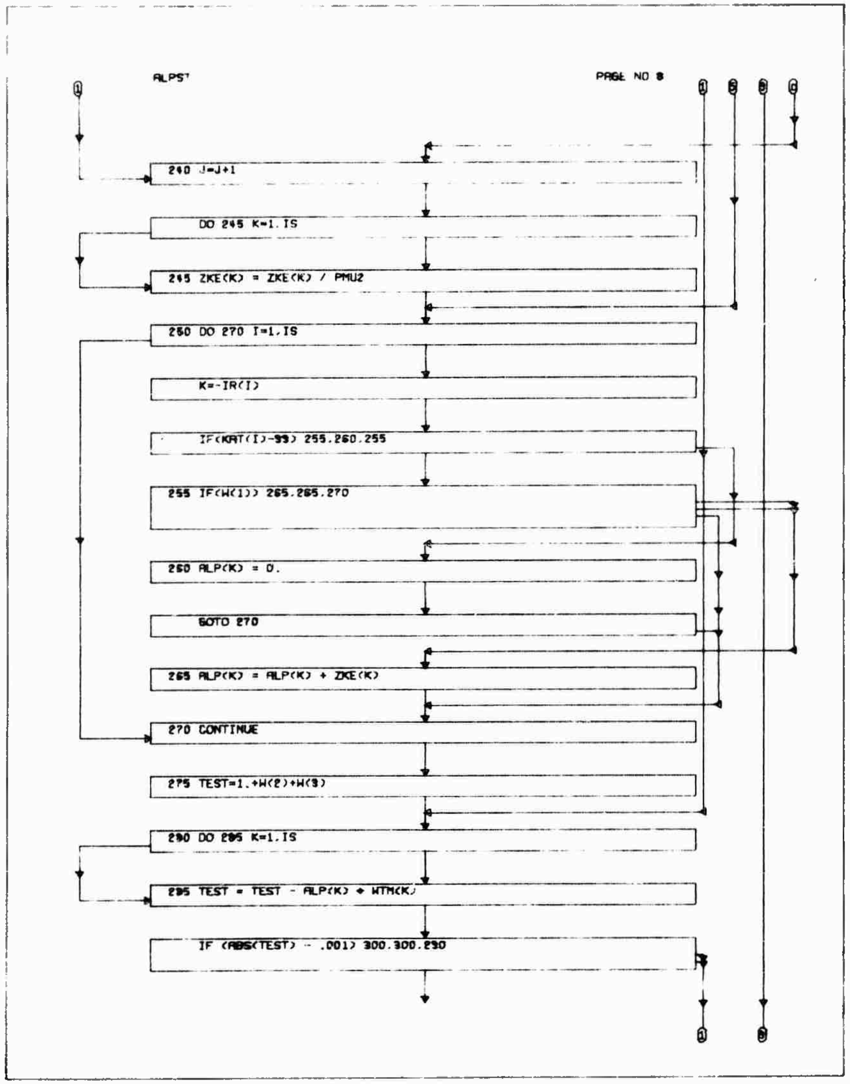

ALPST
PAGE NO 2
60 TFMAX = FFIN(1)
65 JL=0
DO 64 I=1,NFF
IF(REFU-NFIA(I)) 62,61,62
61 REFM=FFIN(I)
JL=JL+1
GO TO 64
62 IF(FFAD-NFIA(I)) 64,63,64
63 FFA=FFIN(I)
JL=JL+1
64 CONTINUE
IF(JL) 71,71,66
66 DO 69 J=1,N
FF(J)=1.E+10
IF(WTM(J)-.01) 69,69,56
56 IF(IFC(J)) 67,68,67

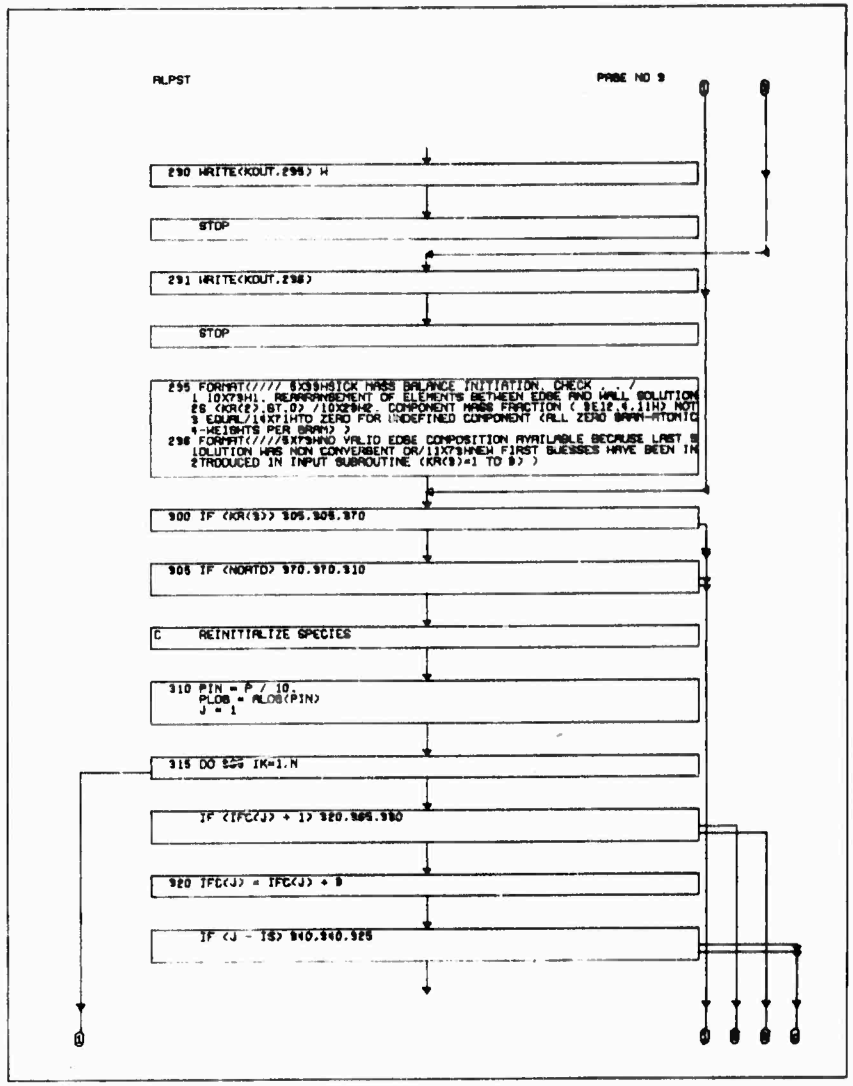

ALPST
PAGE NO 3
67 IF(IABS(IFC(J))-3) 69,68,69
68 FF(J)=(WTM(J)/REFM) **(FFA*GAMEX)
69 CONTINUE
WRITE(KOUT,72) REFM,FFA
IF(NFF-JL) 126,126,71
71 J=1
WRITE(KOUT,10)
72 FORMAT(/6X54HALL GASEOUS DIFUSSION FACTORS RECALCULATED AS (MOL.WT
1/F7.3,3H)**F8.3//)
NP=N+1
DO 120 IK=1,NP
I = 1
I1 = I5
I2 = I6
I3 = I6
I4 = I6
IF(IK-N) 74,74,86
74 IF(IFC(J)) 70,85,70
70 IF (IABS(IFC(J)) - 3) 76,86,76
76 IF (TFMAX - 20000.) 80,56,85
80 TF(J) = TFMAX
I = 0
GOTO 105

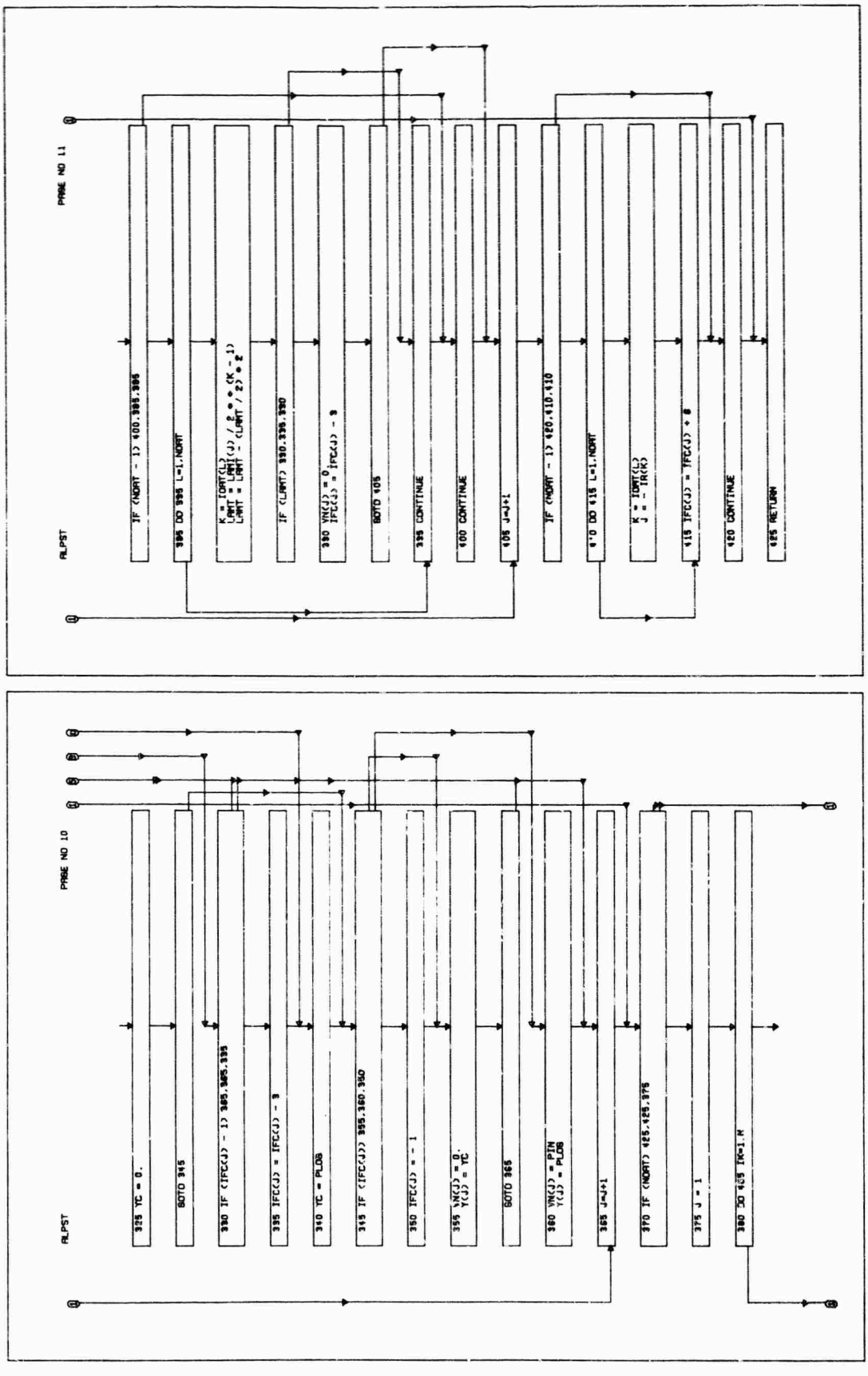

PASE NO 6
ALPST
PASE NO 4
ALPST

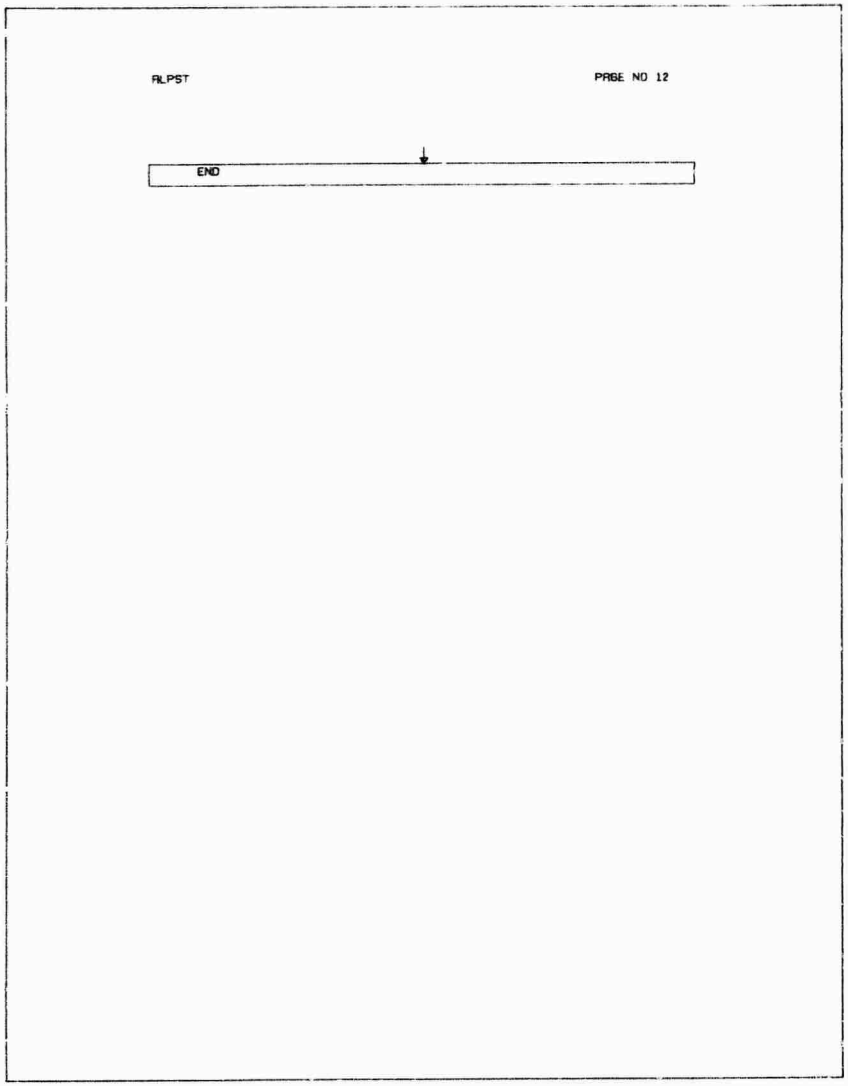

ALPST
PAGE NO 6
172 IF(TK(K,3)) 195,195,200
175 IF (NOATO) 190,190,180
180 DO 185 KK=1,NOATO
IF (IOAT(KK) - K) 185,195,185
185 CONTINUE
190 CONTINUE
GOTO 200
195 NOAT = NOAT + 1
DUM1 = DUM1 - ALPH
IOAT(NOAT) = K
200 CONTINUE
WS = WS * (1. + DUM1)
DO 205 K=1,IS
BAMF(K)=0.
205 ALP(K) = (W(1) * TG(K,1) + W(2) * TG(K,2) + W(3) * TG(K,3)) / WS
TEST = 1.0
IF (KR(6)) 230,215,210

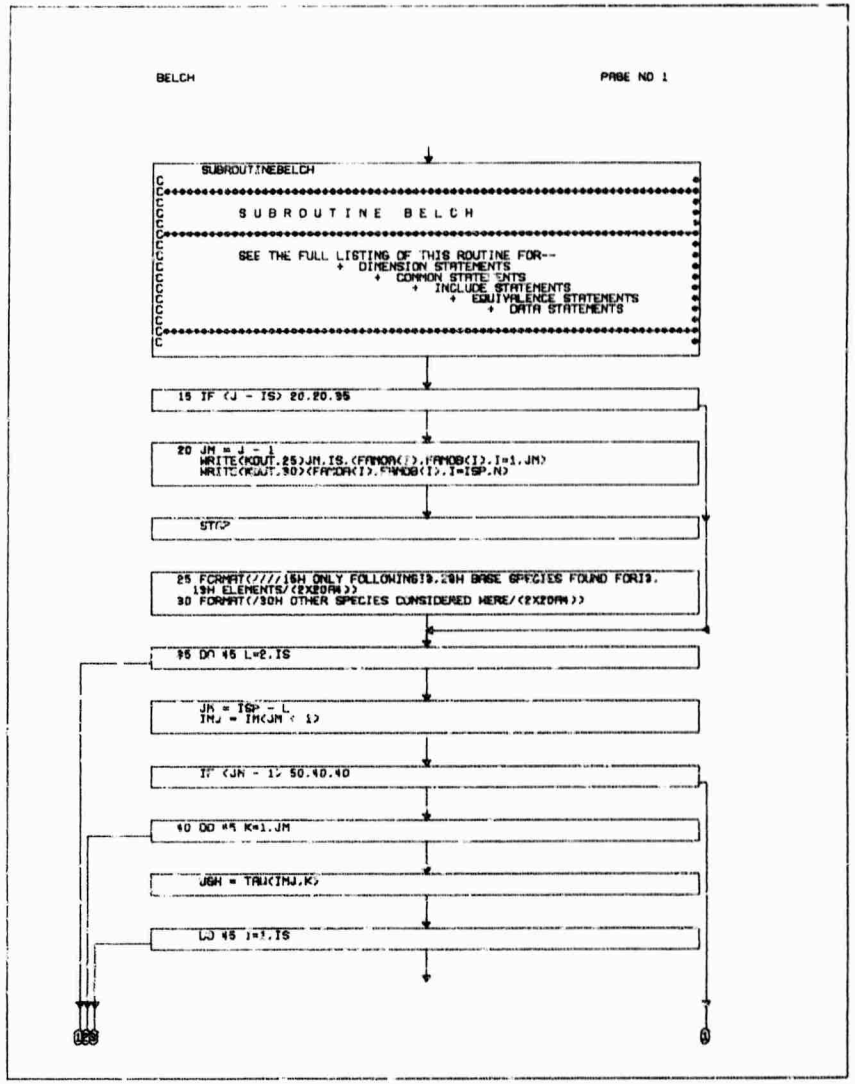

ALPST
PAGE NO 7
210 STOP2222
C=====SURFACE MASS BALANCE PACKAGE GOES HERE
215 IF (KR(4) - 2) 250,220,250
220 IF(NCV+KR(3)) 225,225,231
225 PMU2 = 0.
KR(4) = 1
DO 231 K=1,IS
IF(WTM(K)-1.0) 231,229,229
229 VA = VN(K) / FF(K)
ZKE(K) = VA
230 PMU2 = PMU2 + VA * WTM(K)
231 CONTINUE
J = ISP
DO 240 IK=ISP,N
IF(WTM(J)-1.0) 240,234,234
234 VA = VN(J) / FF(J)
PMU2 = PMU2 + VA * WTM(J)
DO 235 K=1,IS
235 ZKE(K) = ZKE(K) + VA * VNU(J,K)

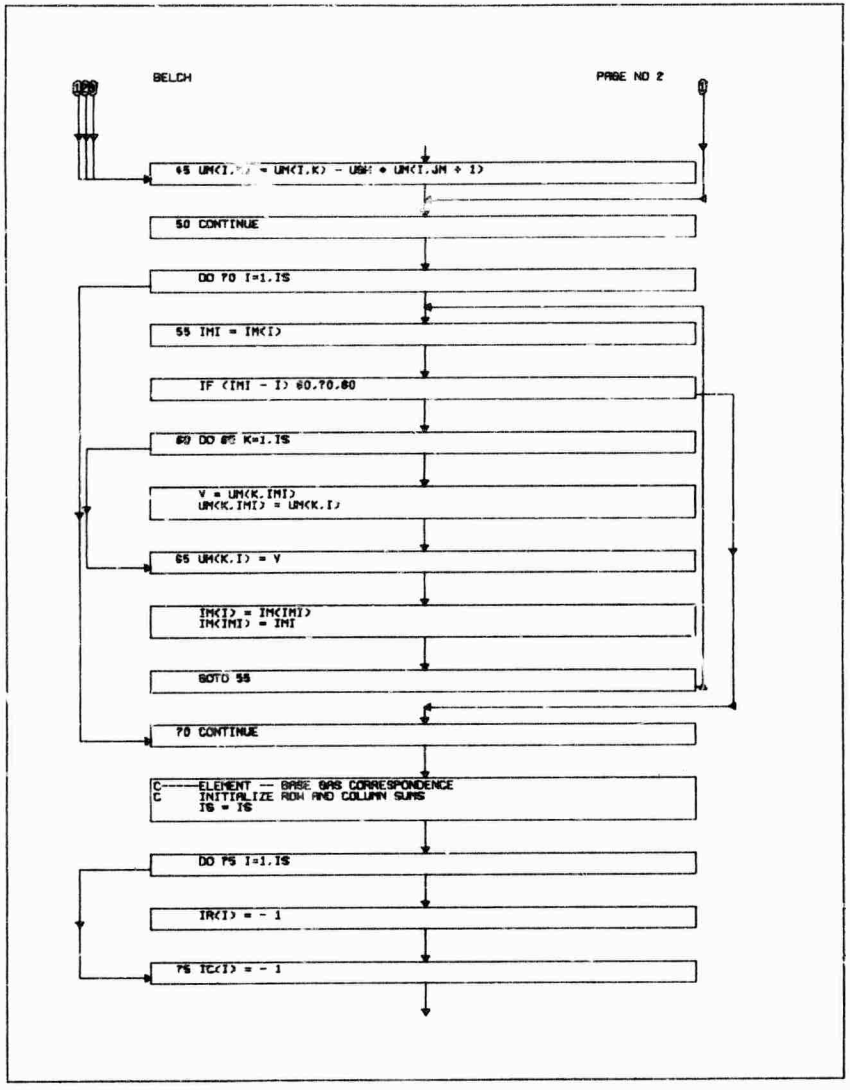

ALPST
PAGE NO 8
240 J=J+1
DO 245 K=1.IS
245 ZKE(K) = ZKE(K) / PMU2
250 DO 270 I=1.IS
K=-IR(I)
IF(KAT(I)-99) 255.260.255
255 IF(H(I)) 265.265.270
260 ALP(K) = 0.
GOTO 270
265 ALP(K) = ALP(K) + ZKE(K)
270 CONTINUE
275 TEST=1.+H(2)+H(3)
280 DO 285 K=1.IS
285 TEST = TEST - ALP(K) + WTM(K)
IF (ABS(TEST) - .001) 300.300.290

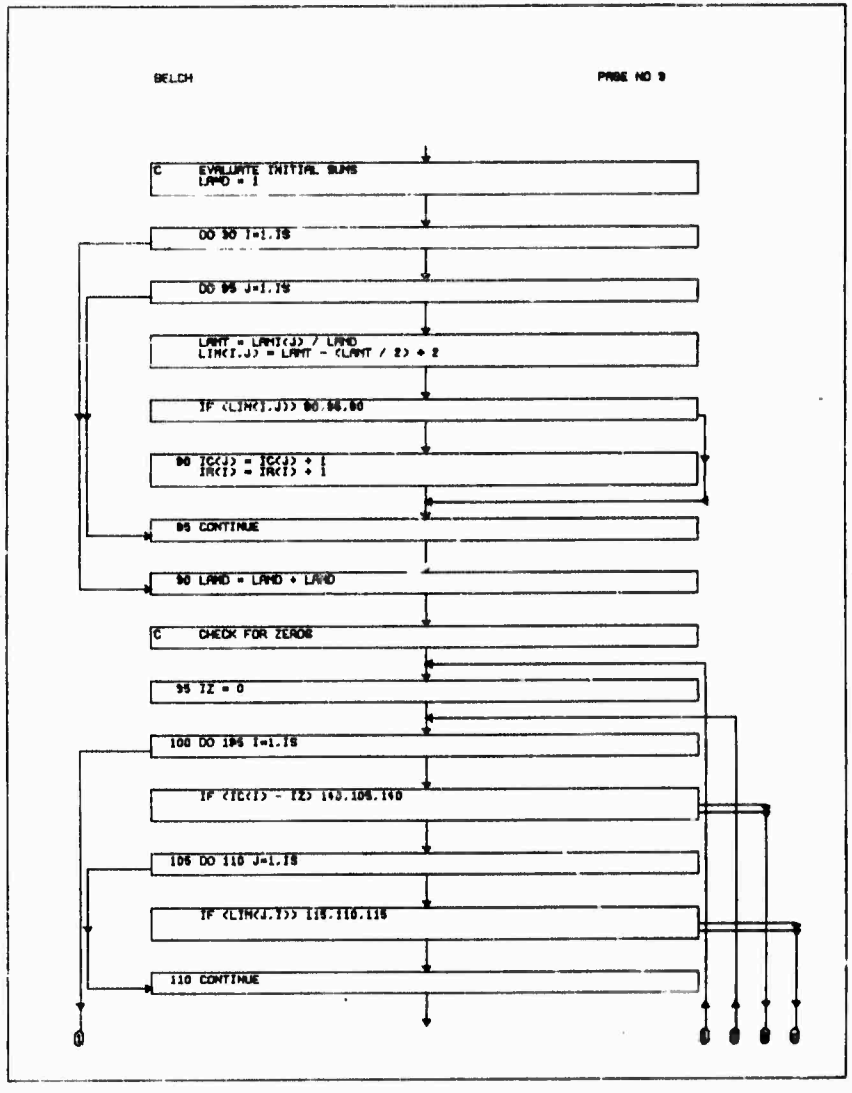

ALPST
PAGE NO 9
290 WRITE(KOUT.295) H
STOP
291 WRITE(KOUT.298)
STOP
295 FORMAT(//// 5X39HSICK MASS BALANCE INITIATION. CHECK . . /
1 10X79H1. REARRANGEMENT OF ELEMENTS BETWEEN EDGE AND WALL SOLUTION
26 (KR(2).GT.0) /10X29H2. COMPONENT MASS FRACTION (3E12.6.11H) NOT
3 EQUAL/14X71HTO ZERO FOR UNDEFINED COMPONENT (ALL ZERO GRAM-ATOMIC
4-WEIGHTS PER GRAM))
298 FORMAT(////5X73HNO VALID EDGE COMPOSITION AVAILABLE BECAUSE LAST S
1OLUTION WAS NON CONVERGENT OR/11X73HNEW FIRST GUESSES HAVE BEEN IN
2TRODUCED IN INPUT SUBROUTINE (KR(3)=1 TO 3))
300 IF (KR(3)) 305.305.370
305 IF (NORTO) 370.370.310
C REINITIALIZE SPECIES
310 PIN = P / 10.
PLOG = ALOG(PIN)
J = 1
315 DO 3?? IK=1.N
IF (IFC(J) + 1) 320.365.380
320 IFC(J) = IFC(J) + 3
IF (J - IS) 340.340.325

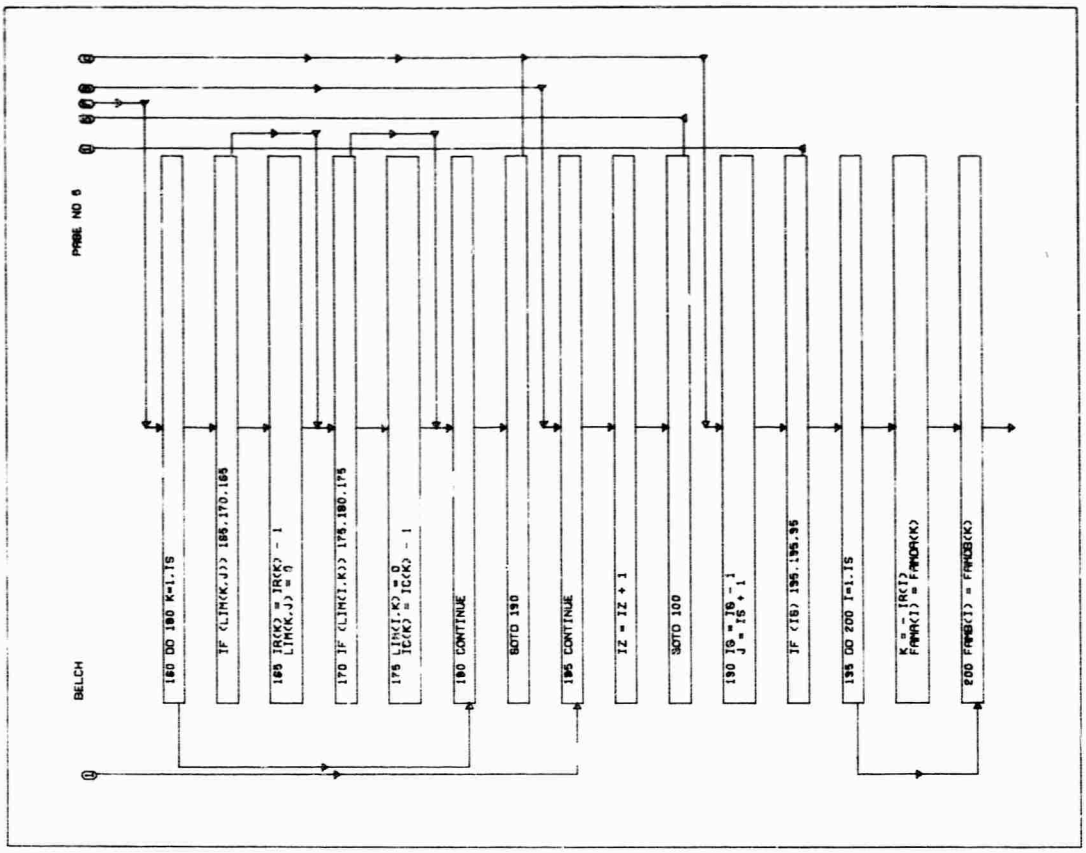

ALPST
PAGE NO 11
IF (NDAT - 1) 400,395,395
395 DO 395 L=1,NDAT
K = IDAT(L)
LAST = LAST - (LAST / 2) * 2
IF (LAST) 390,395,390
390 YN(J) = 0
IFC(J) = IFC(J) - 9
GOTO 405
395 CONTINUE
400 CONTINUE
405 J=J+1
IF (NDAT - 1) 420,410,410
410 DO 415 L=1,NDAT
K = IDAT(L)
J = IA(K)
415 IFC(J) = IFC(J) + 8
420 CONTINUE
425 RETURN
ALPST
PAGE NO 10
325 YC = 0.
GOTO 345
330 IF (IFC(J) - 1) 385,385,335
335 IFC(J) = IFC(J) - 9
340 YC = PLOS
345 IF (IFC(J)) 355,350,350
350 IFC(J) = - 1
355 YN(J) = 0.
Y(J) = YC
GOTO 365
360 YN(J) = PIN
Y(J) = PLOS
365 J=J+1
370 IF (NDAT) 425,425,375
375 J = 1
380 DO 425 IK=1,M

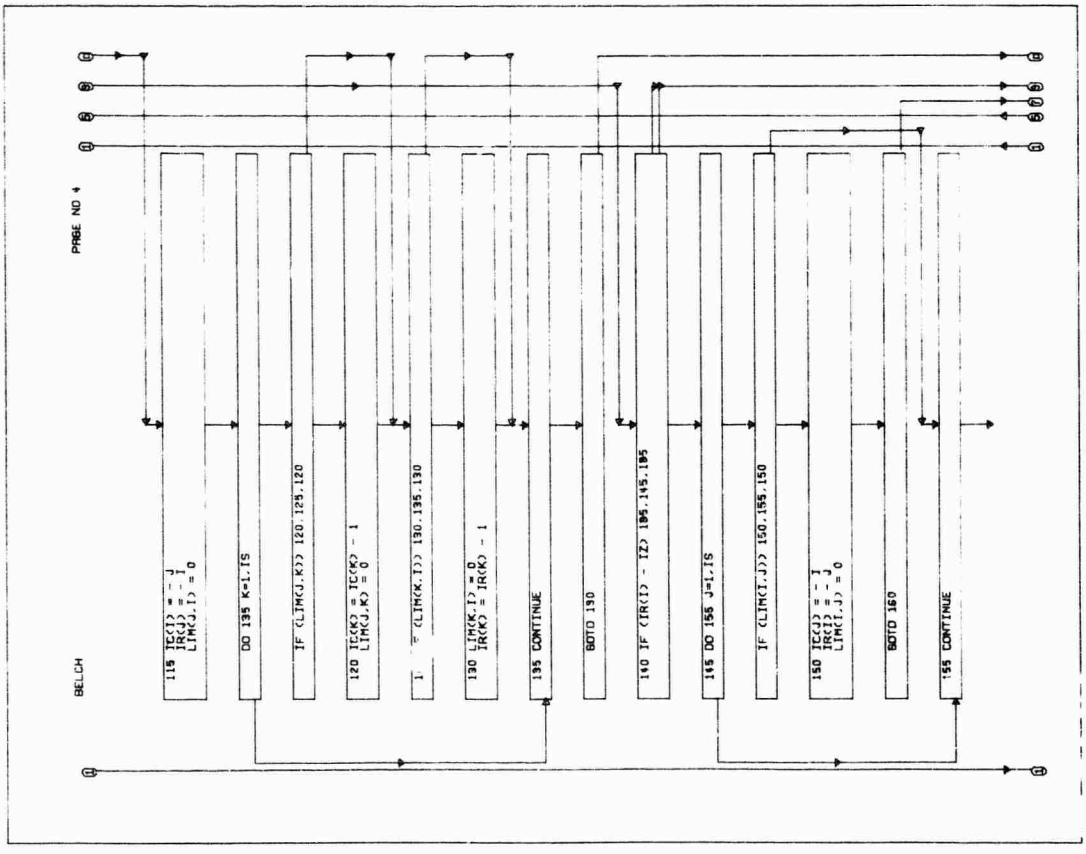

ALPST
PAGE NO 12
END

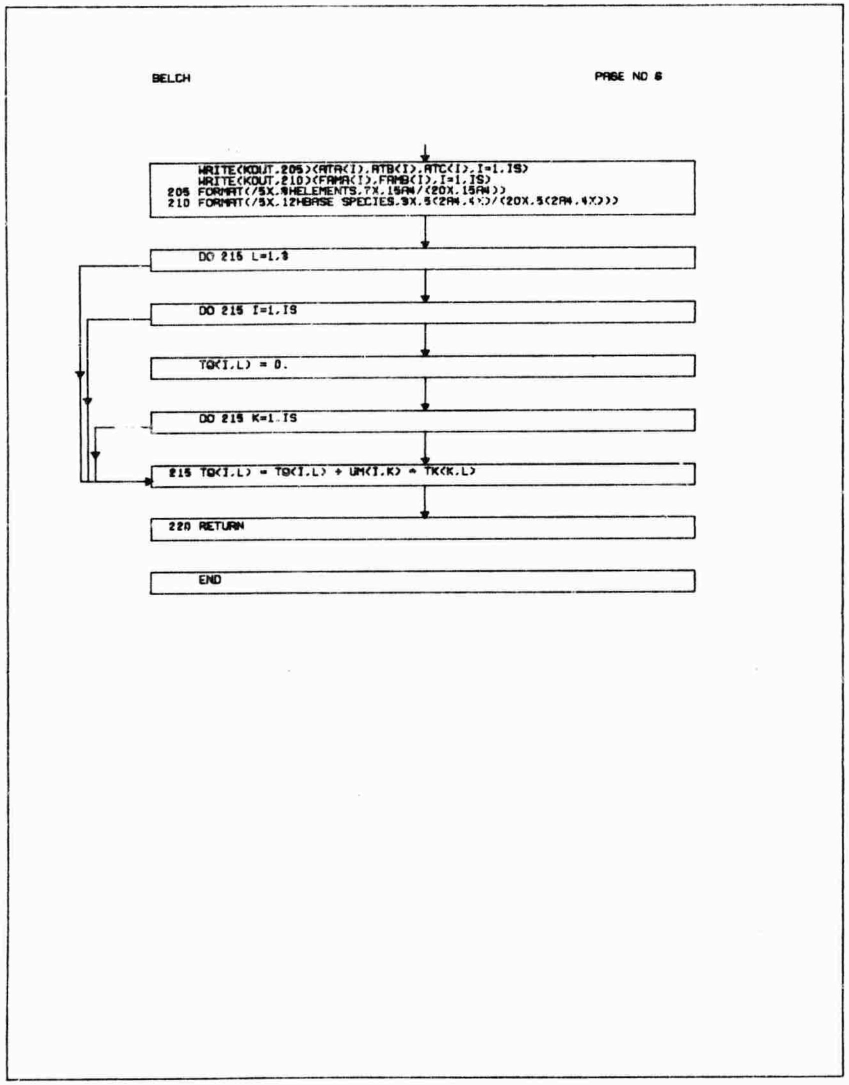

BELCH
PAGE NO 1
SUBROUTINEBELCH
SUBROUTINE BELCH
SEE THE FULL LISTING OF THIS ROUTINE FOR--
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
15 IF (J - IS) 20,20,95
20 JM = J - 1
WRITE(KOUT,25)JM,IS,(FAMOA(I),FAMOB(I),I=1,JM)
WRITE(KOUT,30)(FAMOA(I),FAMOB(I),I=ISP,N)
STOP
25 FORMAT(////,16H ONLY FOLLOWING,I3,28H BASE SPECIES FOUND FOR,I3,
19H ELEMENTS/(2X20A4))
30 FORMAT(/30H OTHER SPECIES CONSIDERED HERE/(2X20A4))
95 DO 45 L=2,IS
JM = ISP - L
IMJ = IM(JM + 1)
IF (JM - 1) 50,40,40
40 DO 45 K=1,JM
JGH = TAU(IMJ,K)
DO 45 I=1,IS
0
0

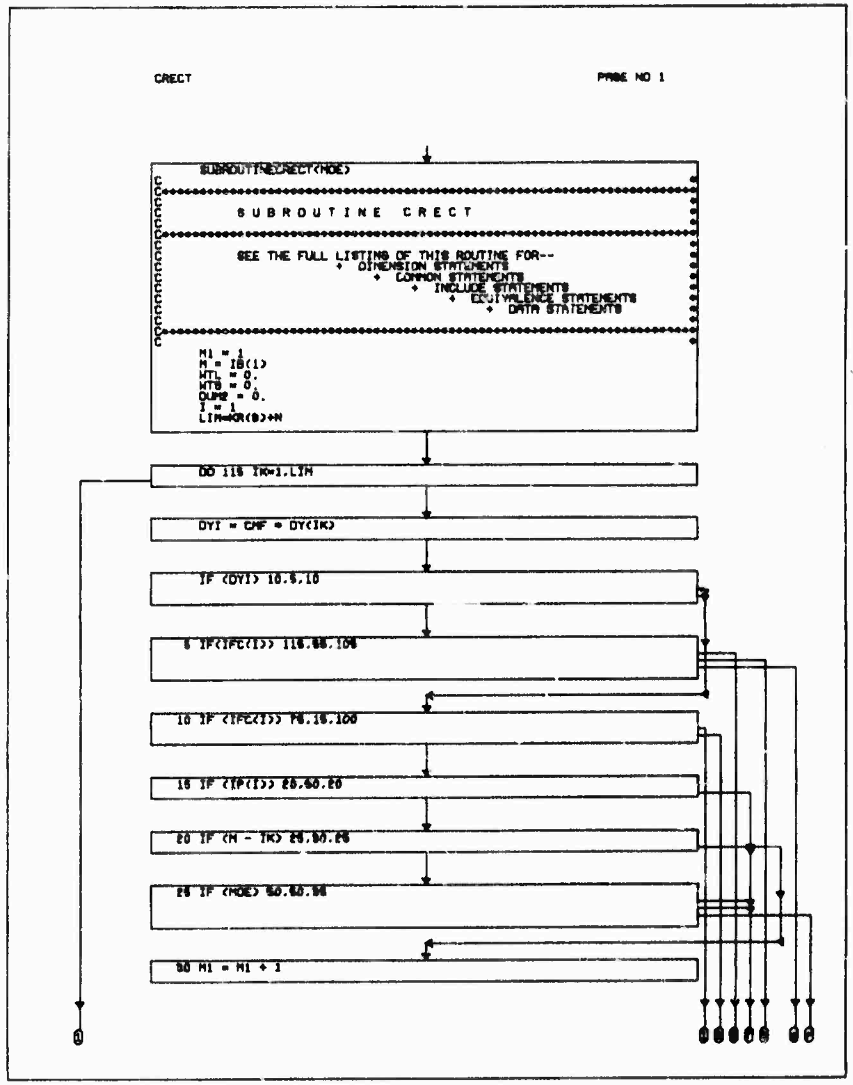

BELCH
PAGE NO 2
65 UM(I,J) = UM(I,K) - UM(I,JM + 1)
50 CONTINUE
DO 70 I=1,IS
55 IMI = IM(I)
IF (IMI - I) 60,70,60
60 DO 65 K=1,IS
V = UM(K,IMI)
UM(K,IMI) = UM(K,I)
65 UM(K,I) = V
IM(I) = IM(IMI)
IM(IMI) = IMI
GOTO 55
70 CONTINUE
C-----ELEMENT -- BASE GAS CORRESPONDENCE
C INITIALIZE ROW AND COLUMN SUMS
IS = IS
DO 75 I=1,IS
IR(I) = - 1
75 IC(I) = - 1

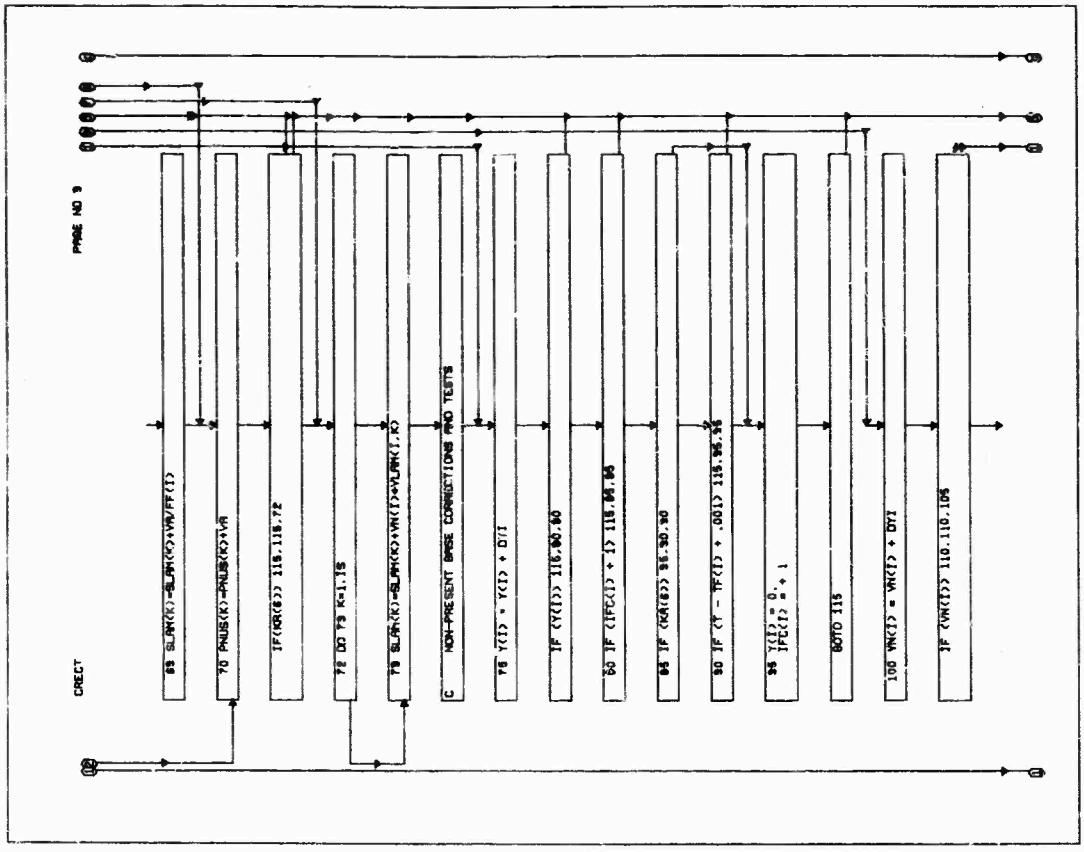

BELCH
PAGE NO 3
C EVALUATE INITIAL SUMS
LAND = 1
DO 90 I=1,IS
DO 85 J=1,IS
LAMT = LAMT(J) / LAND
LIM(I,J) = LAMT - (LAMT / 2) * 2
IF (LIM(I,J)) 80,85,80
80 IC(J) = IC(J) + 1
IM(I) = IM(I) + 1
85 CONTINUE
90 LAND = LAND + LAND
C CHECK FOR ZEROS
95 IZ = 0
100 DO 135 I=1,IS
IF (IC(I) - IZ) 140,105,140
105 DO 110 J=1,IS
IF (LIM(J,I)) 115,110,115
110 CONTINUE

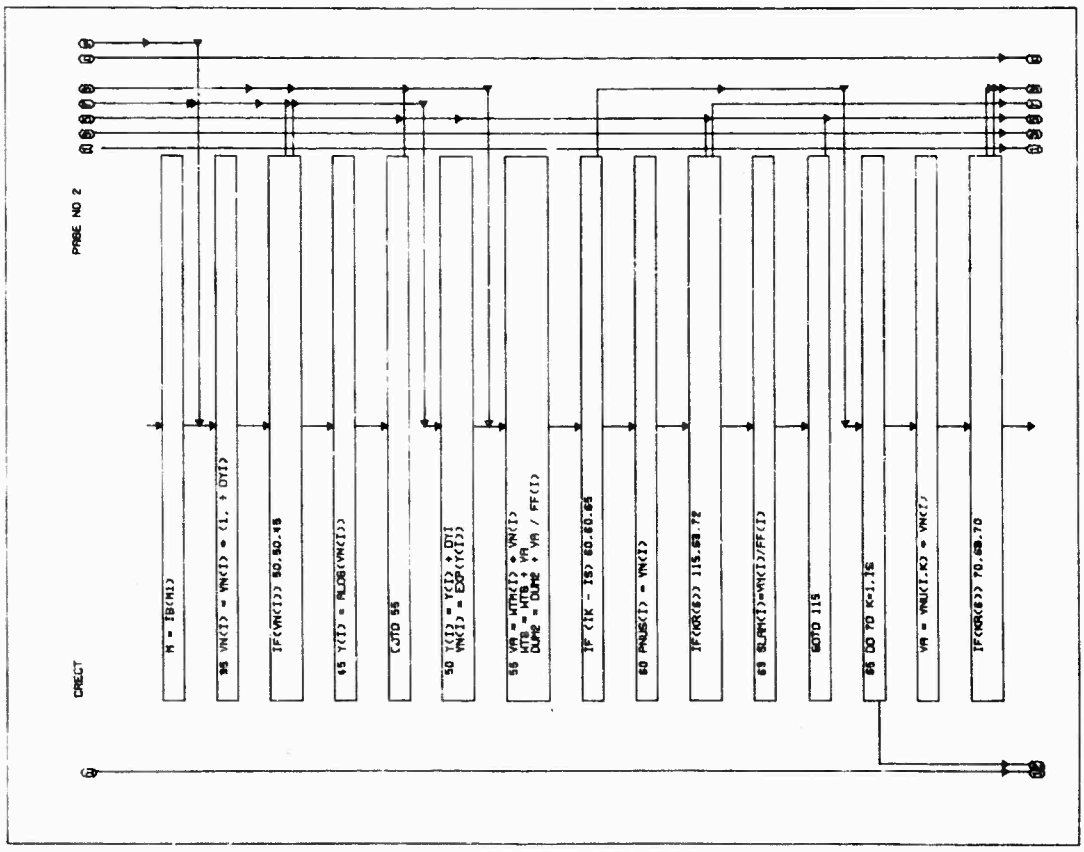

PAGE NO 5
BELCH
160 DO 180 K=1,IS
165 IR(K) = JR(K) - 1
LIM(K,J) = 0
170 IF (LIM(I,K)) 175,180,175
175 LIM(I,K) = 0
IC(K) = IC(K) - 1
180 CONTINUE
185 IF (LIM(K,J)) 165,170,165
190 GOTO 190
195 CONTINUE
IZ = IZ + 1
GOTO 100
190 IG = IG - 1
J = IS + 1
IF (IS) 195,195,35
195 DO 200 I=1,IS
K = IR(I)
FANA(I) = FANA(K)
200 FANB(I) = FANB(K)

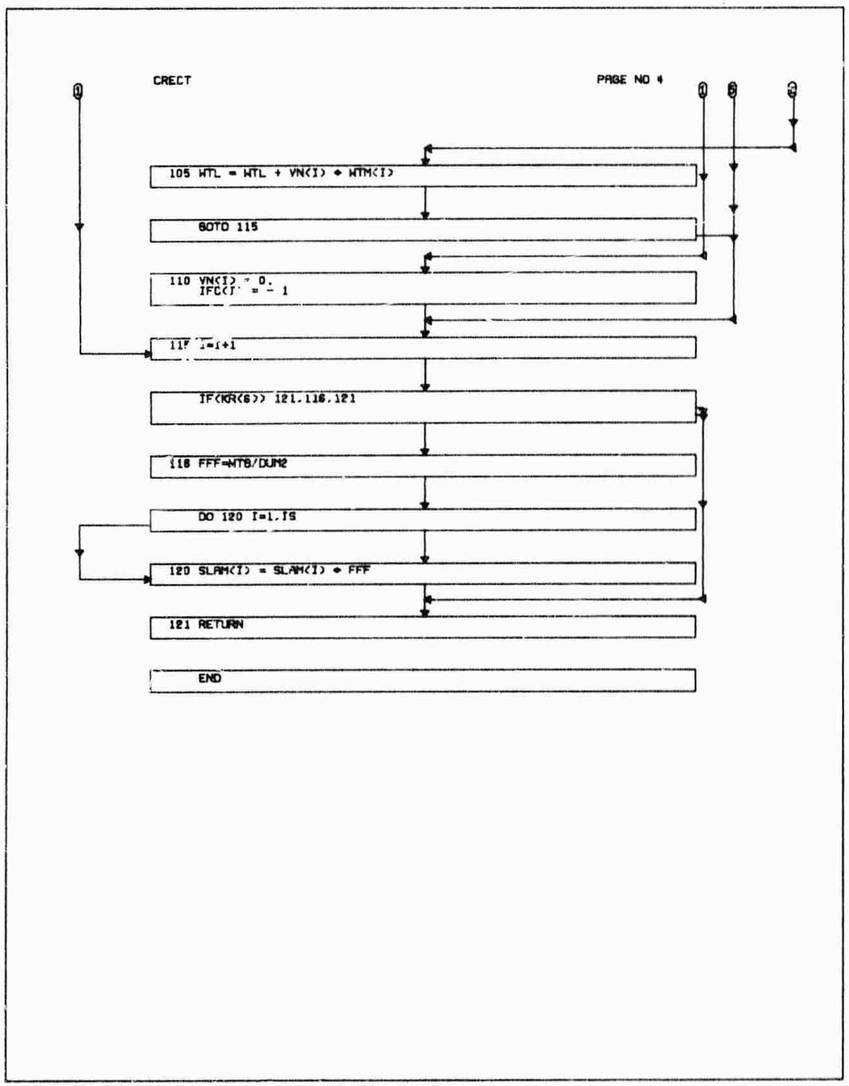

PAGE NO 4
BELCH
115 IC(J) = - J
IR(J) = - I
LIM(J,I) = 0
DO 135 K=1,IS
IF (LIM(J,K)) 120,125,120
120 IC(K) = IC(K) - 1
LIM(J,K) = 0
IF (LIM(K,I)) 130,135,130
130 LIM(K,I) = 0
IR(K) = IR(K) - 1
135 CONTINUE
GOTO 130
140 IF (IR(I) - IZ) 105,145,105
145 DO 155 J=1,IS
IF (LIM(I,J)) 150,155,150
150 IC(J) = - I
IR(I) = - J
LIM(I,J) = 0
GOTO 160
155 CONTINUE

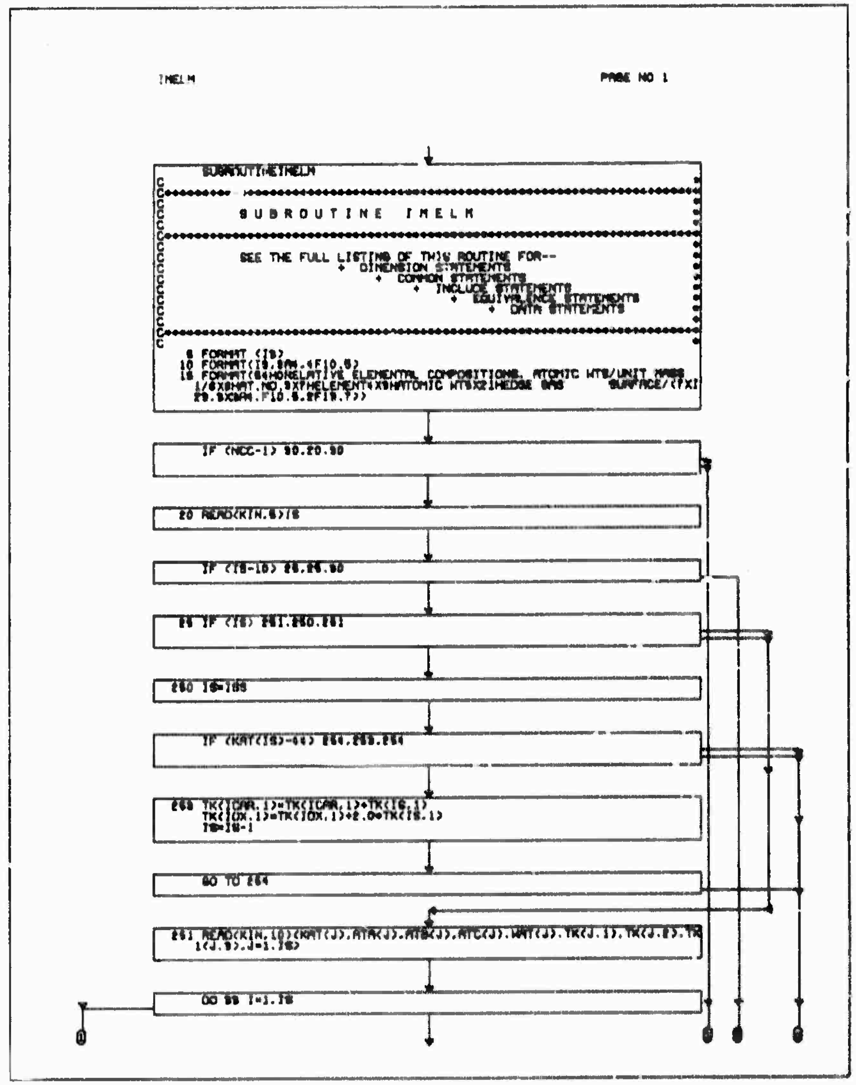

BELCH
PAGE NO 6
WRITE(KOUT,205)(ATA(I),ATB(I),ATC(I),I=1,IS)
WRITE(KOUT,210)(FAMA(I),FAMB(I),I=1,IS)
205 FORMAT(/5X,8HELEMENTS,7X,15A4/(20X,15A4))
210 FORMAT(/5X,12HBASE SPECIES,9X,5(2A4,4X)/(20X,5(2A4,4X)))
DO 215 L=1,3
DO 215 I=1,IS
TG(I,L) = 0.
DO 215 K=1,IS
215 TG(I,L) = TG(I,L) + UM(I,K) * TK(K,L)
220 RETURN
END

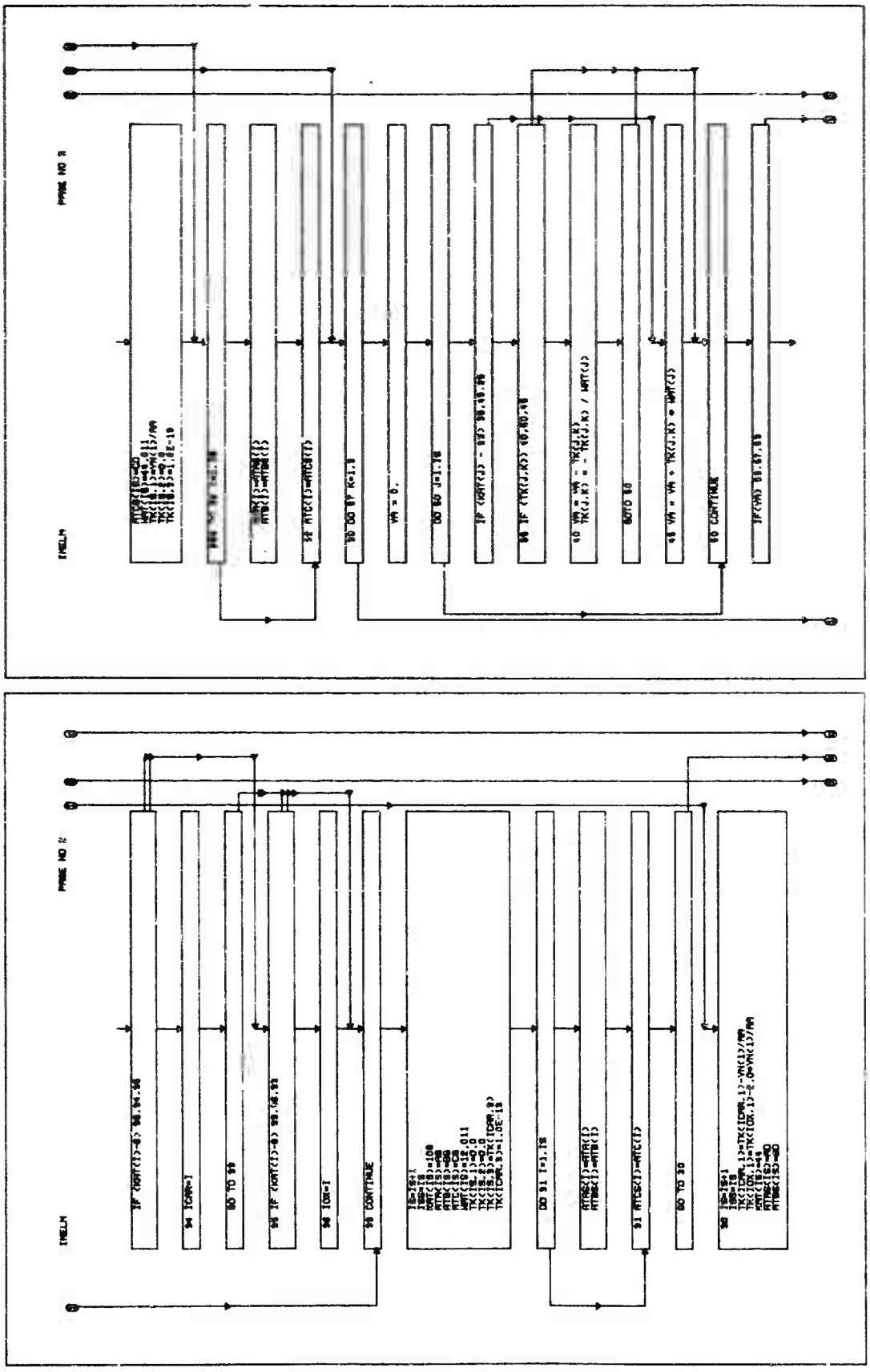

CRECT
PAGE NO 1
SUBROUTINE CRECT(MOE)
S U B R O U T I N E   C R E C T
SEE THE FULL LISTING OF THIS ROUTINE FOR--
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
M1 = 1
M = IB(1)
WTL = 0.
WTS = 0.
DUM2 = 0.
I = 1
LIM=KR(8)+M
DO 115 IK=1,LIM
DYI = CMF * DY(IK)
IF (DYI) 10,5,10
5 IF(IFC(I)) 115,95,105
10 IF (IFC(I)) 75,15,100
15 IF (IP(I)) 25,50,20
20 IF (M - IK) 25,50,25
25 IF (MOE) 50,60,95
50 M1 = M1 + 1

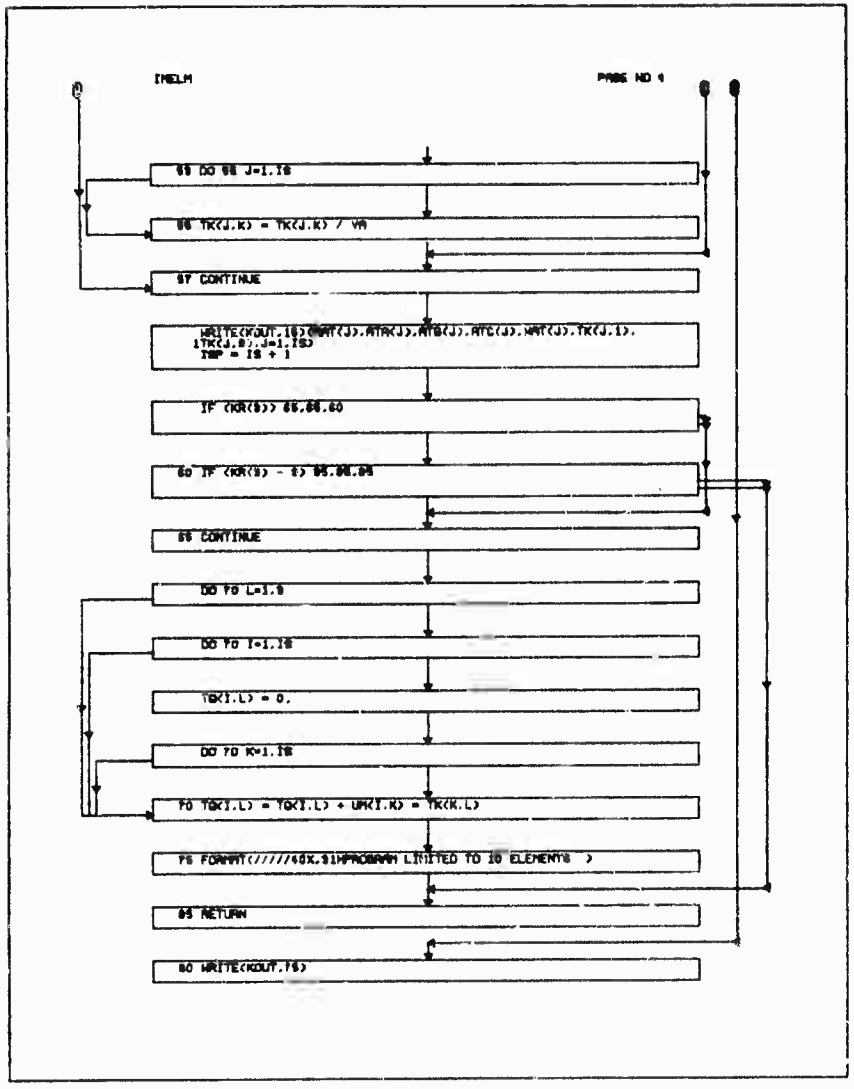

PAGE NO 3
CRECT
85 BLANK(K)=BLANK(K)*VA/FF(I)
90 PAUSE(K)=PAUSE(K)*VA
IF(KOR(6)) 115,115,72
72 DO 73 K=1,15
73 BLANK(K)=BLANK(K)*VN(I)*VLANK(I,K)
C NON-PRESENT BASE CONDITIONS AND TESTS
75 Y(I) = Y(I) + DYI
IF (Y(I)) 110,80,80
80 IF (IFC(I) + 1) 110,85,85
85 IF (KAT(6)) 86,90,90
90 IF (Y - TF(I) + .001) 110,95,95
95 Y(I) = 0.
IFC(I) = 1
GOTO 115
100 VN(I) = VN(I) + DYI
IF (VN(I)) 110,110,105

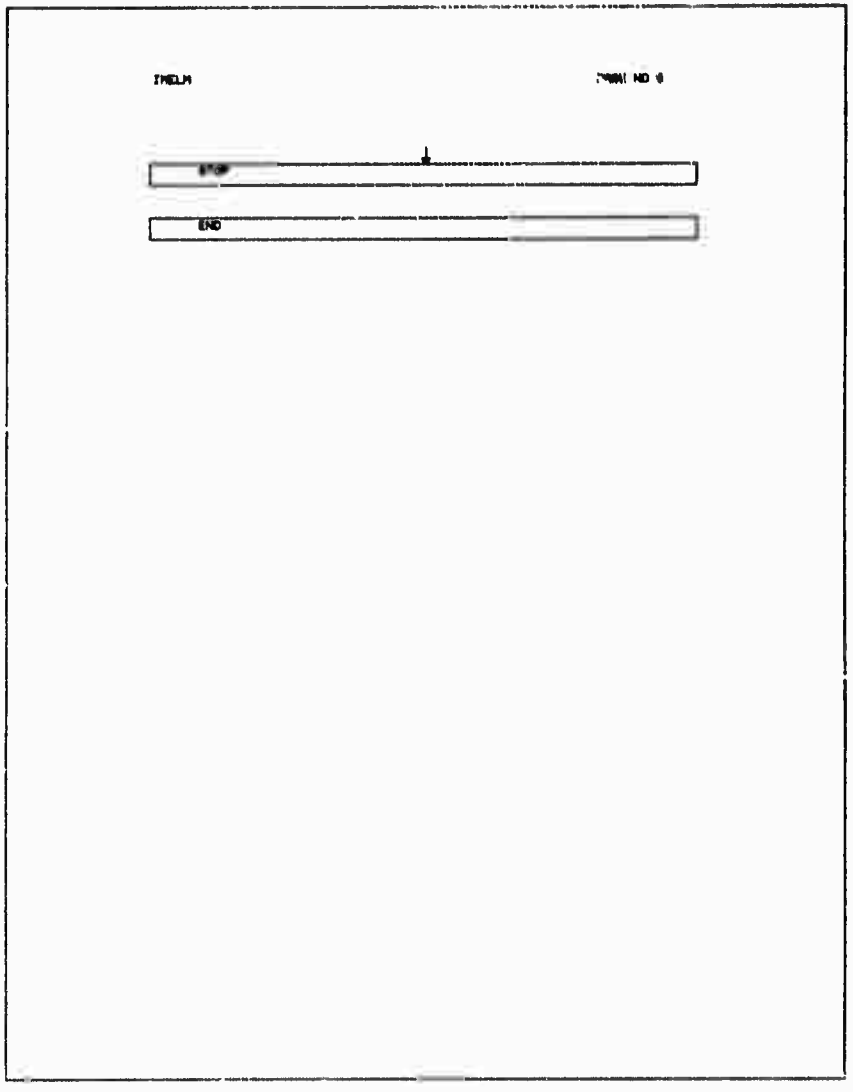

PAGE NO 2
CRECT
M = IB(M1)
55 VN(I) = VN(I) + (1. + DYI)
IF(VN(I)) 60,60,45
45 Y(I) = RLOG(VN(I))
GOTO 55
50 Y(I) = Y(I) + DYI
VN(I) = EXP(Y(I))
55 VA = WTR(I) * VN(I)
HTB = HTB + VA
DUM2 = DUM2 + VA / FF(I)
IF (IK - IS) 60,60,65
60 PAUSE(I) = VN(I)
IF(KOR(6)) 115,68,72
68 BLANK(I)=VN(I)/FF(I)
GOTO 115
85 DO 90 K=1,15
VA = VN(I,K) * VN(I)
IF(KOR(6)) 70,68,70

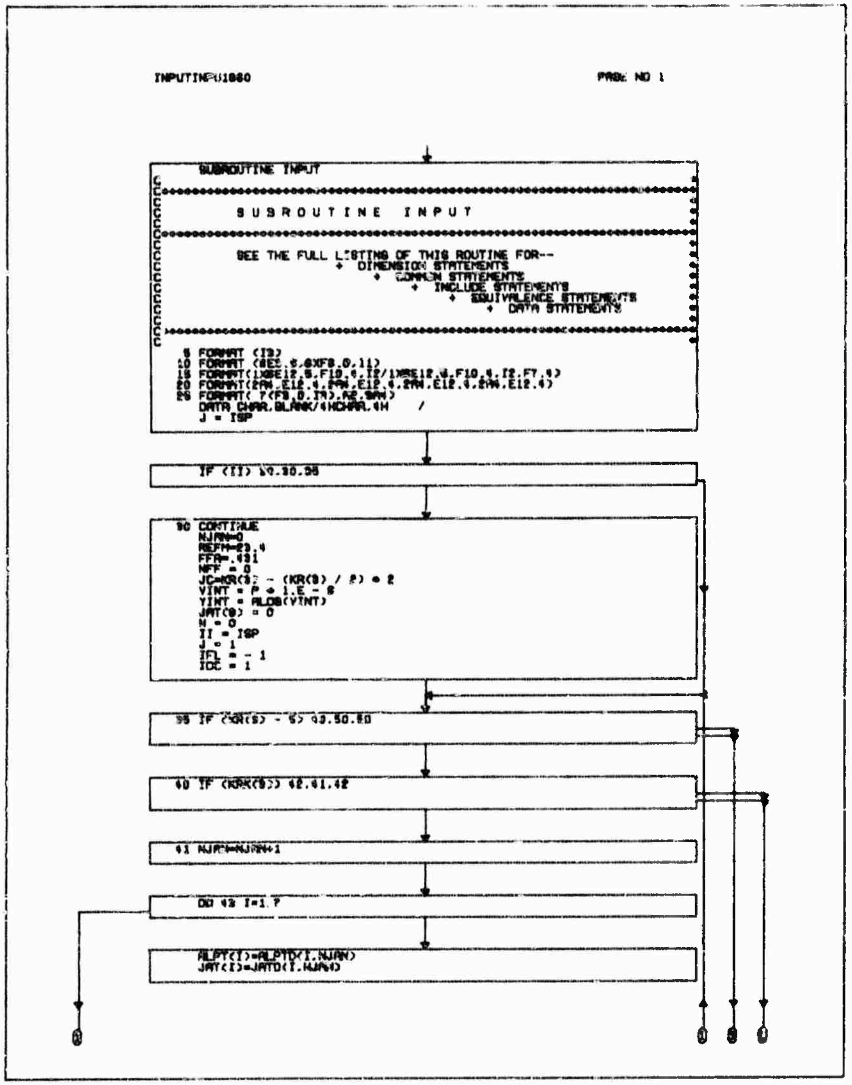

CRECT
PAGE NO 4
105 WTL = WTL + VN(I) * WTM(I)
GOTO 115
110 VN(I) = 0.
115 I=I+1
IF(KR(6)) 121,116,121
116 FFF=WTB/DUM2
DO 120 I=1,IS
120 SLAM(I) = SLAM(I) + FFF
121 RETURN
END

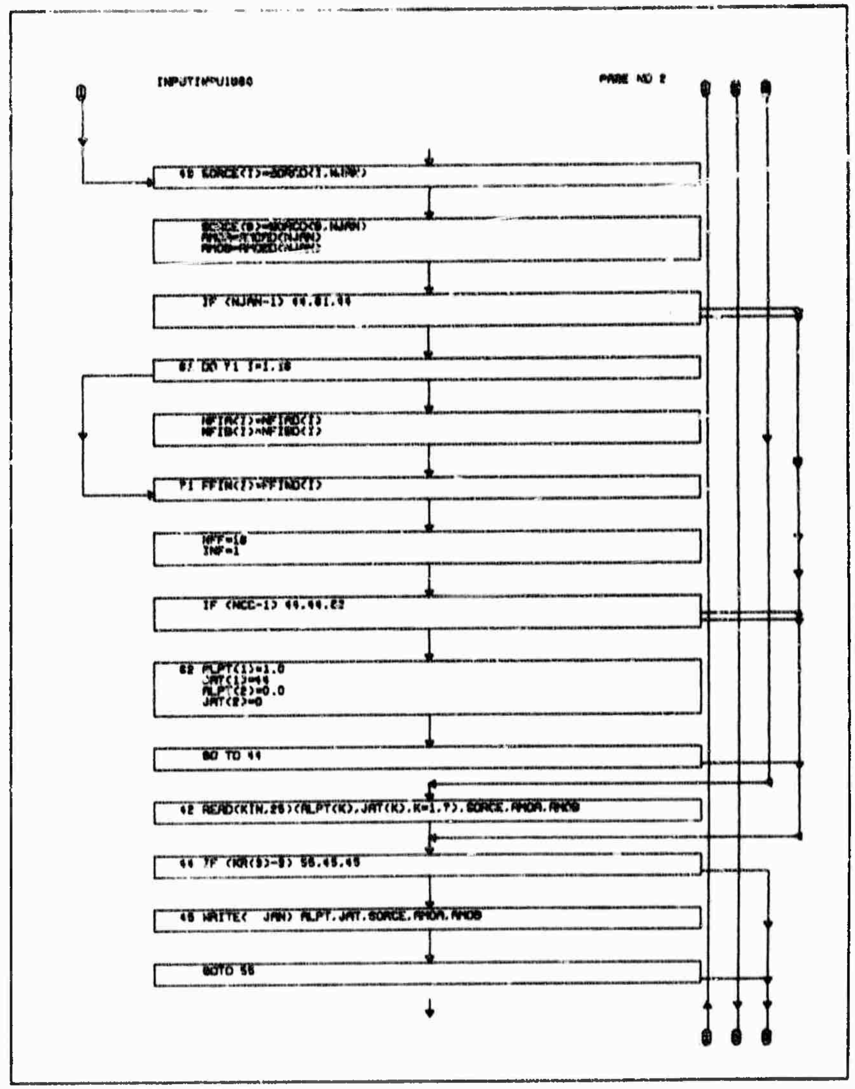

IMELM
PAGE NO 1
SUBROUTINE IMELM
SEE THE FULL LISTING OF THIS ROUTINE FOR--
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
IF (NCC-1) 90,20,90
GO TO 264
DO 99 I=1,IS

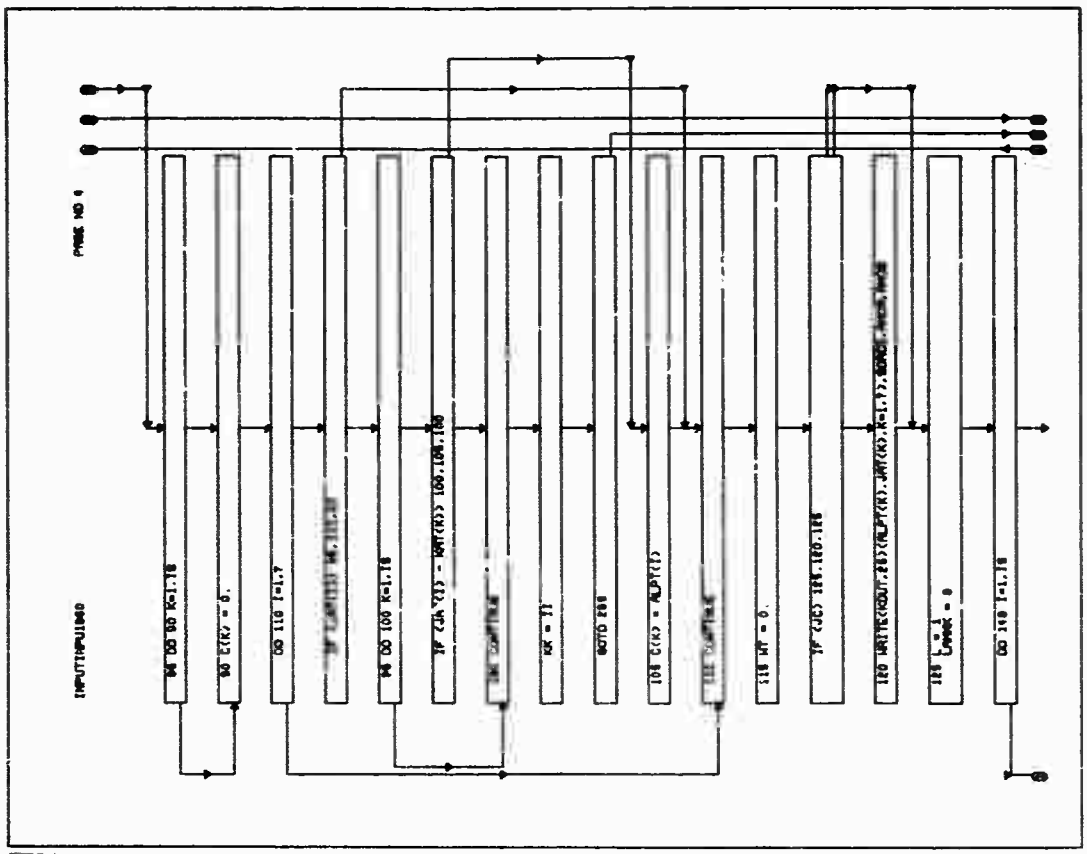


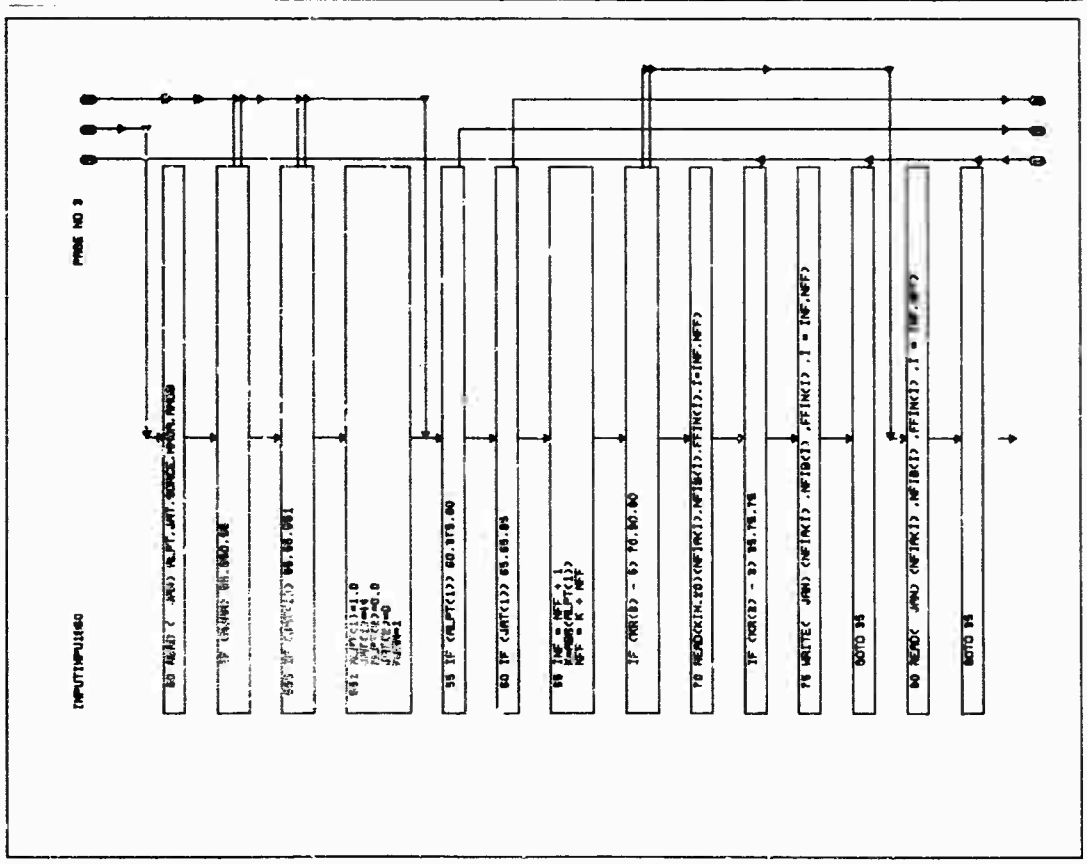

IMSLM
PAGE NO 4
65 DO 66 J=1,15
66 TK(J,K) = TK(J,K) / VR
67 CONTINUE
WRITE(KOUT,10)(WAT(J),ATAK(J),ATB(J),ATC(J),WAT(J),TK(J,1),
1TK(J,8),J=1,15)
IMP = IS + 1
IF (KR(8)) 68,68,60
60 IF (KR(8) - 8) 68,68,65
68 CONTINUE
DO 70 L=1,8
DO 70 I=1,15
TQ(I,L) = 0.
DO 70 K=1,15
70 TQ(I,L) = TQ(I,L) + UM(I,K) * TK(K,L)
75 FORMAT(/////40X,31HPROGRAM LIMITED TO 10 ELEMENTS)
65 RETURN
80 WRITE(KOUT,75)

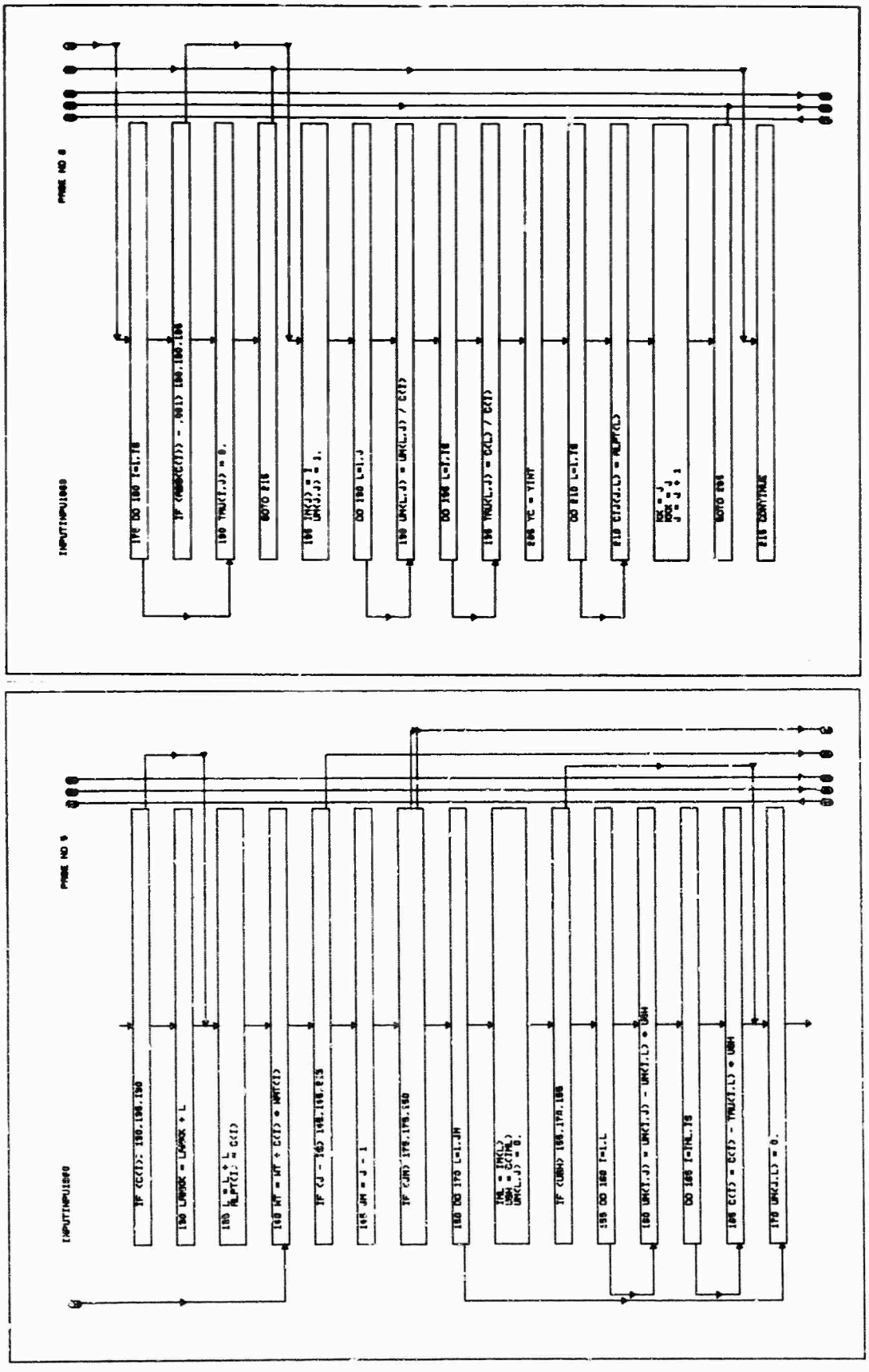

IMSLM
PAGE NO 6
STOP
END

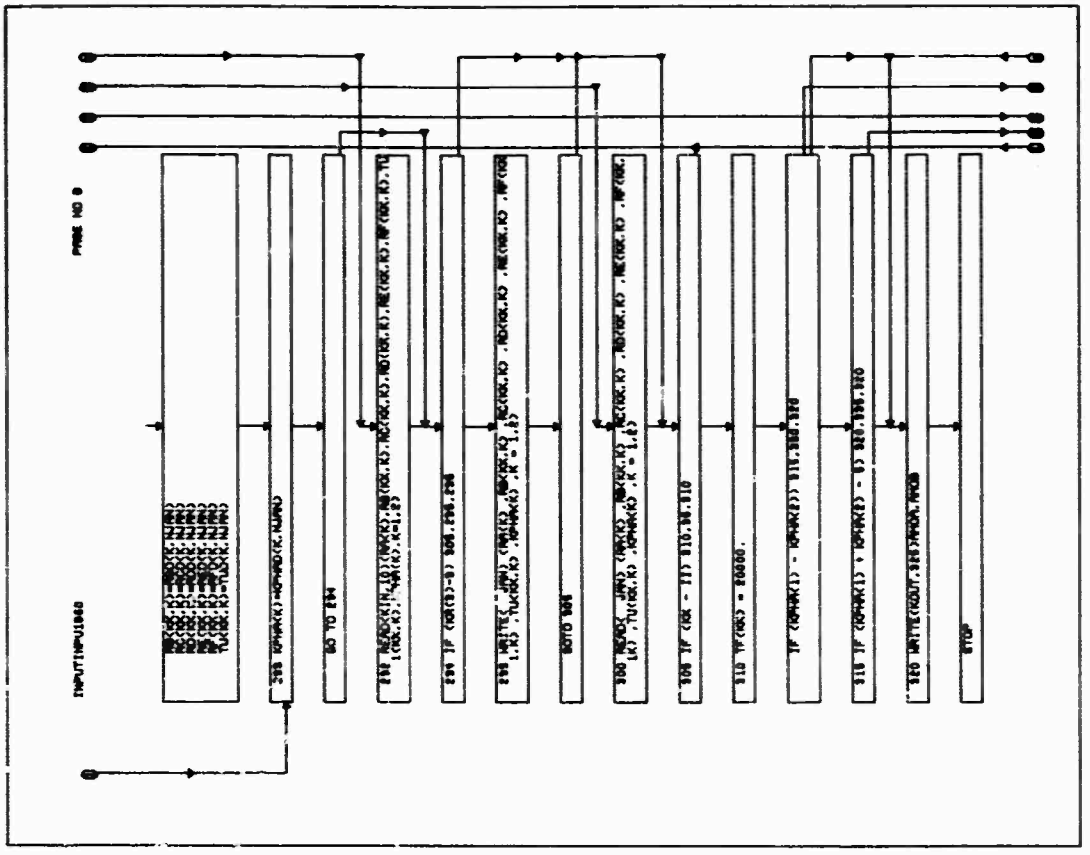

INPUTINPU1080
PAGE NO 1
SUBROUTINE INPUT
S U B R O U T I N E   I N P U T
SEE THE FULL LISTING OF THIS ROUTINE FOR--
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
5 FORMAT (I3)
J = ISP
IF (II) 30.30.35
30 CONTINUE
NJAN=0
REFM=23.4
FFA=.431
NFF = 0
VINT = P * 1.E - 8
YINT = ALOG(VINT)
JAT(8) = 0
N = 0
II = ISP
J = 1
IFL = - 1
ICC = 1
40 IF (KRK(8)) 42.41.42
41 NJAN=NJAN+1
DO 43 I=1.7
ALPT(I)=ALPTD(I.NJAN)
JAT(I)=JATD(I.NJAN)

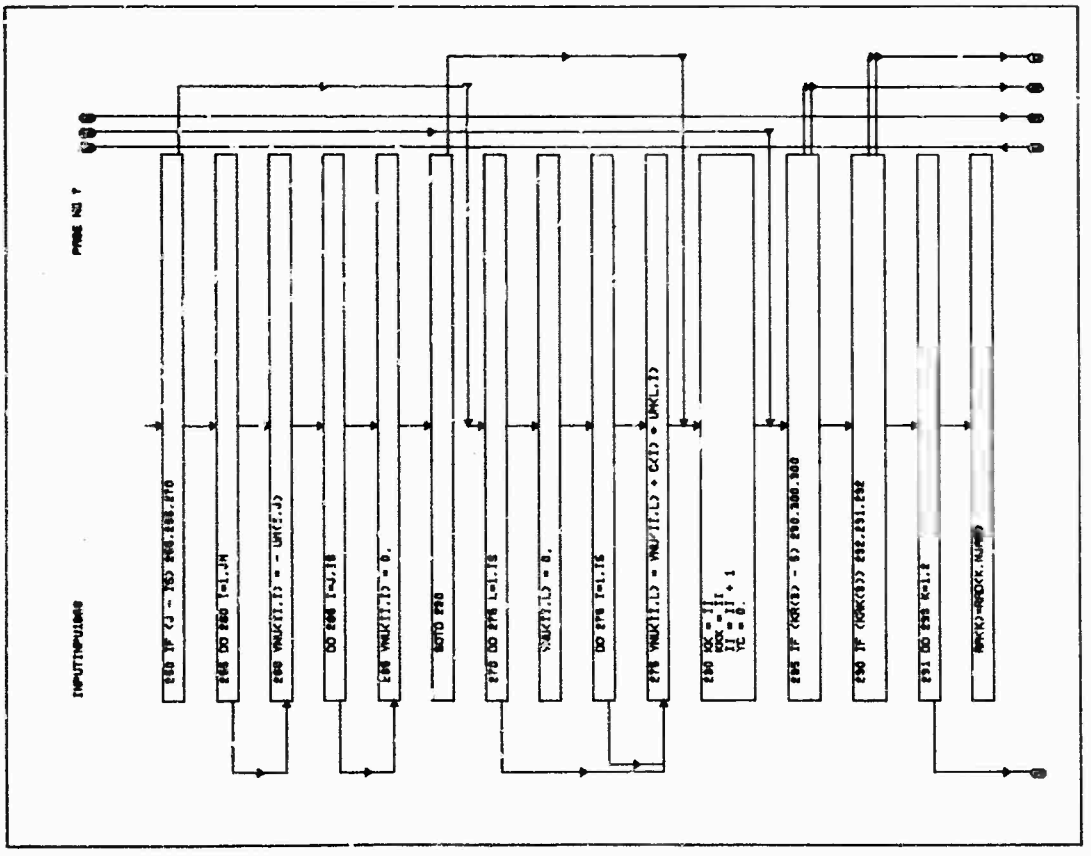

INPUTINPU1080
PAGE NO 2
IF (NJAN-1) 44.81.44
NFF=18
INF=1
IF (NCC-1) 44.44.82
82 ALPT(1)=1.0
JAT(1)=44
ALPT(2)=0.0
JAT(2)=0
GO TO 44
42 READ(KIN.26)(ALPT(K),JAT(K),K=1.7).SORCE.AMOA.AMOB
44 IF (KR(5)-8) 55.45.45
45 WRITE(JAN) ALPT.JAT.SORCE.AMOA.AMOB
GOTO 55

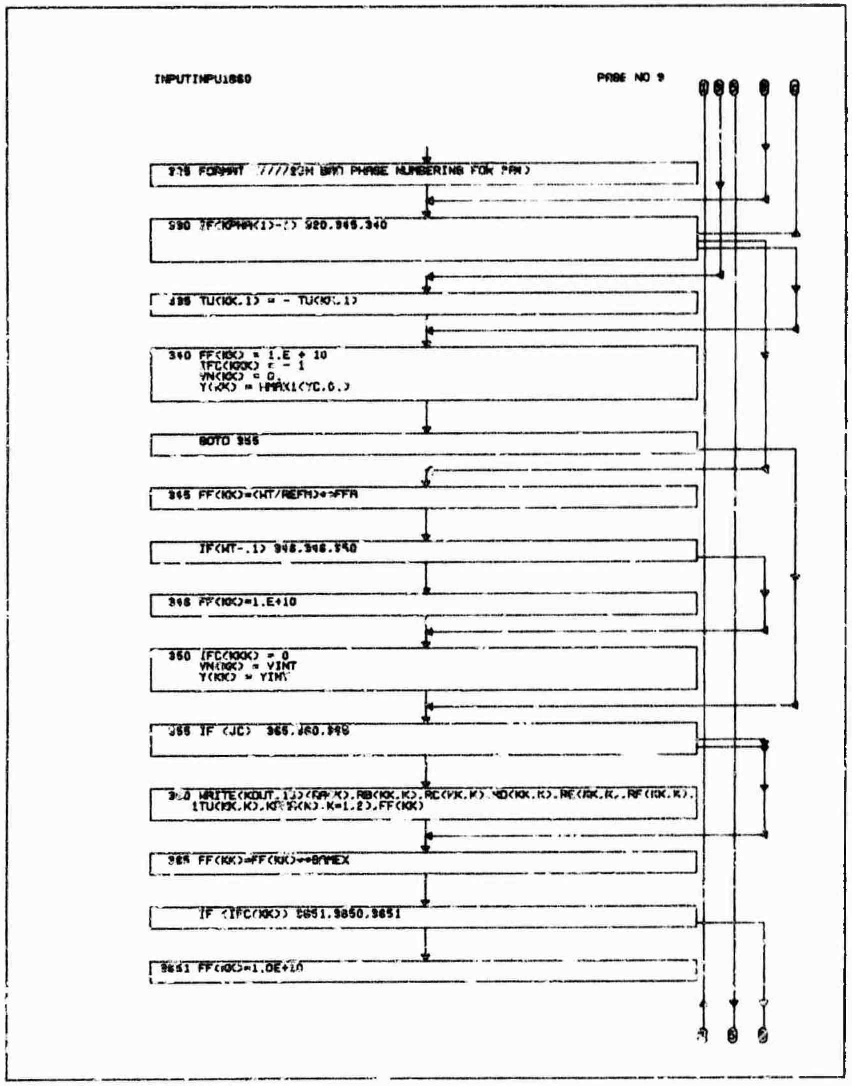


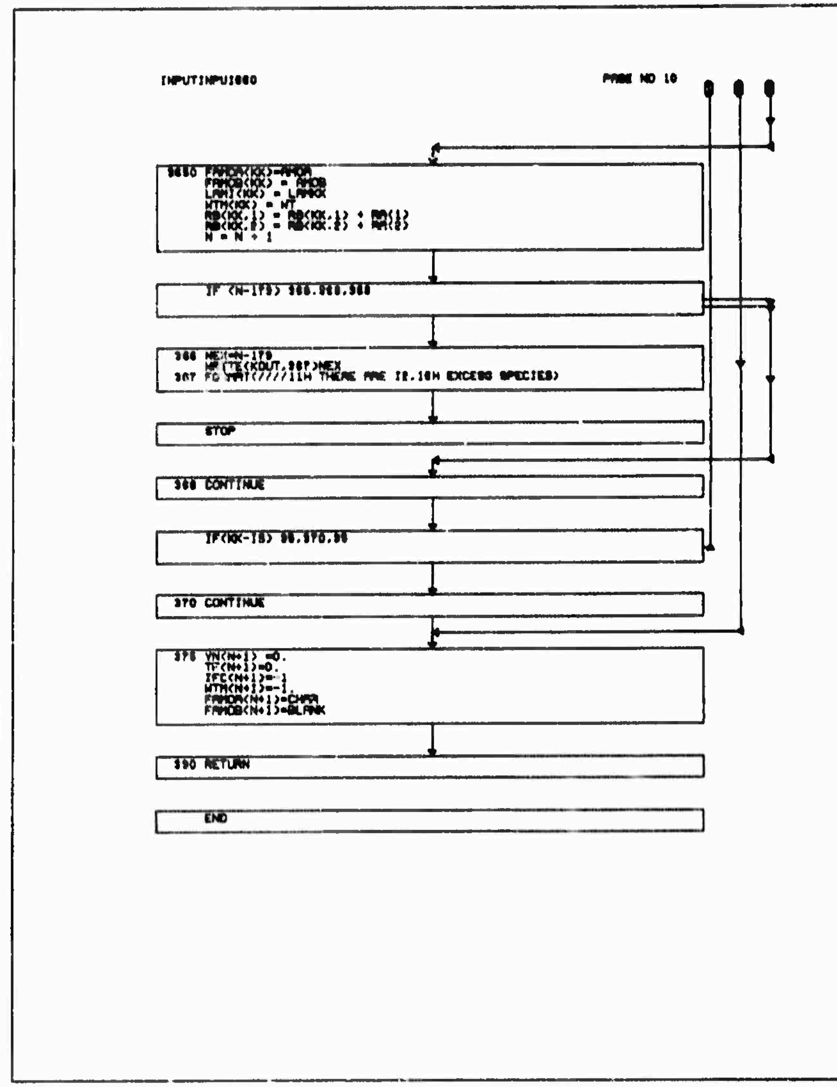


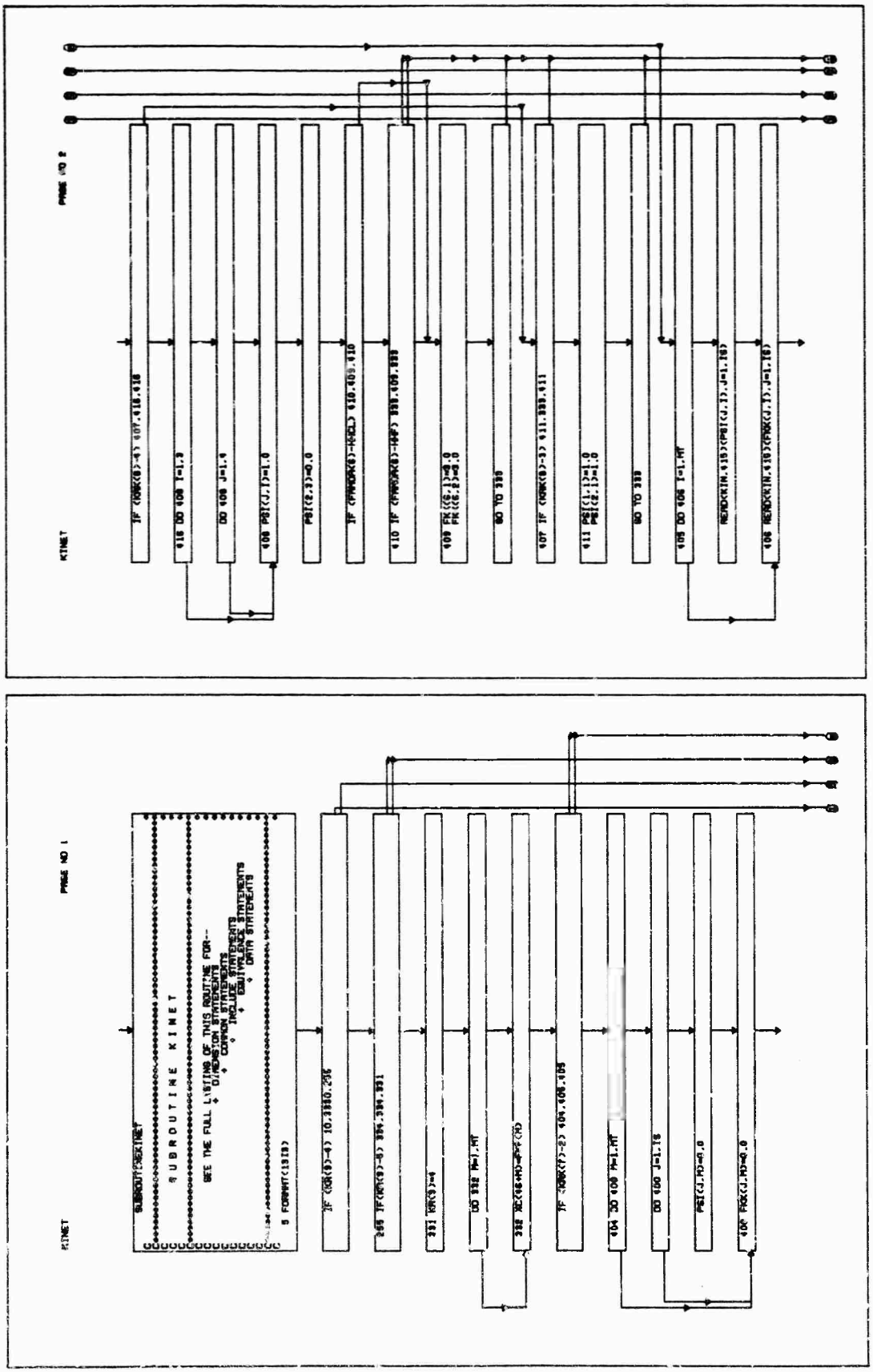


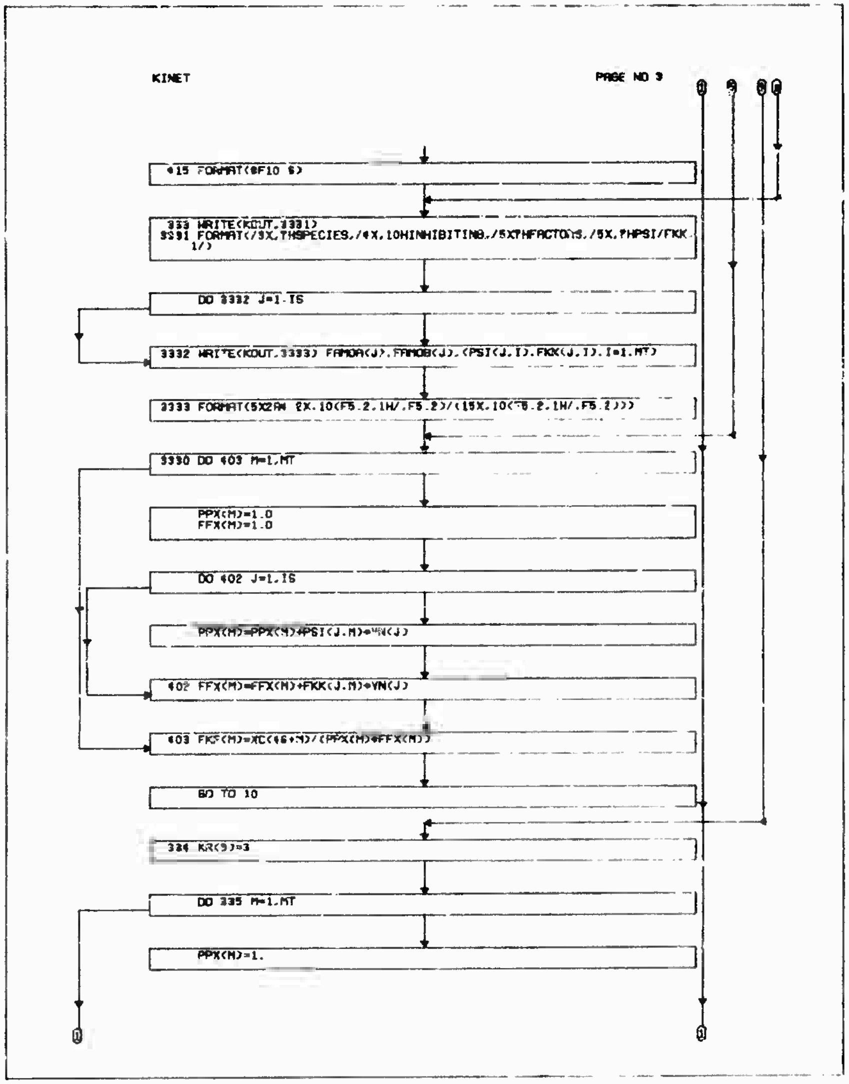


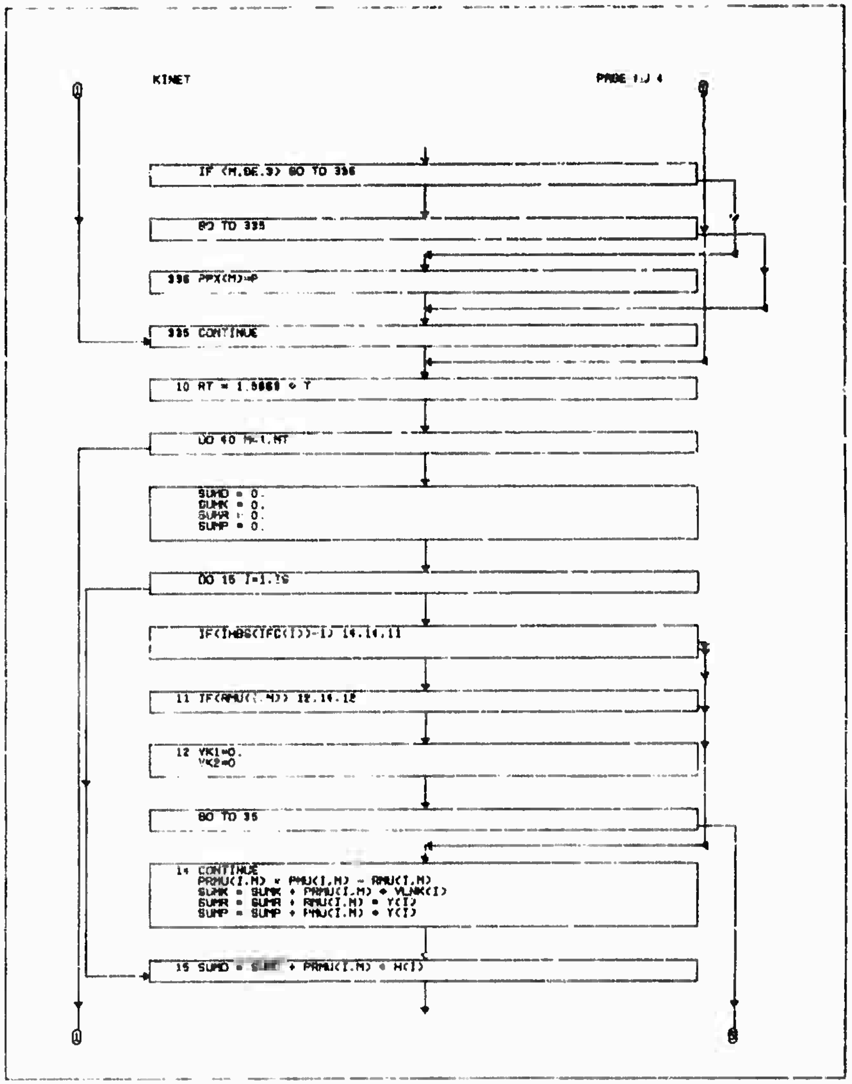


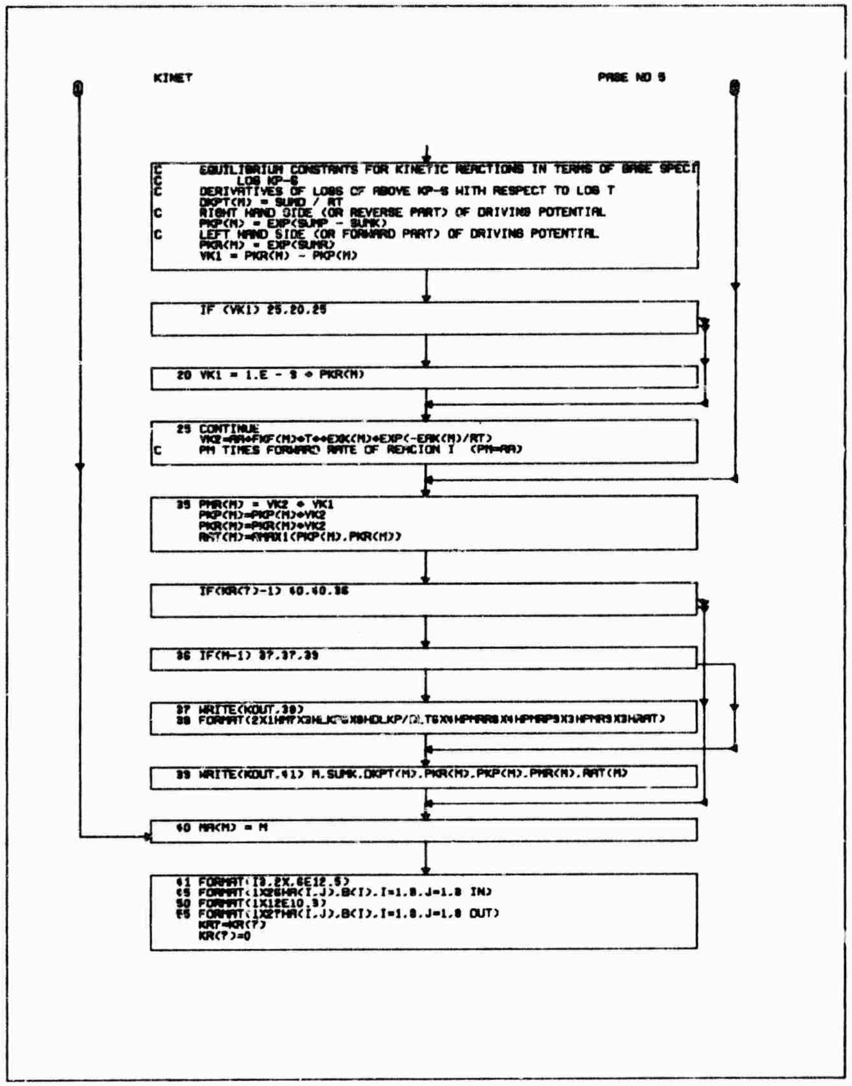

INPUTINPU1660
PAGE NO 9
335 FORMAT (////22H BAD PHASE NUMBERING FOR PA)
330 IF(KPHA(1)-1) 320,345,340
335 TU(KK,1) = - TU(KK,1)
340 FF(KK) = 1.E + 10
IFC(KKK) = - 1
YN(KK) = 0.
Y(KK) = AMAX1(YC,0.)
GOTO 355
345 FF(KK)=(WT/REFM)**FFA
IF(WT-.1) 348,348,350
348 FF(KK)=1.E+10
350 IFC(KKK) = 0
YN(KK) = VINT
Y(KK) = YINT
355 IF (JC) 365,360,365
360 WRITE(KOUT,11)(FA(K),RB(KK,K),RC(KK,K),RD(KK,K),RE(KK,K),RF(KK,K),
1TU(KK,K),KT(KK,K),K=1,2),FF(KK)
365 FF(KK)=FF(KK)**BAMEX
IF (IFC(KK)) 3651,3650,3651
3651 FF(KK)=1.0E+10

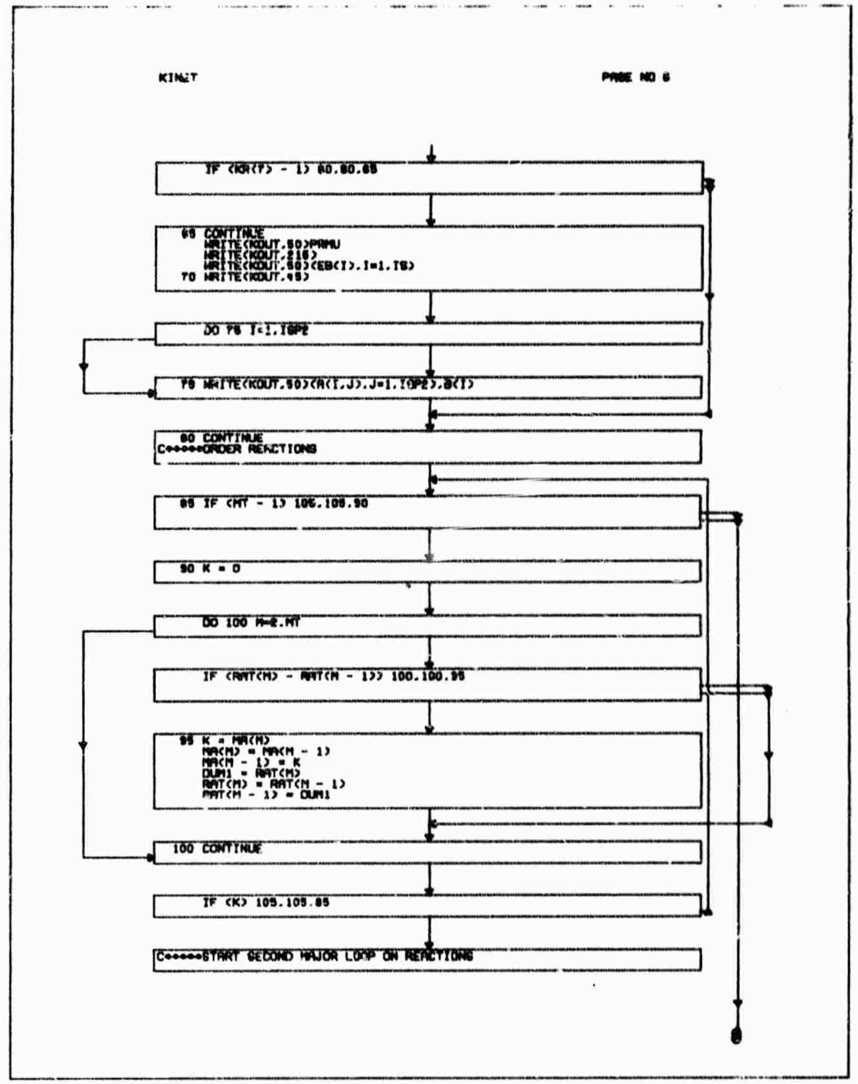

INPUTINPU1660
PAGE NO 10
3650 FAMOA(KK)=AMOA
FAMOB(KK) = AMOB
LAM1(KK) = LAMKK
WTM(KK) = WT
RB(KK,1) = RB(KK,1) + RA(1)
RB(KK,2) = RB(KK,2) + RA(2)
N = N + 1
IF (N-175) 366,368,368
366 NEX=N-175
WRITE(KOUT,367)NEX
367 FORMAT(////11H THERE ARE I2,16H EXCESS SPECIES)
STOP
368 CONTINUE
IF(KK-15) 55,370,55
370 CONTINUE
375 YN(N+1) =0.
TF(N+1)=0.
IFC(N+1)=-1
WTM(N+1)=-1.
FAMOA(N+1)=CHAR
FAMOB(N+1)=BLANK
390 RETURN
END

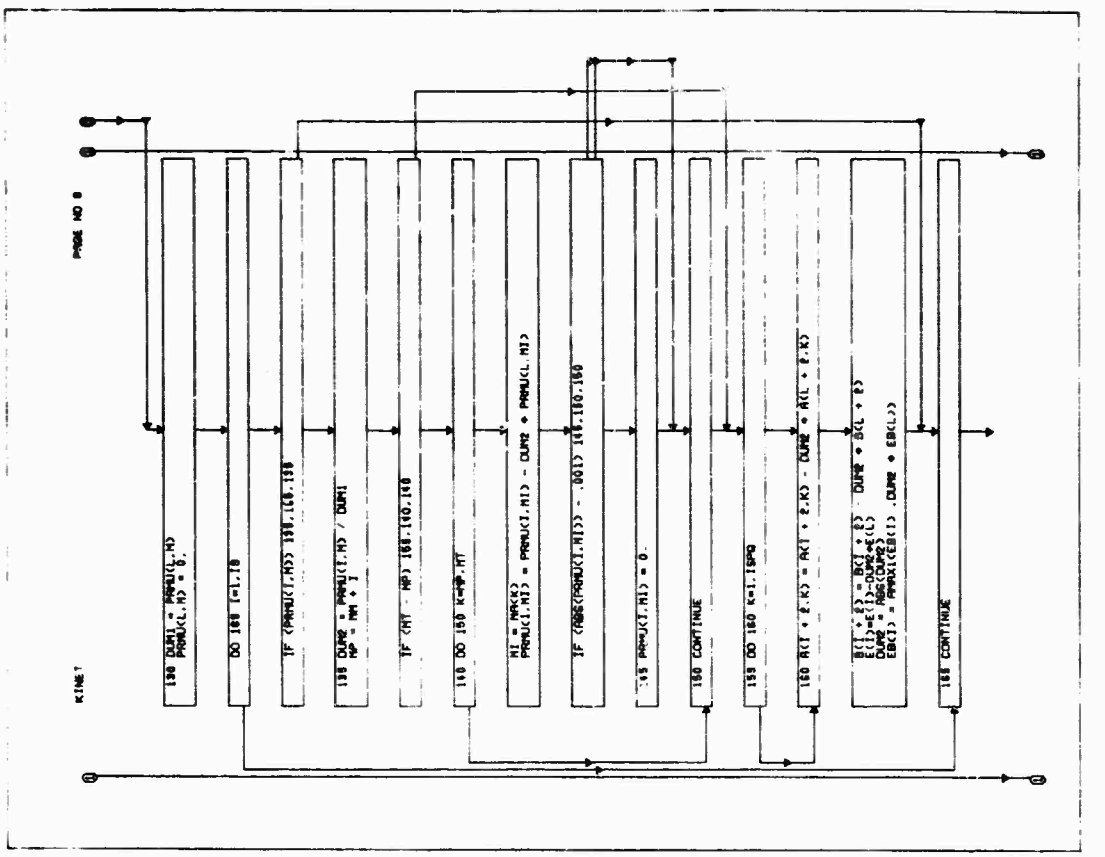

KINET
PAGE NO 1
SUBROUTINE KINET
SEE THE FULL LISTING OF THIS ROUTINE FOR--
♦ DIMENSION STATEMENTS
♦ COMMON STATEMENTS
♦ INCLUDE STATEMENTS
♦ EQUIVALENCE STATEMENTS
♦ DATA STATEMENTS
KINET
PAGE NO 2

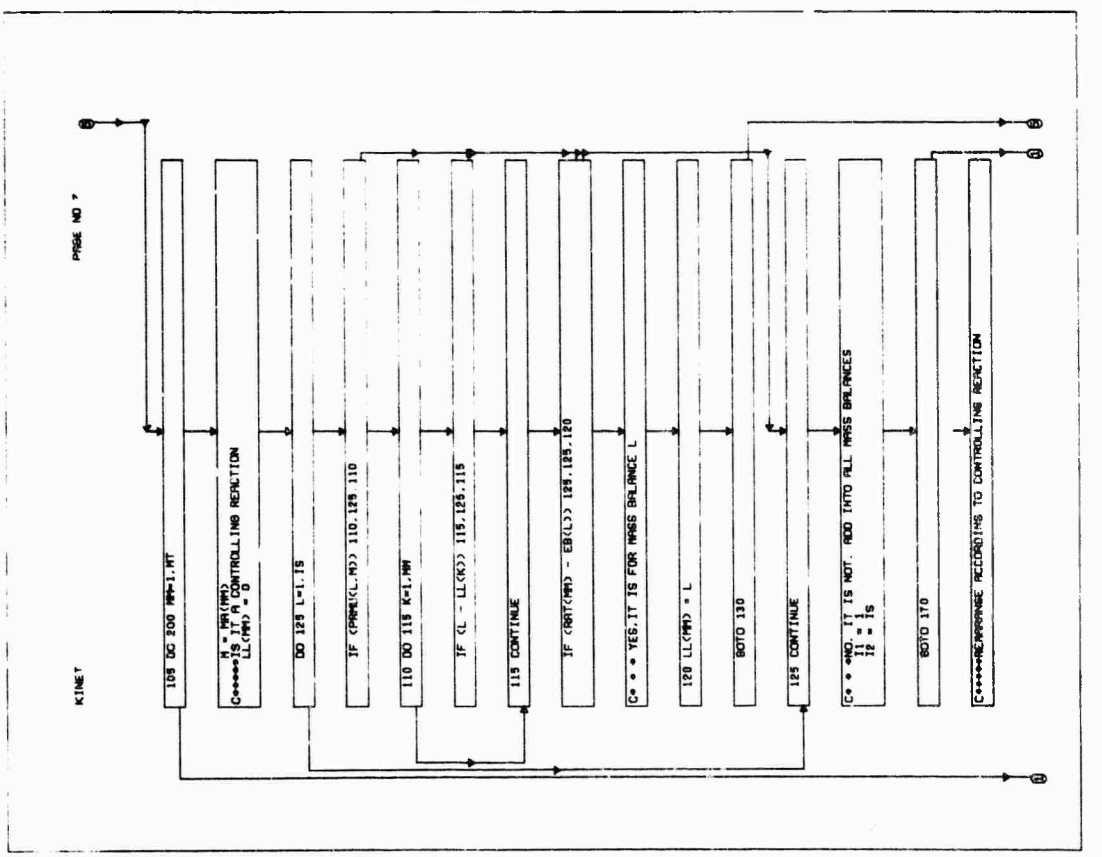

KINET
PAGE NO 3
415 FORMAT(8F10 6)
333 WRITE(KOUT.3331)
3331 FORMAT(/3X.7HSPECIES./4X.10HINHIBITING./5X7HFACTORS./5X.7HPSI/FKK.
1/)
DO 3332 J=1.IS
3332 WRITE(KOUT.3333) FAMOA(J).FAMOB(J).(PSI(J.I).FKK(J.I).I=1.MT)
3333 FORMAT(5X2A4 2X.10(F5.2.1H/.F5.2)/(15X.10(F5.2.1H/.F5.2)))
3330 DO 403 M=1.MT
PPX(M)=1.0
FFX(M)=1.0
DO 402 J=1.IS
PPX(M)=PPX(M)+PSI(J.M)*VN(J)
402 FFX(M)=FFX(M)+FKK(J.M)*VN(J)
403 FKF(M)=XC(46+M)/(PPX(M)*FFX(M))
GO TO 10
334 KR(9)=3
DO 335 M=1.MT
PPX(M)=1.

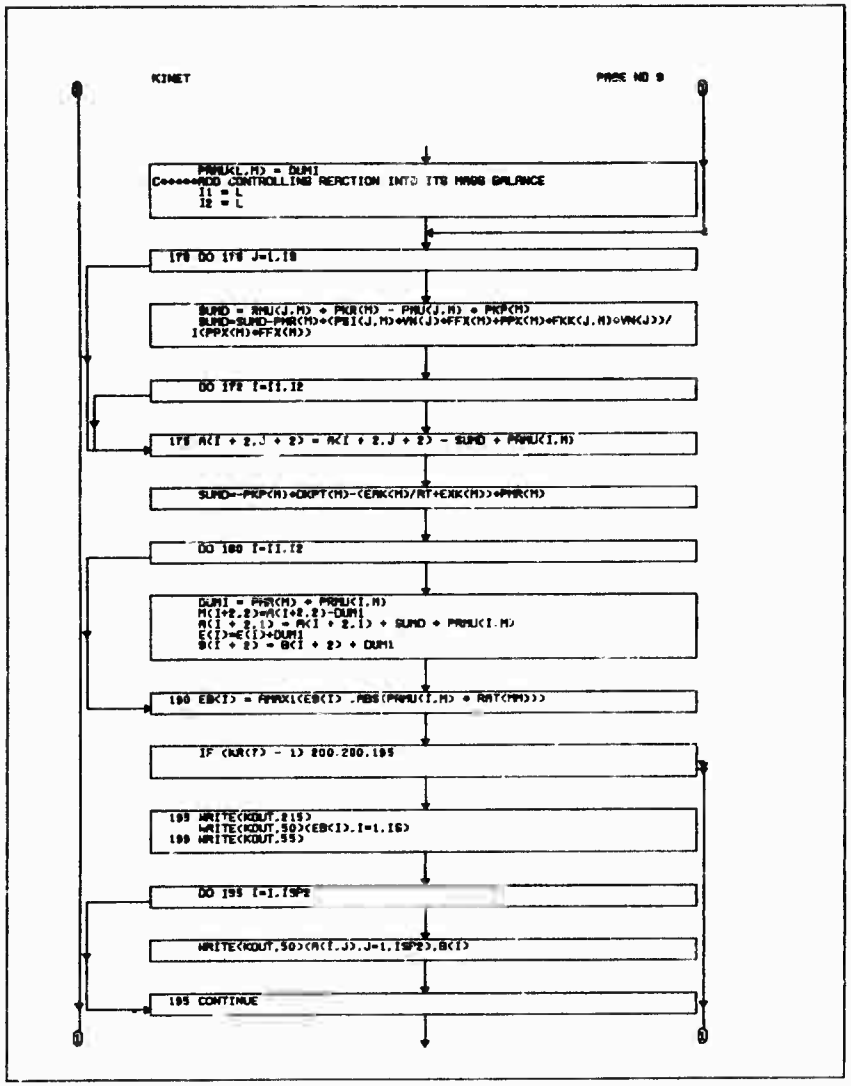

KINET
PAGE NO 4
IF (M.DE.3) GO TO 336
GO TO 335
336 PPX(M)=P
335 CONTINUE
10 RT = 1.9869 * T
DO 40 M=1.MT
SUMD = 0.
SUMK = 0.
SUMR = 0.
SUMP = 0.
DO 15 I=1.IS
IF(IABS(IFC(I))-1) 14.14.11
11 IF(RMU(I.M)) 12.14.12
12 VK1=0.
VK2=0
GO TO 35
14 CONTINUE
PRMU(I.M) = PMU(I.M) - RMU(I.M)
SUMK = SUMK + PRMU(I.M) * VLNK(I)
SUMR = SUMR + RMU(I.M) * Y(I)
SUMP = SUMP + PMU(I.M) * Y(I)
15 SUMD = SUMD + PRMU(I.M) * H(I)

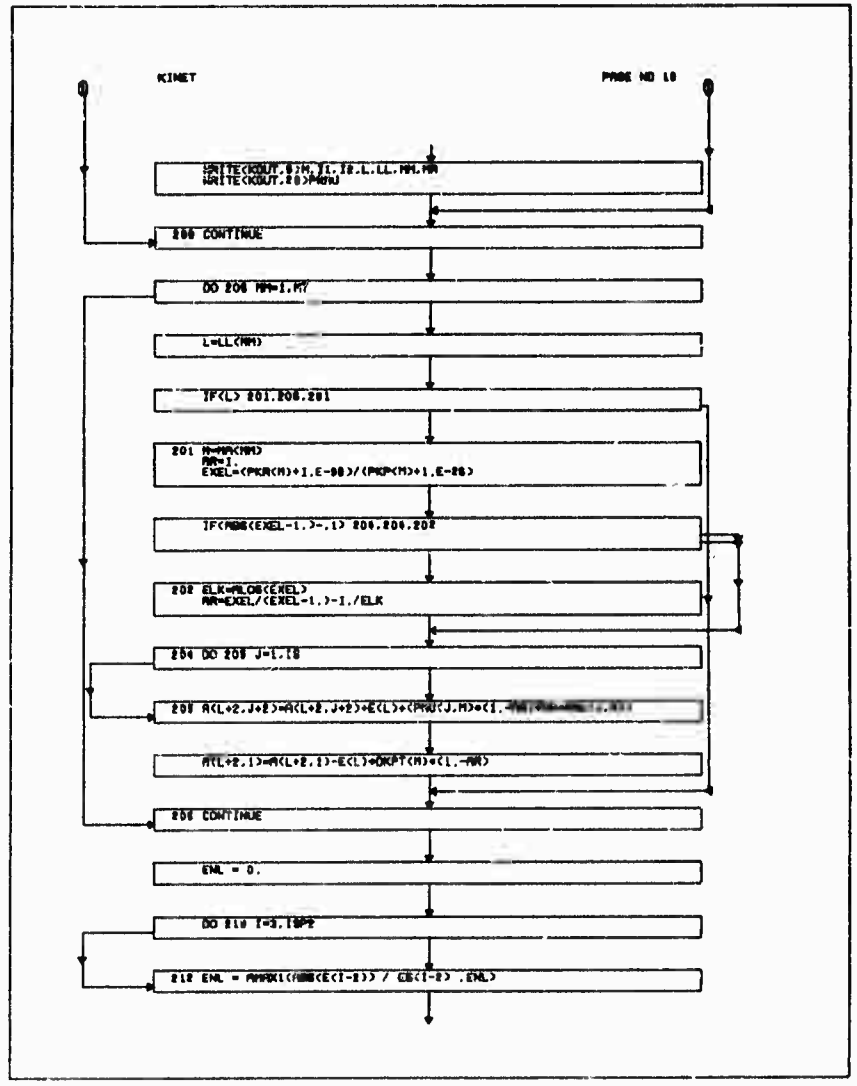

KINET
PAGE NO 5
C EQUILIBRIUM CONSTANTS FOR KINETIC REACTIONS IN TERMS OF BASE SPECI
C LOG KP-S
C DERIVATIVES OF LOGS OF ABOVE KP-S WITH RESPECT TO LOG T
DKPT(M) = SUMD / RT
C RIGHT HAND SIDE (OR REVERSE PART) OF DRIVING POTENTIAL
PKP(M) = EXP(SUMP - SUMK)
C LEFT HAND SIDE (OR FORWARD PART) OF DRIVING POTENTIAL
PKR(M) = EXP(SUMR)
VK1 = PKR(M) - PKP(M)
IF (VK1) 25.20.25
20 VK1 = 1.E - 9 * PKR(M)
25 CONTINUE
VK2=AA*FKF(M)*T**EXK(M)*EXP(-EAK(M)/RT)
C PM TIMES FORWARD RATE OF REACION I (PM=AA)
35 PMR(M) = VK2 * VK1
PKP(M)=PKP(M)*VK2
PKR(M)=PKR(M)*VK2
RAT(M)=AMAX1(PKP(M).PKR(M))
IF(KR(7)-1) 40.40.36
36 IF(M-1) 37.37.39
37 WRITE(KOUT.38)
38 FORMAT(2X1HM7X3HLKC6X8HDLKP/DLT6X4HPMRR8X4HPMRP9X3HPMR9X3HRAT)
39 WRITE(KOUT.41) M.SUMK.DKPT(M).PKR(M).PKP(M).PMR(M).RAT(M)
40 MA(M) = M
41 FORMAT(I3.2X.6E12.5)
45 FORMAT(1X26HA(I.J).B(I).I=1.8.J=1.8 IN)
50 FORMAT(1X12E10.3)
55 FORMAT(1X27HA(I.J).B(I).I=1.8.J=1.8 OUT)
KR7=KR(7)
KR(7)=0


KINET
PAGE NO 6
IF (KR(7) - 1) 80.80.65
65 CONTINUE
WRITE(KOUT.50)PAMU
WRITE(KOUT.216)
WRITE(KOUT.50)(EB(I).I=1.IS)
70 WRITE(KOUT.45)
DO 75 I=1.IGP2
75 WRITE(KOUT.50)(A(I.J).J=1.IGP2).B(I)
80 CONTINUE
C*****ORDER REACTIONS
85 IF (MT - 1) 105.105.90
90 K = 0
DO 100 M=2.MT
IF (RAT(M) - RAT(M - 1)) 100.100.95
95 K = MA(M)
MA(M) = MA(M - 1)
MA(M - 1) = K
DUM1 = RAT(M)
RAT(M) = RAT(M - 1)
RAT(M - 1) = DUM1
100 CONTINUE
IF (K) 105.105.85
C*****START SECOND MAJOR LOOP ON REACTIONS

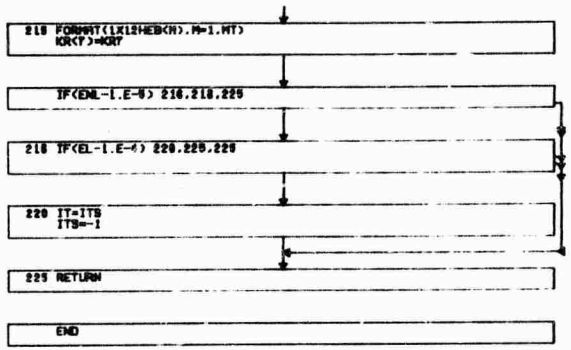

KINET
PASE NO 8
130 DUM1 = PARU(L,M)
PARU(L,M) = 0.
DO 160 I=1,18
IF (PARU(I,M)) 150,160,150
150 DUM2 = PARU(I,M) / DUM1
MP = MM + 1
IF (MT - MP) 160,160,140
160 DO 180 K=MP,MT
NI = NPAR2
PARU(I,NI) = PARU(I,NI) - DUM2 * PARU(L,NI)
IF (ABS(PARU(I,NI)) - .001) 145,160,160
145 PARU(I,NI) = 0.
180 CONTINUE
190 DO 200 K=1,ISPG
200 R(I + 8,K) = R(I + 8,K) - DUM2 * R(L + 8,K)
B(I + 8) = R(I + 8) DUM2 * B(L + 8)
E(I)=E(I)-DUM2*E(L)
DUM2 = ABS(DUM2)
EB(I) = AMAX1(EB(I) ,DUM2 * EB(L))
185 CONTINUE


KINET
PASE NO 7
100 DO 200 MM=1,MT
C*****IS IT A CONTROLLING REACTION
M = MR(MM)
LL(MM) = 0
DO 125 L=1,IS
IF (PARU(L,M)) 110,125,110
110 DO 115 K=1,MM
IF (L - LL(K)) 115,125,115
115 CONTINUE
IF (ABT(MM) - EB(L)) 125,125,120
C* * * YES.IT IS FOR MASS BALANCE L
120 LL(MM) = L
GOTO 130
125 CONTINUE
C* * * NO. IT IS NOT. ADD INTO ALL MASS BALANCES
I1 = 1
I2 = IS
GOTO 170
C*****REARRANGE ACCORDING TO CONTROLLING REACTION

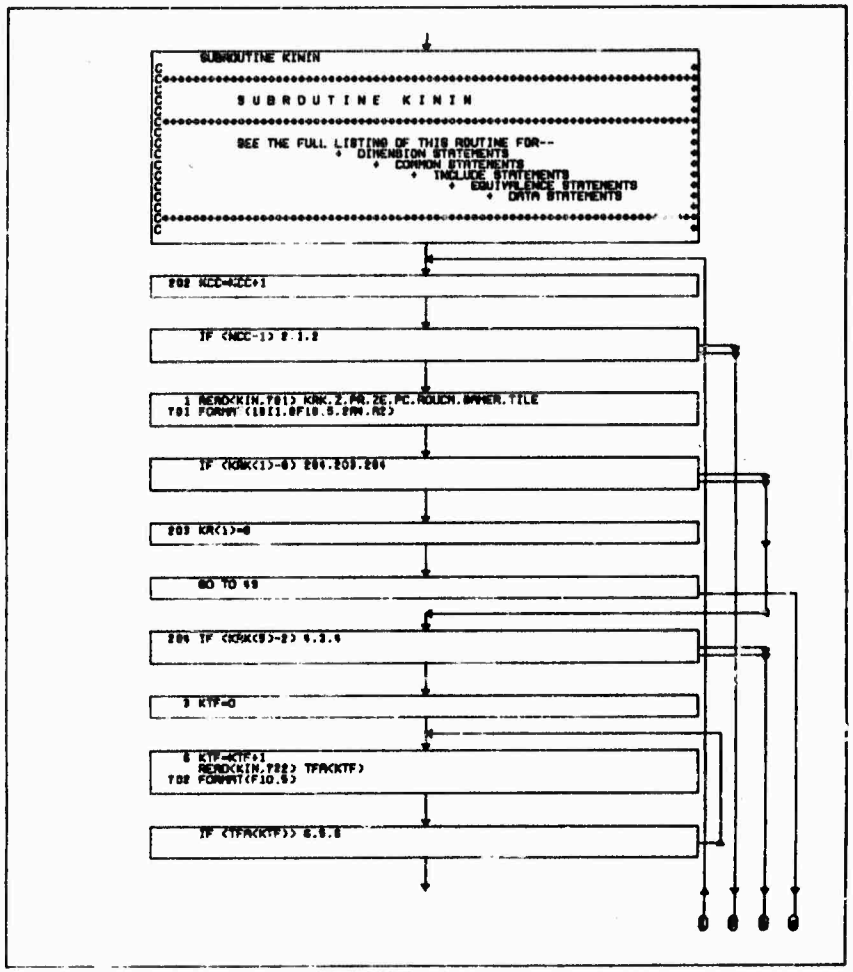

KINET
PAGE NO 9
PMMU(L,M) = DUM1
C*****ADD CONTROLLING REACTION INTO ITS MASS BALANCE
II = L
I2 = L
170 DO 170 J=L,I8
SUMD = RMU(J,M) * PKR(M) - PMU(J,M) * PKP(M)
SUMD=SUMD-PMR(M)*(PBI(J,M)*VN(J)*FFX(M)+PPX(M)*FKK(J,M)*VN(J))/
1(PPX(M)+FFX(M))
DO 172 I=II,I2
172 A(I + 2,J + 2) = A(I + 2,J + 2) - SUMD * PMMU(I,M)
SUMD=-PKP(M)*OKPT(M)-(EAK(M)/RT+EXK(M))*PMR(M)
DO 180 I=II,I2
DUM1 = PMR(M) * PMMU(I,M)
A(I+2,2)=A(I+2,2)-DUM1
A(I + 2,1) = A(I + 2,1) + SUMD * PMMU(I,M)
E(I)=E(I)+DUM1
B(I + 2) = B(I + 2) + DUM1
180 EB(I) = AMAX1(EB(I) ,ABS(PMMU(I,M) * RAT(MM)))
IF (NR(7) - 1) 200,200,185
185 WRITE(KOUT,215)
WRITE(KOUT,50)(EB(I),I=1,I8)
190 WRITE(KOUT,55)
DO 195 I=1,ISP2
WRITE(KOUT,50)(A(I,J),J=1,ISP2),B(I)
195 CONTINUE

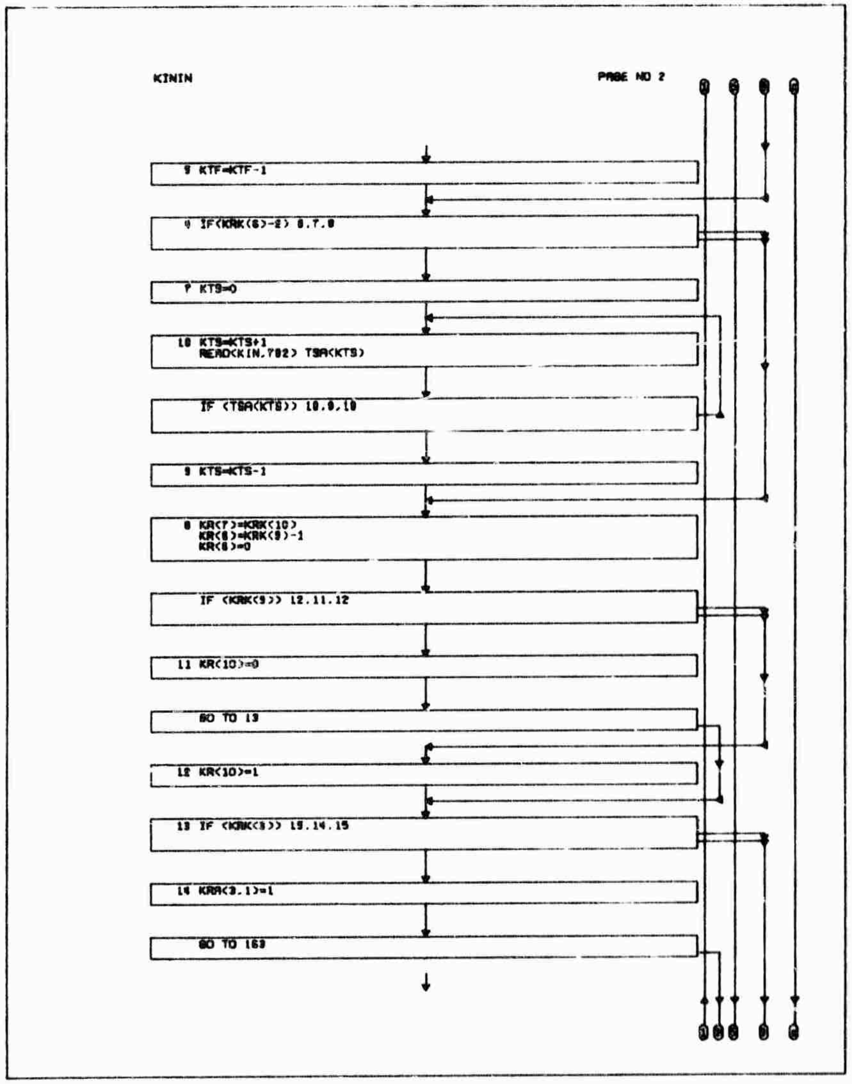

KINET
PAGE NO 10
WRITE(KOUT,8)M,II,I2,L,LL,MM,MA
WRITE(KOUT,20)PMMU
200 CONTINUE
DO 206 MM=1,MT
L=LL(MM)
IF(L) 201,206,201
201 M=MA(MM)
MA=1.
EXEL=(PKR(M)+1.E-98)/(PKP(M)+1.E-26)
IF(ABS(EXEL-1.)-.1) 206,206,202
202 ELK=ALOG(EXEL)
MA=EXEL/(EXEL-1.)-1./ELK
204 DO 205 J=1,I8
205 A(L+2,J+2)=A(L+2,J+2)+E(L)*(PMU(J,M)*(1.-MA
A(L+2,1)=A(L+2,1)-E(L)*OKPT(M)*(1.-MA)
206 CONTINUE
EML = 0.
DO 210 I=3,ISP2
210 EML = AMAX1(ABS(E(I-2)) / EB(I-2) ,EML)

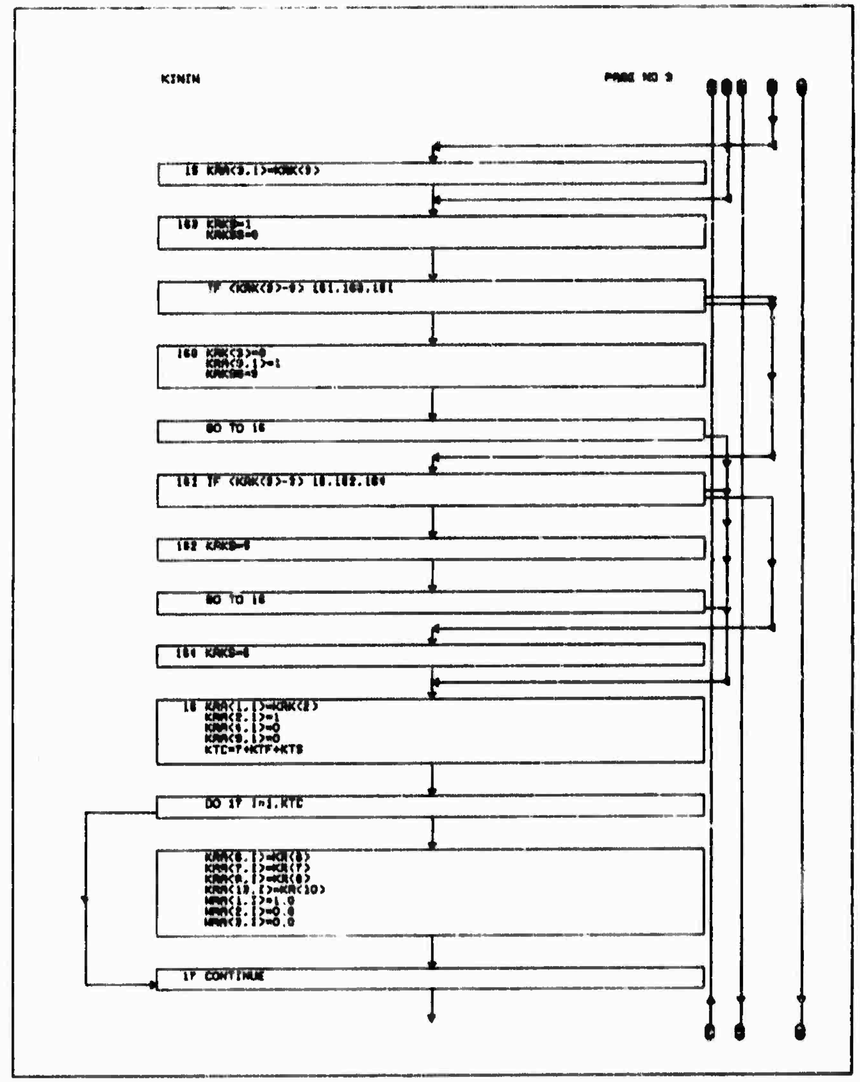
KINET PAGE NO 11

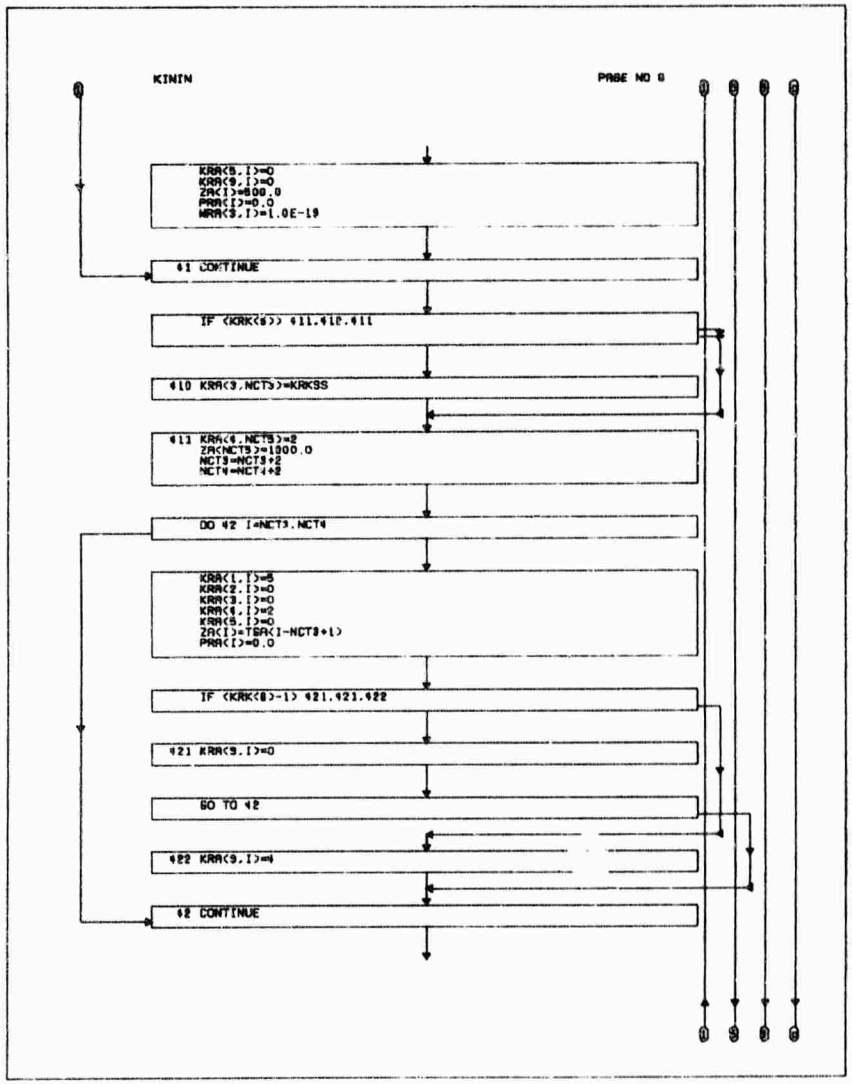


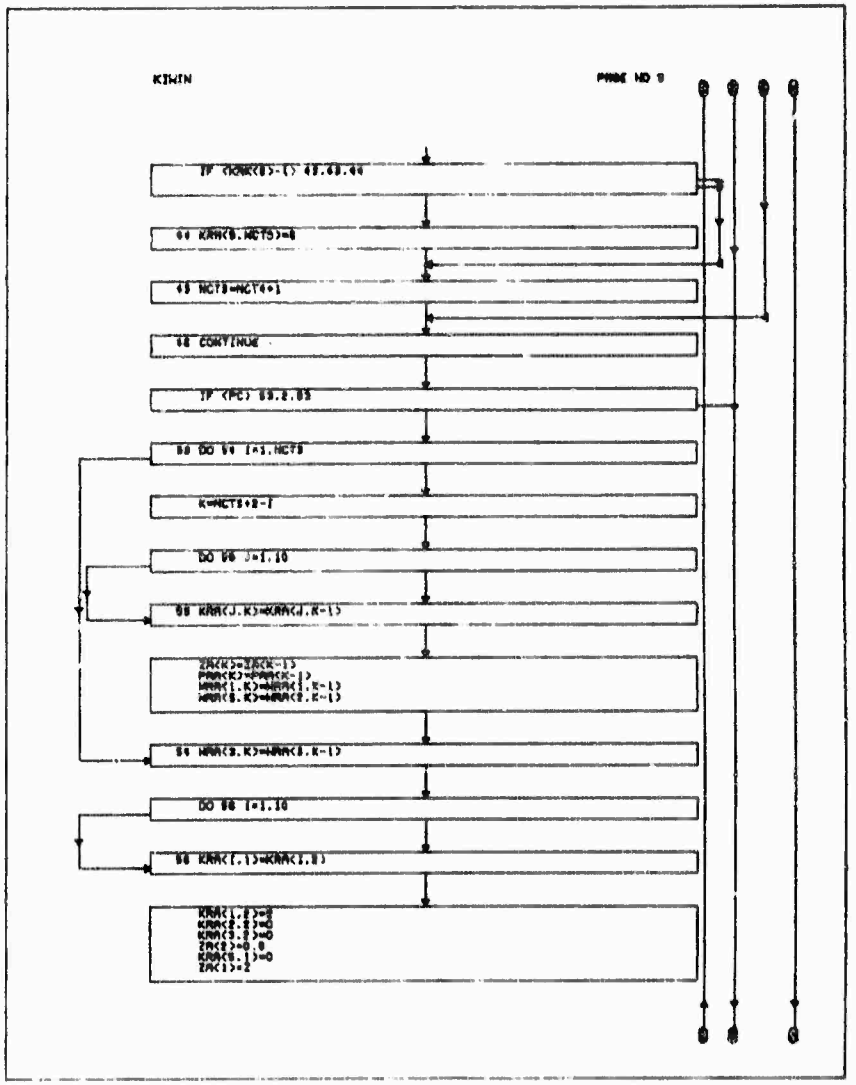
KININ PAGE NO 1

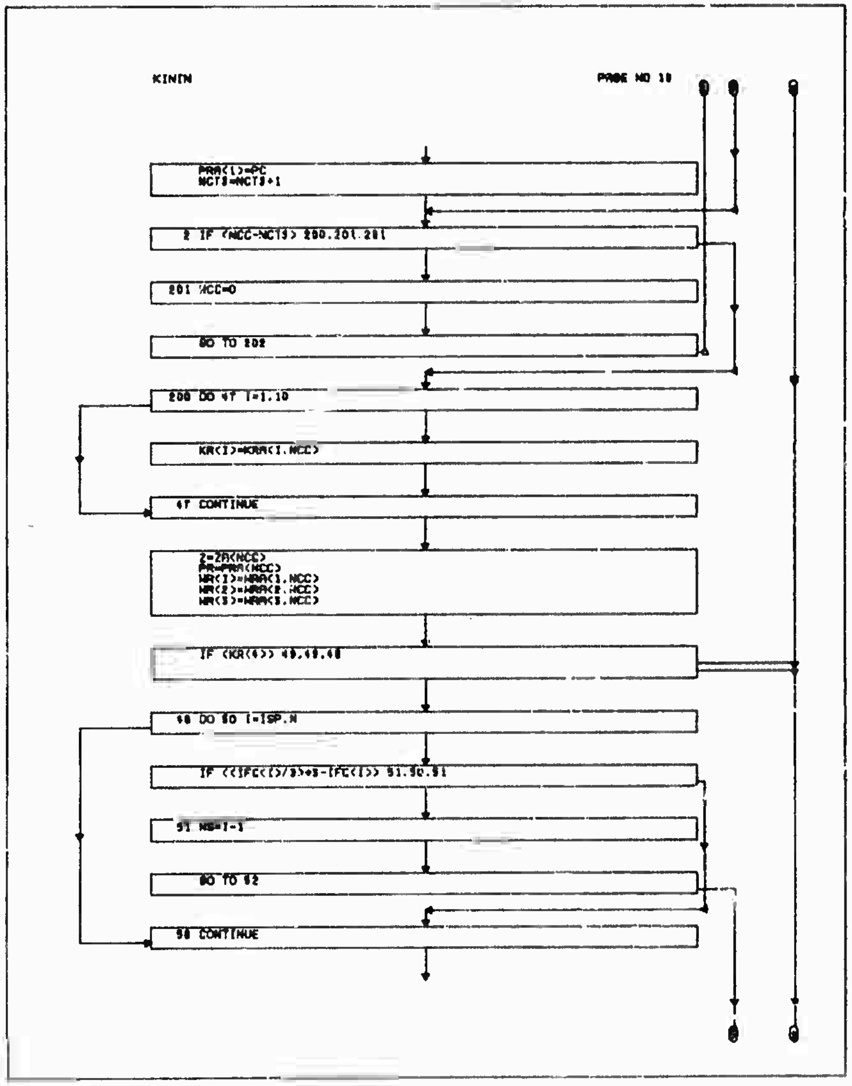


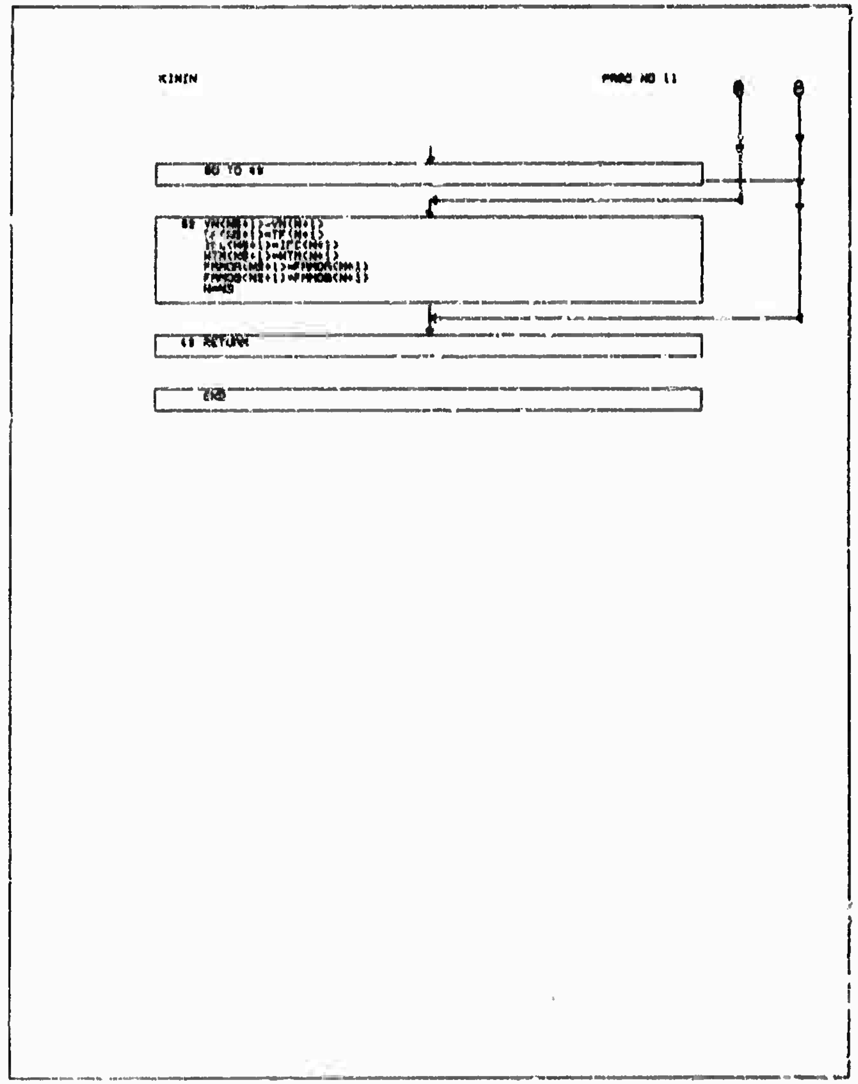

KININ
PAGE NO 2
5 KTF=KTF-1
6 IF(KRK(6)-2) 8,7,8
7 KTS=0
10 KTS=KTS+1
READ(KIN,782) TSA(KTS)
IF (TSA(KTS)) 10,9,10
9 KTS=KTS-1
8 KR(7)=KRK(10)
KR(8)=KRK(8)-1
KR(6)=0
IF (KRK(9)) 12,11,12
11 KR(10)=0
GO TO 13
12 KR(10)=1
13 IF (KRK(8)) 15,14,15
14 KRA(3,1)=1
GO TO 169

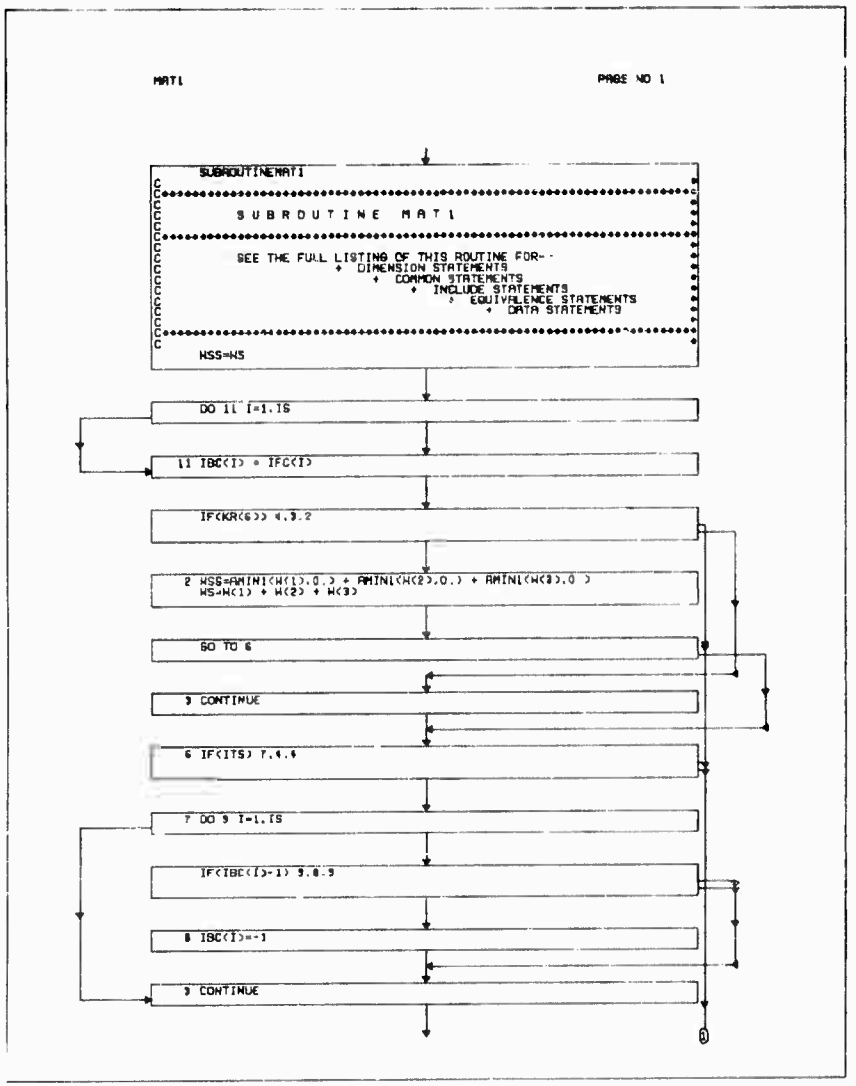

KININ
PAGE NO 3
GO TO 16
GO TO 16
DO 17 I=1,KTC
KTC=7+KTF+KTS
17 CONTINUE

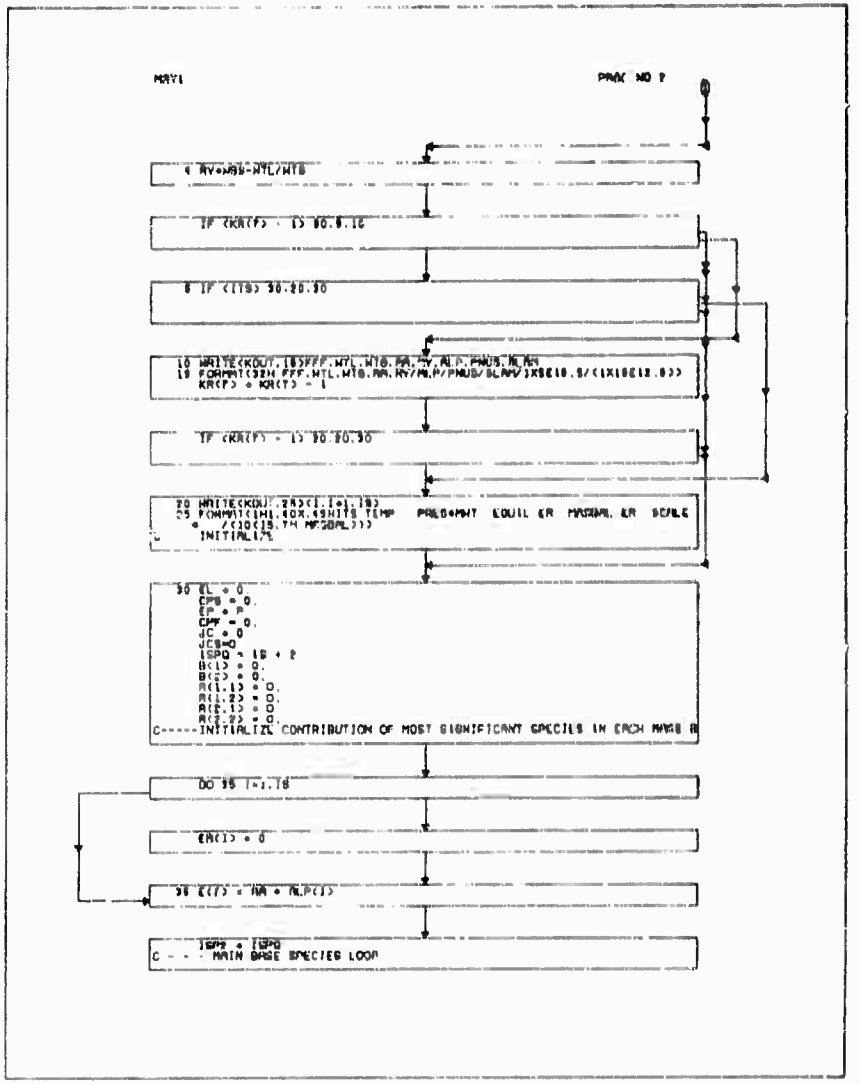

KININ
PAGE NO 8
KRK(5,I)=0
KRK(9,I)=0
ZK(I)=600.0
PRK(I)=0.0
MRK(3,I)=1.0E-19
411 CONTINUE
IF (KRK(6)) 411,410,411
410 KRK(3,NCT5)=KRKSS
411 KRK(4,NCT5)=2
ZK(NCT5)=1800.0
NCT3=NCT3+2
NCT4=NCT4+2
DO 42 I=NCT3,NCT4
KRK(1,I)=6
KRK(2,I)=0
KRK(3,I)=0
KRK(4,I)=2
KRK(5,I)=0
ZK(I)=TBK(I-NCT3+1)
PRK(I)=0.0
IF (KRK(6)-1) 421,421,422
421 KRK(9,I)=0
GO TO 42
422 KRK(9,I)=4
42 CONTINUE

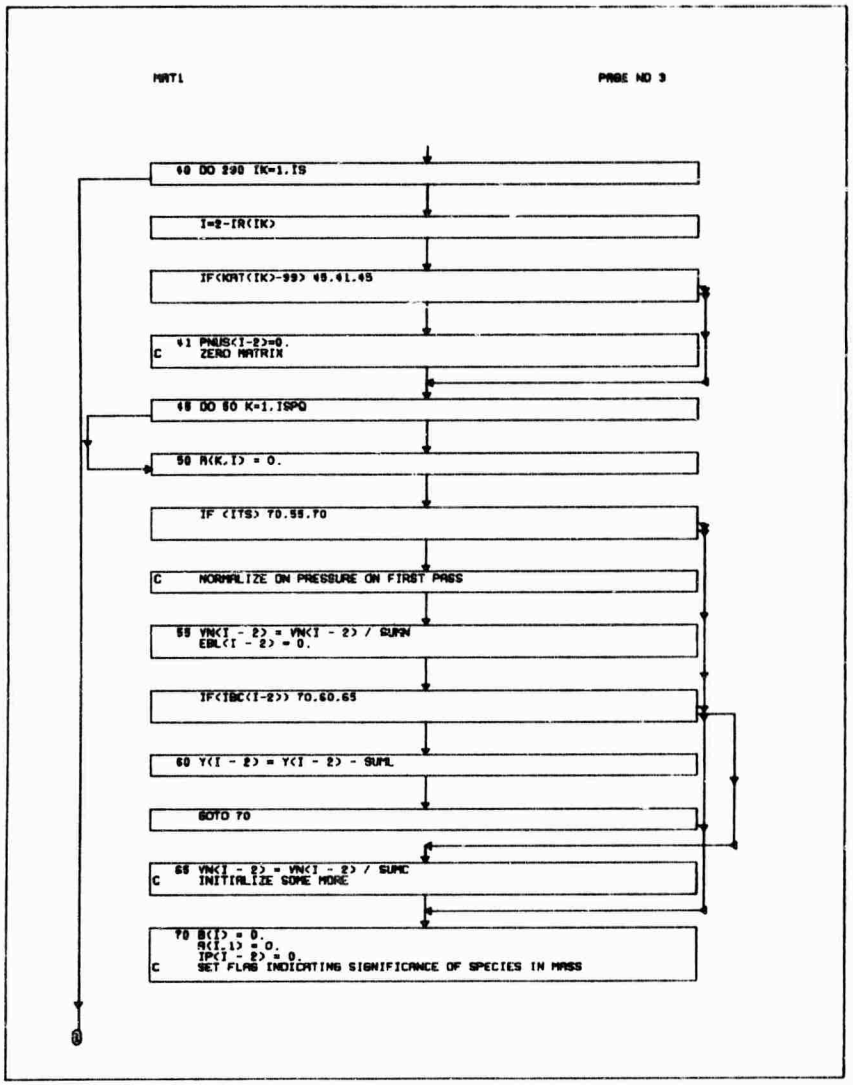

KININ
PAGE NO 9
IF (KRK(8)-1) 48,48,44
44 KRK(8,NCT5)=0
45 NCT5=NCT4+1
46 CONTINUE
IF (PC) 65,2,65
50 DO 54 I=1,NCT5
K=NCT5+2-I
DO 50 J=1,10
50 KRK(J,K)=KRK(J,K-1)
ZK(K)=ZK(K-1)
PRK(K)=PRK(K-1)
MRK(1,K)=MRK(1,K-1)
MRK(8,K)=MRK(8,K-1)
54 MRK(3,K)=MRK(3,K-1)
DO 58 I=1,10
58 KRK(I,1)=KRK(I,3)
KRK(1,2)=3
KRK(2,2)=0
KRK(3,2)=0
ZK(2)=0.0
KRK(9,1)=0
ZK(1)=2

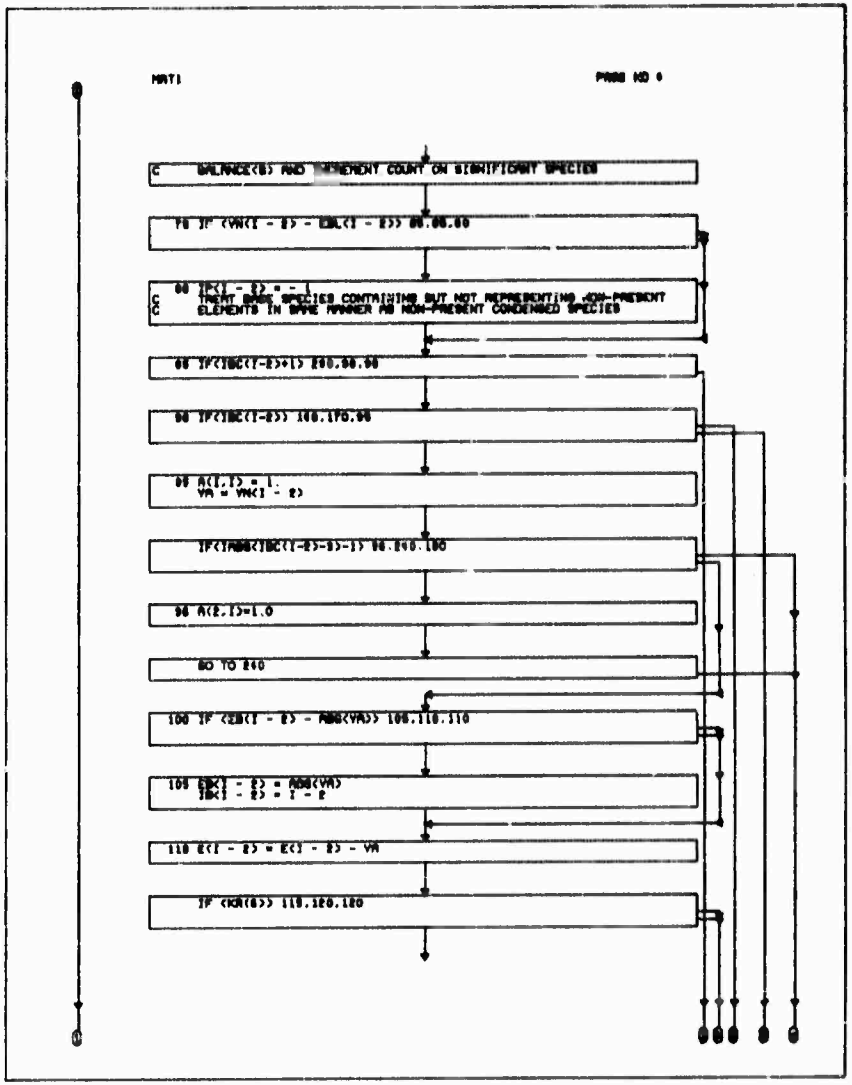

KININ
PAGE NO 10
PRA(1)=PC
NCTS=NCTS+1
2 IF (NCC-NCTS) 200,201,201
201 NCC=0
GO TO 202
200 DO 47 I=1,10
KR(I)=KRA(I,NCC)
47 CONTINUE
Z=ZA(NCC)
PR=PRA(NCC)
NR(1)=NRA(1,NCC)
NR(2)=NRA(2,NCC)
NR(3)=NRA(3,NCC)
IF (KR(4)) 49,48,48
48 DO 50 I=ISP,N
IF ((IFC((I/3)*3-IFC(I)) 51,50,51
51 NS=I-1
GO TO 52
50 CONTINUE

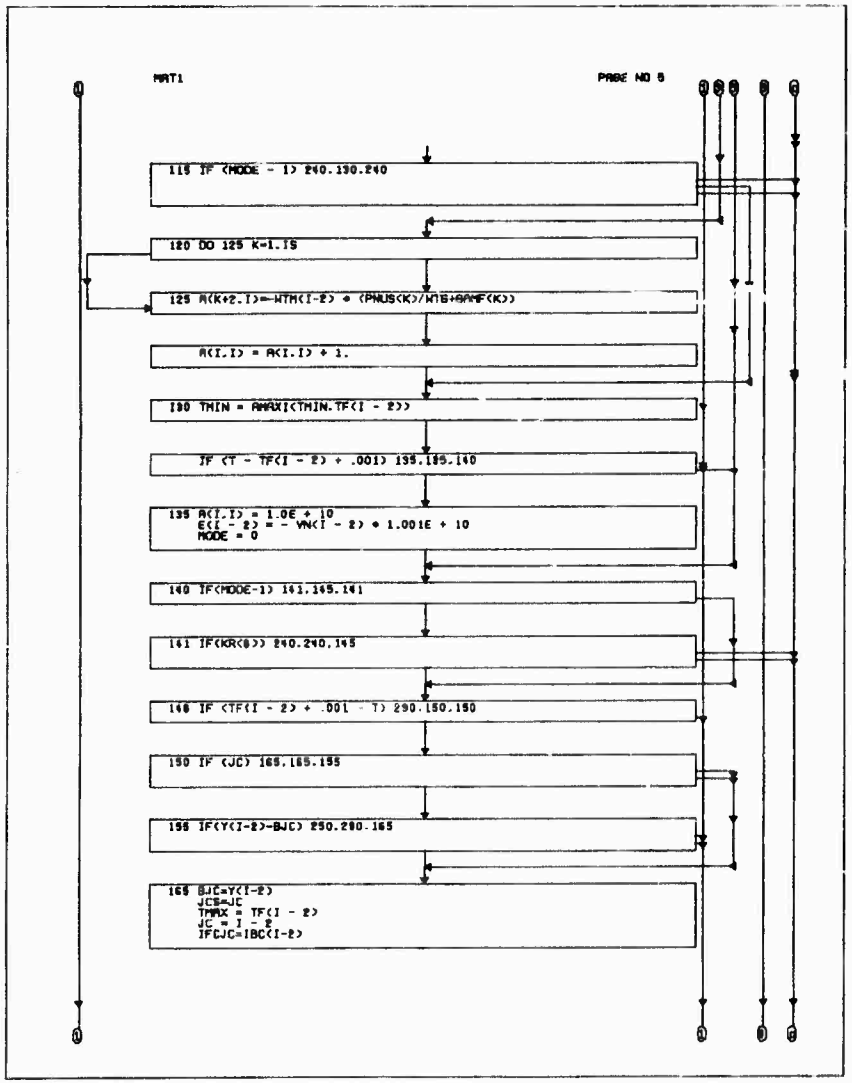

KININ
PAGE NO 11
GO TO 49
49 RETURN
END

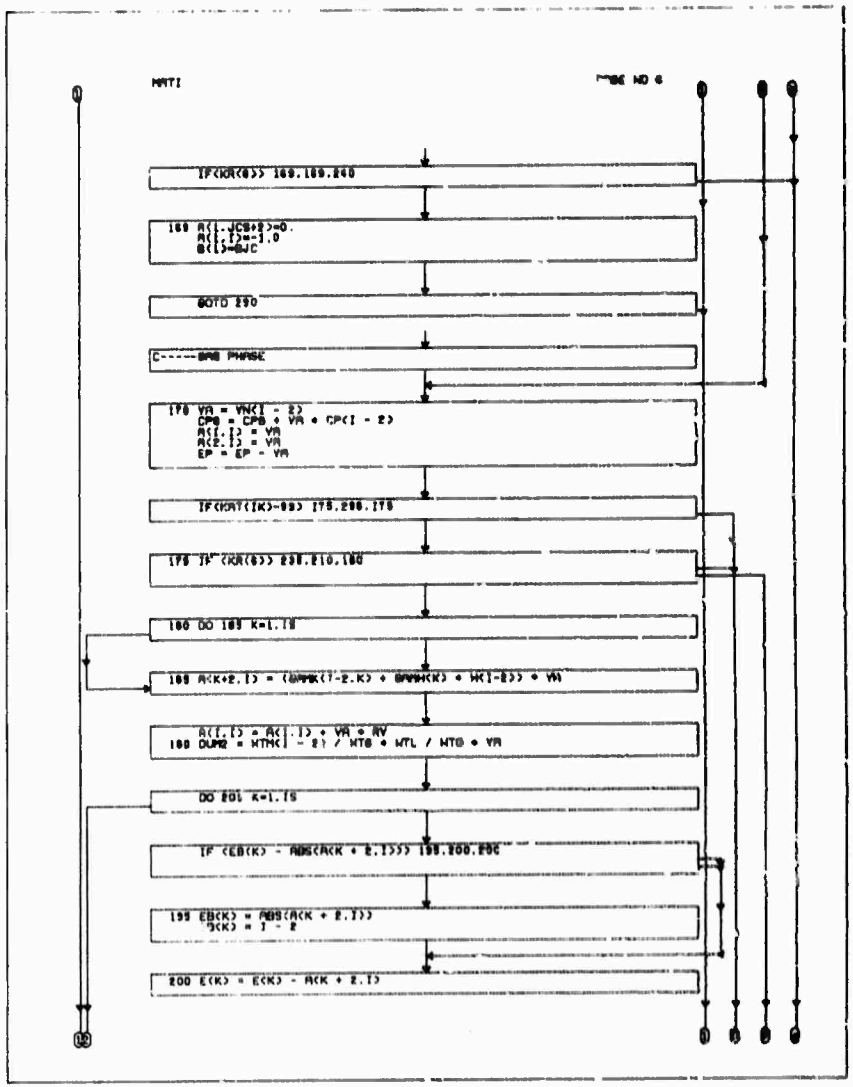

MAT1
PAGE NO 1
SUBROUTINEMAT1
S U B R O U T I N E M A T 1
SEE THE FULL LISTING OF THIS ROUTINE FOR--
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
NSS=NS
DO 11 I=1,IS
11 IBC(I) = IFC(I)
IF(KR(6)) 4,3,2
2 NSS=AMINI(W(1),0.) + AMINI(W(2),0.) + AMINI(W(3),0.)
NS=W(1) + W(2) + W(3)
GO TO 6
3 CONTINUE
6 IF(ITS) 7,4,4
7 DO 9 I=1,IS
IF(IBC(I)-1) 9,8,9
8 IBC(I)=-1
9 CONTINUE

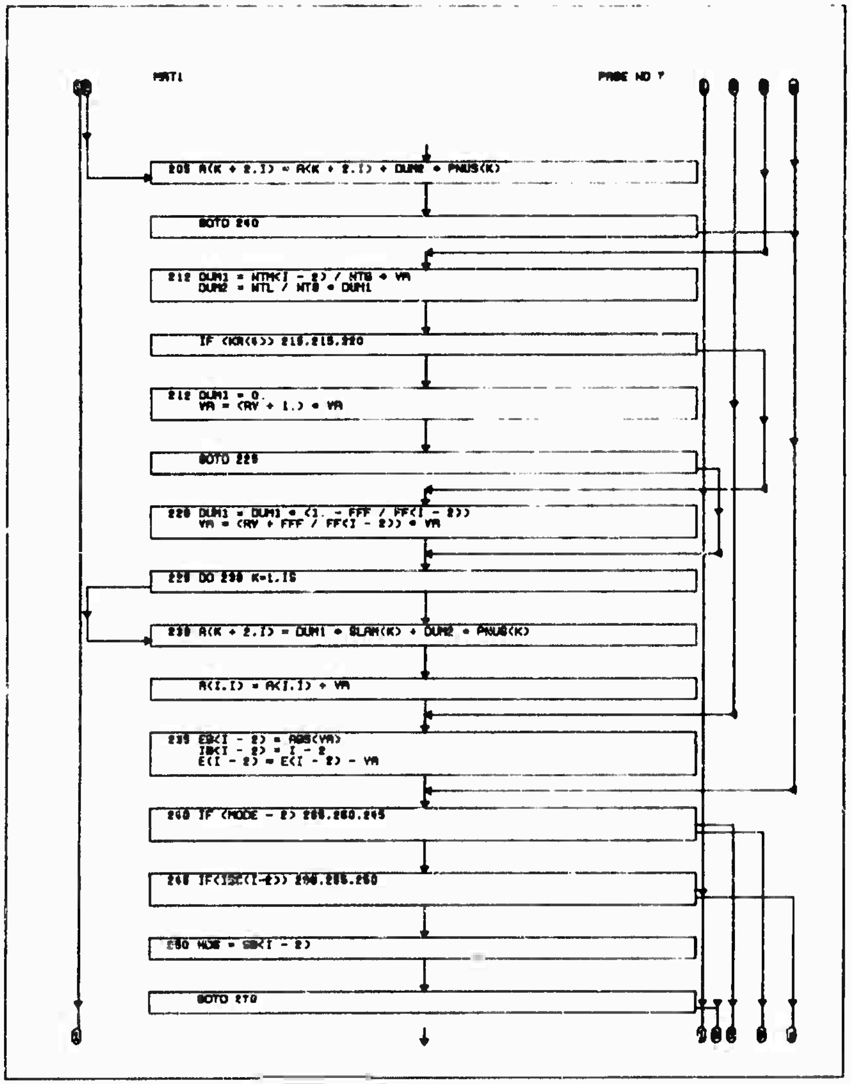

MAT1
PAGE NO 2
C AV=AVO-ATL/WTB
IF (KR(7) - 1) 80,8,16
8 IF (ITS) 30,20,30
10 WRITE(KOUT,15)FFF,ATL,WTB,AA,AV,ALP,AMUS,AL,AA
15 FORMAT(32H FFF,ATL,WTB,AA,AV,ALP,AMUS,AL,AA/1X5E18.8/(1X10E12.8))
KR(7) = KR(7) - 1
IF (KR(7) - 1) 90,80,90
20 WRITE(KOUT,25)(I,I=1,IS)
25 FORMAT(1H1,40X,49HITS TEMP PRESSURE EQUIL ER MASSAL ER SCALE
+ /(10(I9,7H MFSCAL)))
INITIALIZE
30 EL = 0.
CPS = 0.
EP = P
CAV = 0.
JC = 0
JCS=0
LSPO = IS + 2
B(1) = 0.
B(2) = 0.
A(1,1) = 0.
A(1,2) = 0.
A(2,1) = 0.
A(2,2) = 0.
C-----INITIALIZE CONTRIBUTION OF MOST SIGNIFICANT SPECIES IN EACH MASS R
DO 35 I=1,IS
EM(I) = 0
35 E(I) = AA * AL*P(I)
LSP2 = LSPO
C - - - MAIN BASE SPECIES LOOP

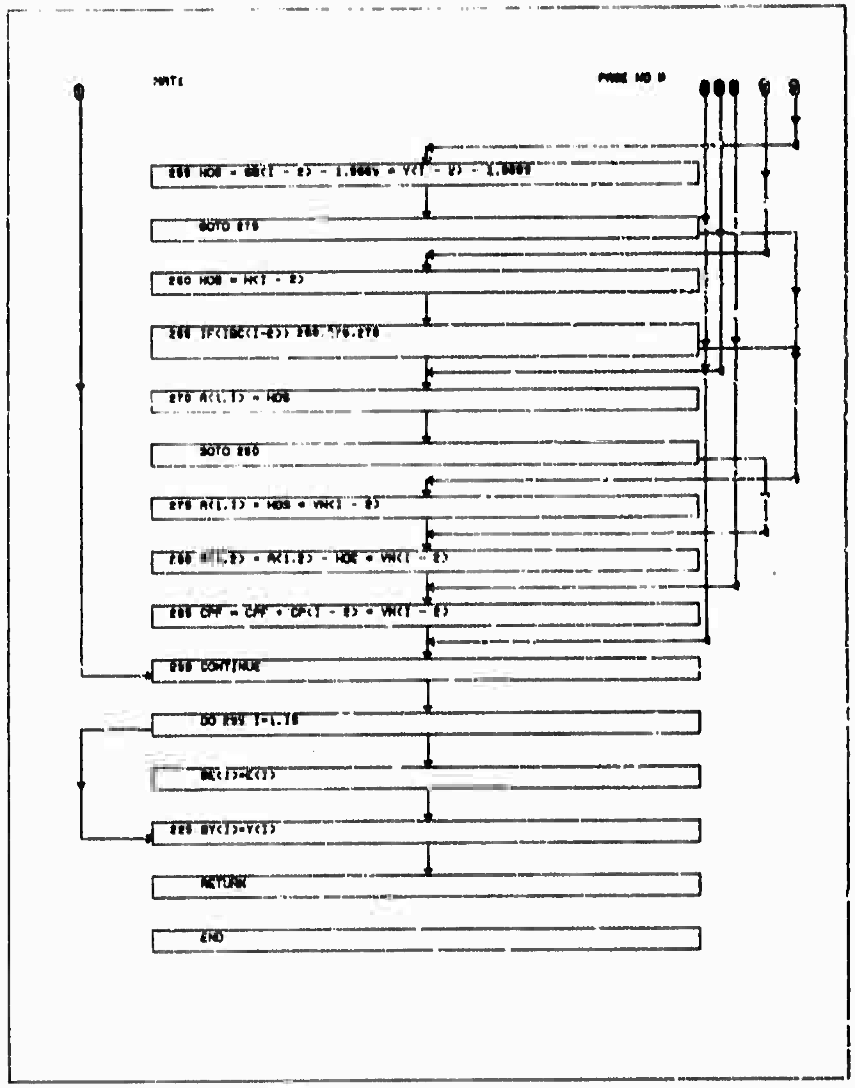

MAT1
PAGE NO 3
40 DO 290 IK=1,IS
I=2-IR(IK)
IF(KAT(IK)-99) 45,41,45
41 PNUS(I-2)=0.
C ZERO MATRIX
45 DO 80 K=1,ISPQ
50 A(K,I) = 0.
IF (ITS) 70,55,70
C NORMALIZE ON PRESSURE ON FIRST PASS
55 VN(I - 2) = VN(I - 2) / SUMN
EBL(I - 2) = 0.
IF(IBC(I-2)) 70,60,65
60 Y(I - 2) = Y(I - 2) - SUML
GOTO 70
65 VN(I - 2) = VN(I - 2) / SUMC
C INITIALIZE SOME MORE
70 B(I) = 0.
A(I,1) = 0.
IP(I - 2) = 0
C SET FLAG INDICATING SIGNIFICANCE OF SPECIES IN MASS

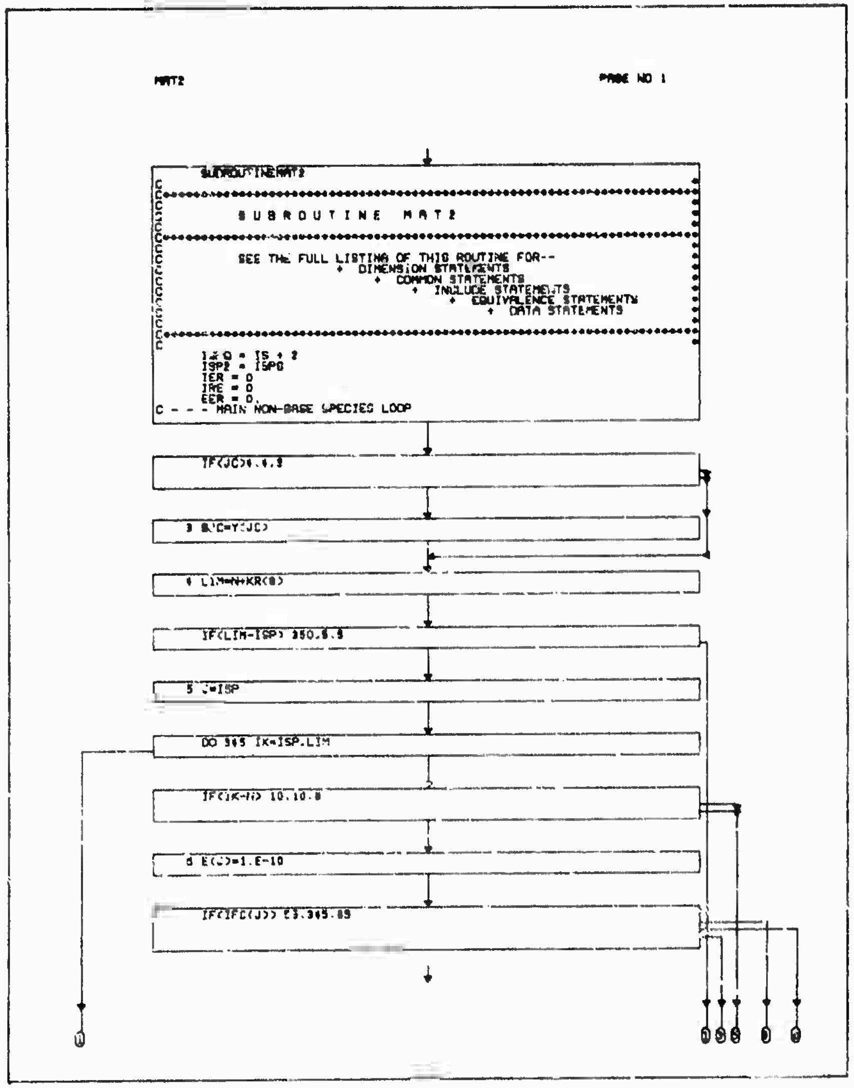

MAT1
PAGE NO 4
C BALANCE(B) AND ELEMENT COUNT ON SIGNIFICANT SPECIES
70 IF (VN(I - 2) - EBL(I - 2)) 80,80,60
60 IP(I - 2) = 1
C INERT BASE SPECIES CONTAINING BUT NOT REPRESENTING NON-PRESENT
C ELEMENTS IN SAME MANNER AS NON-PRESENT CONDENSED SPECIES
80 IF(IBC(I-2)+1) 100,90,90
90 IF(IBC(I-2)) 100,170,90
95 A(I,I) = 1.
VA = VN(I - 2)
IF(IABS(IBC(I-2)-2)-1) 96,140,100
96 A(2,I)=1.0
GO TO 140
100 IF (EBL(I - 2) - ABS(VA)) 105,110,110
105 EBL(I - 2) = ABS(VA)
IBC(I - 2) = I - 2
110 B(I - 2) = B(I - 2) - VA
IF (KR(8)) 110,120,120

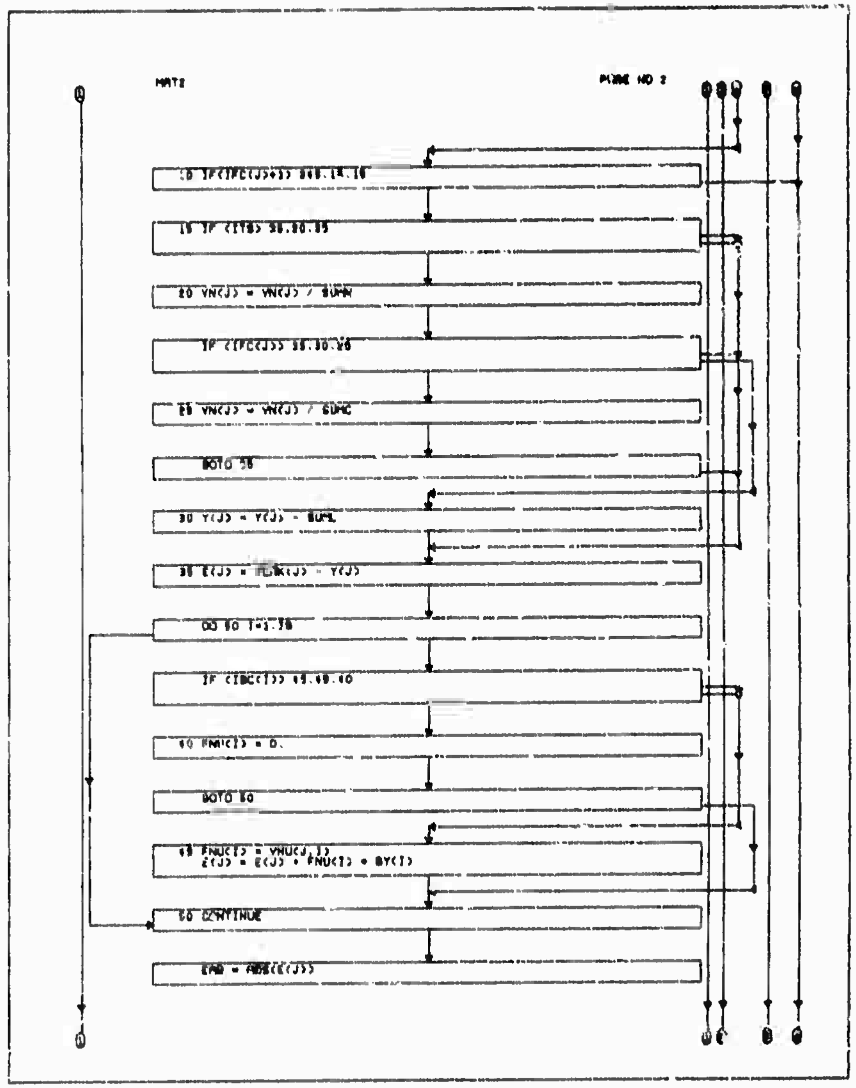

MAT1
PAGE NO 5
115 IF (MODE - 1) 240,130,240
120 DO 125 K=1,15
125 A(K+2,I)=-WTM(I-2) * (PNUS(K)/WTB+BAMF(K))
A(I,I) = A(I,I) + 1.
130 TMIN = AMAX1(TMIN,TF(I - 2))
IF (T - TF(I - 2) + .001) 135,135,140
135 A(I,I) = 1.0E + 10
E(I - 2) = - VN(I - 2) * 1.001E + 10
MODE = 0
140 IF(MODE-1) 141,145,141
141 IF(KR(8)) 240,240,145
146 IF (TF(I - 2) + .001 - T) 290,150,150
150 IF (JC) 165,165,155
155 IF(Y(I-2)-BJC) 250,290,165
165 BJC=Y(I-2)
JCB=JC
TMAX = TF(I - 2)
JC = I - 2
IF(JC-IBC(I-2)

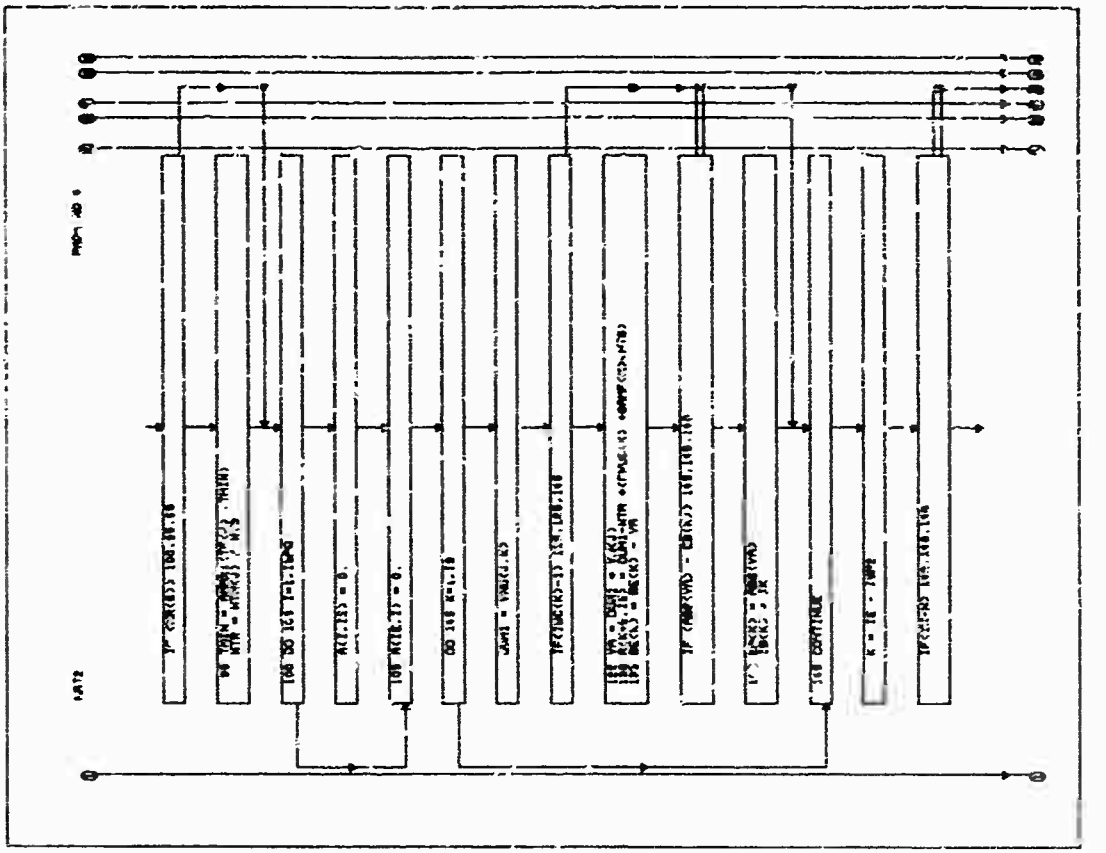

MAT1
PAGE NO 6
IF(KR(8)) 169,169,240
169 A(I,JCB+2)=0.
A(I,I)=1.0
B(I)=BJC
GOTO 290
C-----BAR PHASE
170 VA = VN(I - 2)
CP8 = CP8 + VA * CP(I - 2)
A(I,I) = VA
A(2,I) = VA
EP = EP - VA
IF(KAT(IK)-88) 178,288,178
175 IF (KR(8)) 238,210,180
180 DO 185 K=1,15
185 A(K+2,I) = (BMAK(I-2,K) + BAMA(K) * WK(I-2)) * VA
A(I,I) = A(I,I) + VA * AV
185 DUM2 = WTM(I - 2) / WTB * WTL / WTB * VA
DO 201 K=1,15
IF (EB(K) - ABS(A(K + 2,I))) 195,200,200
195 EB(K) = ABS(A(K + 2,I))
JC(K) = I - 2
200 E(K) = E(K) - A(K + 2,I)

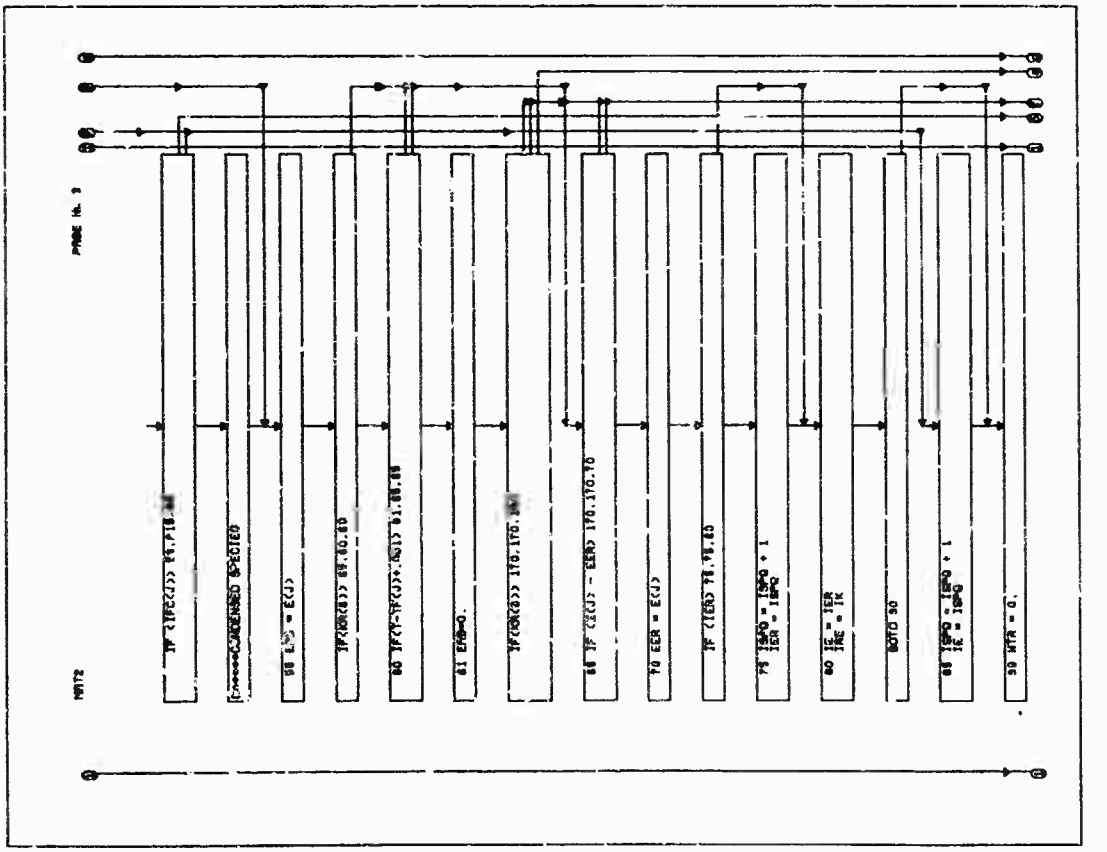

MAT1
PAGE NO 7
205 A(K + 2.I) = A(K + 2.I) + DUM2 * PNUS(K)
GOTO 240
212 DUM1 = NTM(I - 2) / NTB * VA
DUM2 = NTL / NTB * DUM1
IF (KR(4)) 215.215.220
212 DUM1 = 0.
VA = (RV + 1.) * VA
GOTO 225
220 DUM1 = DUM1 * (1. - FFF / FF(I - 2))
VA = (RV + FFF / FF(I - 2)) * VA
225 DO 230 K=1.15
230 A(K + 2.I) = DUM1 * SLAM(K) + DUM2 * PNUS(K)
A(I.I) = A(I.I) + VA
235 EB(I - 2) = ABS(VA)
IB(I - 2) = I - 2
E(I - 2) = E(I - 2) - VA
240 IF (MODE - 2) 255.250.245
245 IF(ISC(I-2)) 250.255.250
250 HOS = SB(I - 2)
GOTO 270

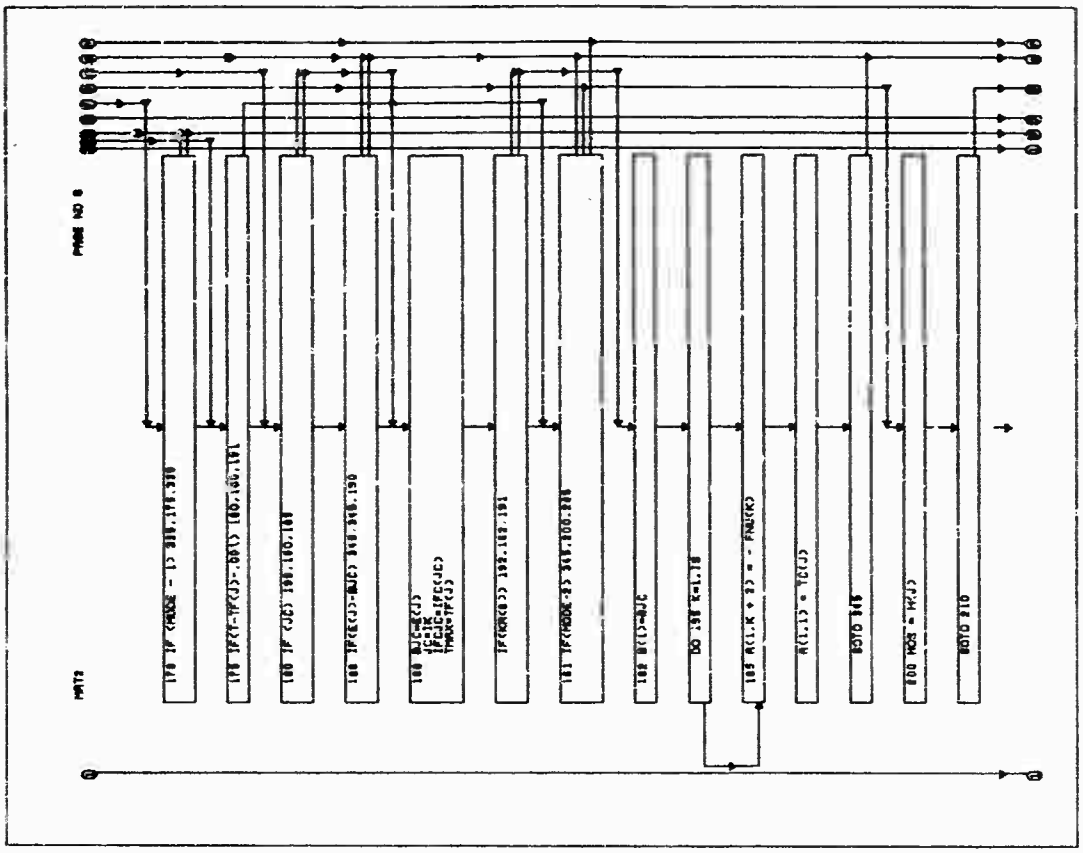

MAT1
PAGE NO 8
GOTO 275
260 HOS = HK(I - 2)
265 IF(ISC(I-2)) 260.275.270
270 A(1.I) = HOS
GOTO 280
275 A(1.I) = HOS * VN(I - 2)
CPF = CPF + CP(I - 2) * VN(I - 2)
290 CONTINUE
DO 295 I=1.15
SE(I)=E(I)
295 SY(I)=Y(I)
RETURN
END

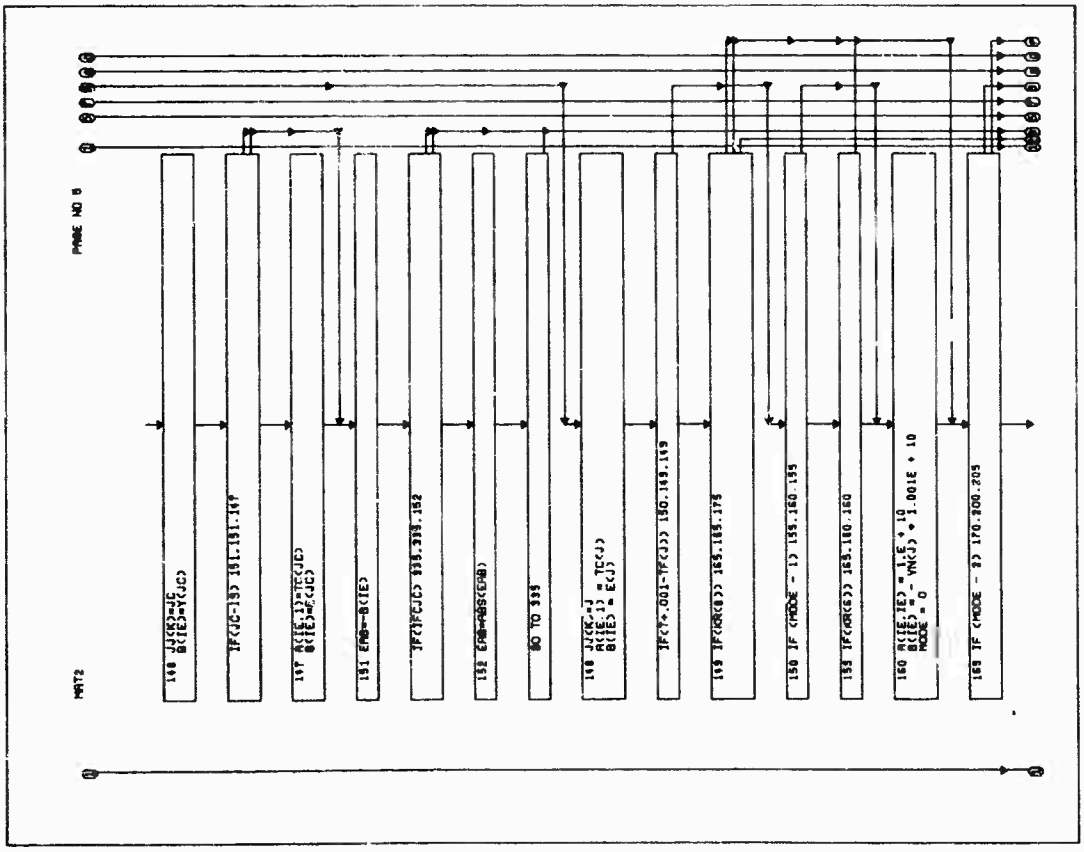

MAT2
PAGE NO 1
SUBROUTINE MAT2
S U B R O U T I N E   M A T 2
SEE THE FULL LISTING OF THIS ROUTINE FOR--
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
ISQ = IS + 2
ISP2 = ISPO
IER = 0
IRE = 0
EER = 0.
C - - - MAIN NON-BASE SPECIES LOOP
5 J=ISP
DO 345 IK=ISP.LIM
8 E(J)=1.E-10

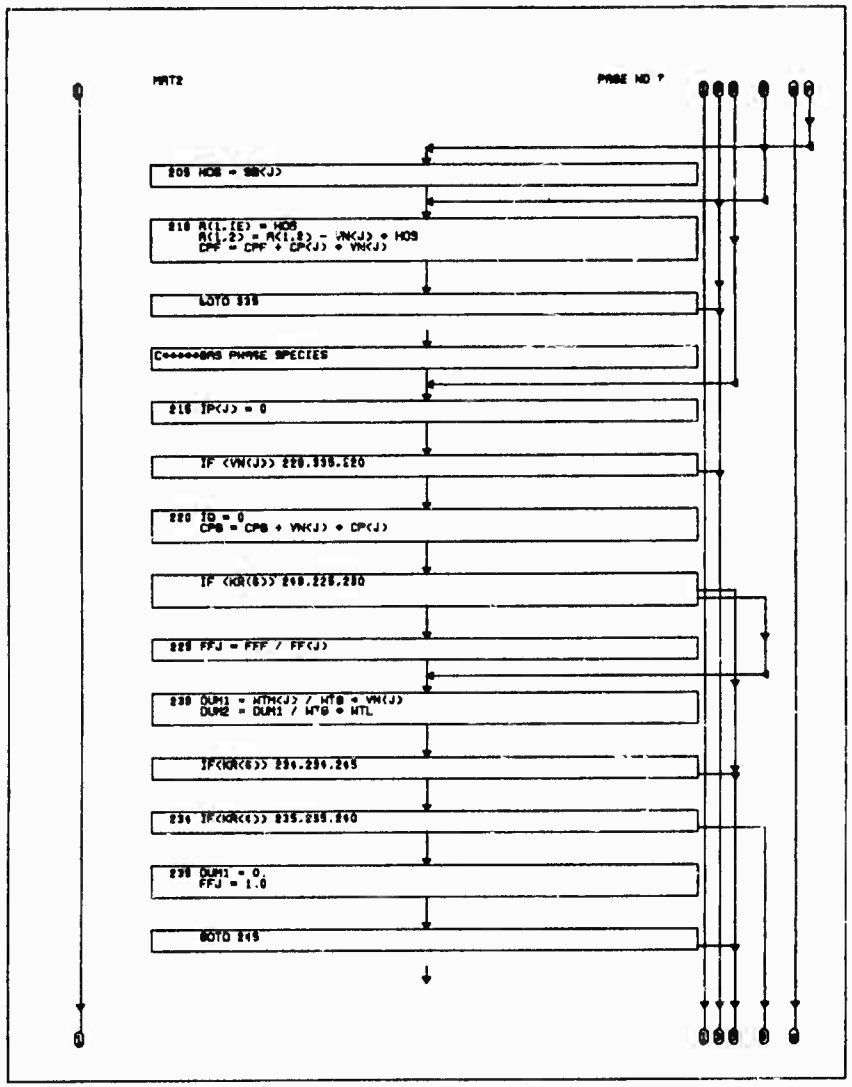

MAT2
PAGE NO 2
20 VN(J) = VN(J) / SUMN
GOTO 35
DO 50 I=1.78
40 FNU(I) = 0.
GOTO 50
50 CONTINUE

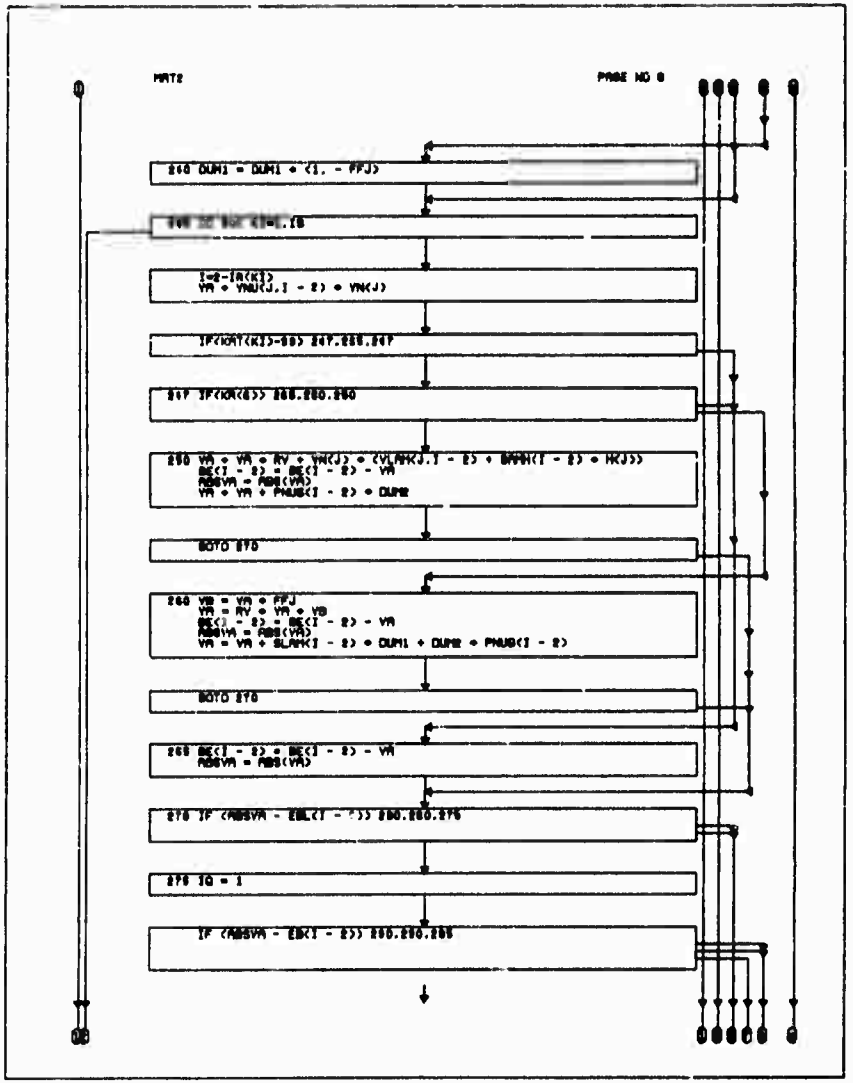


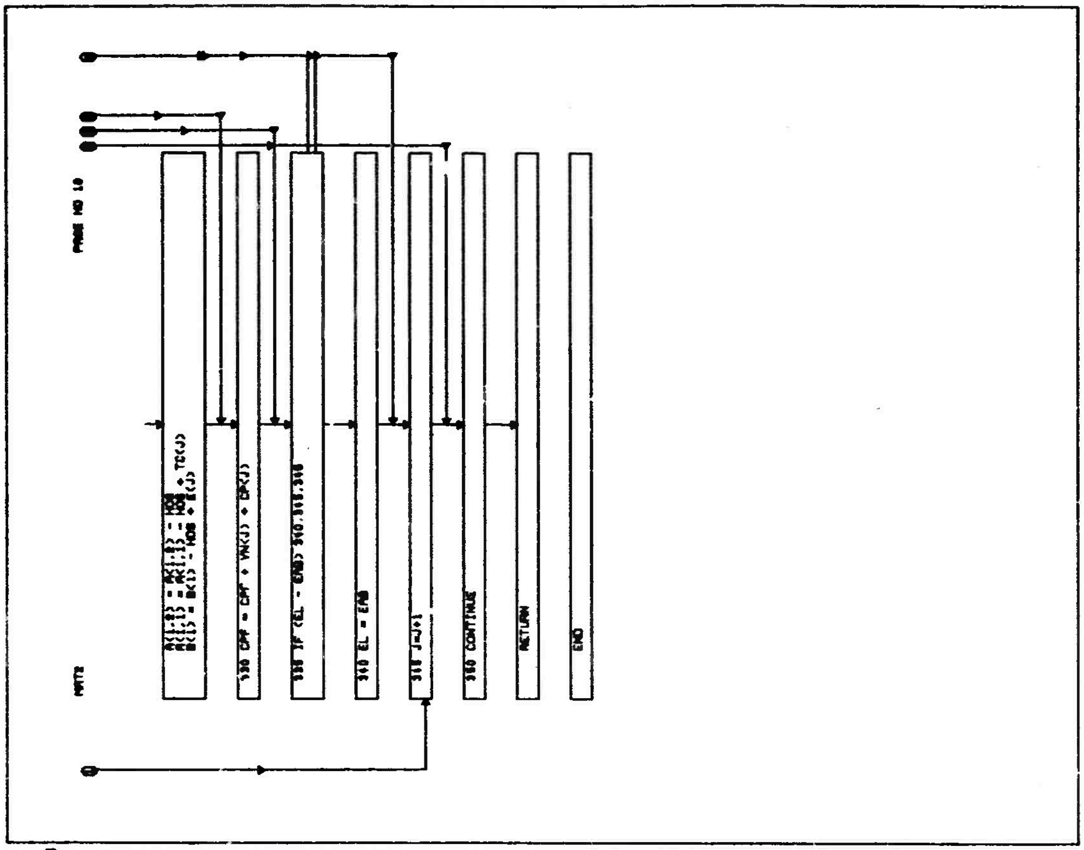


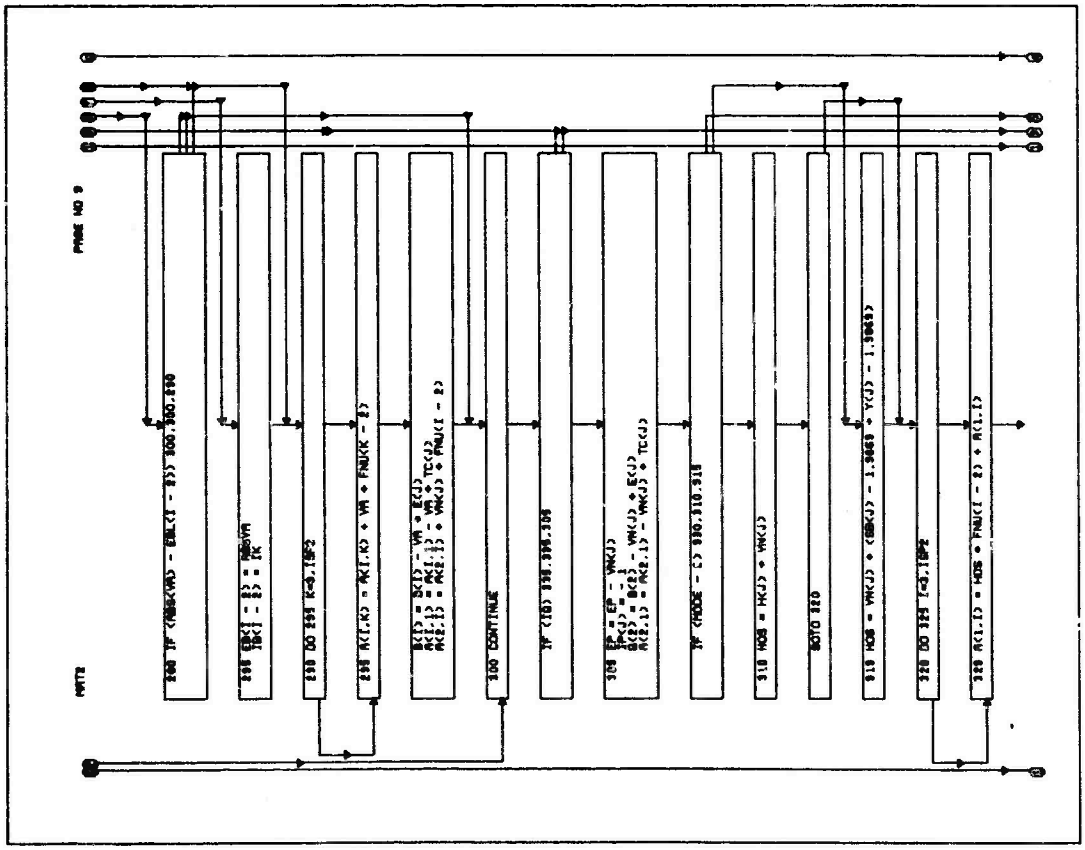


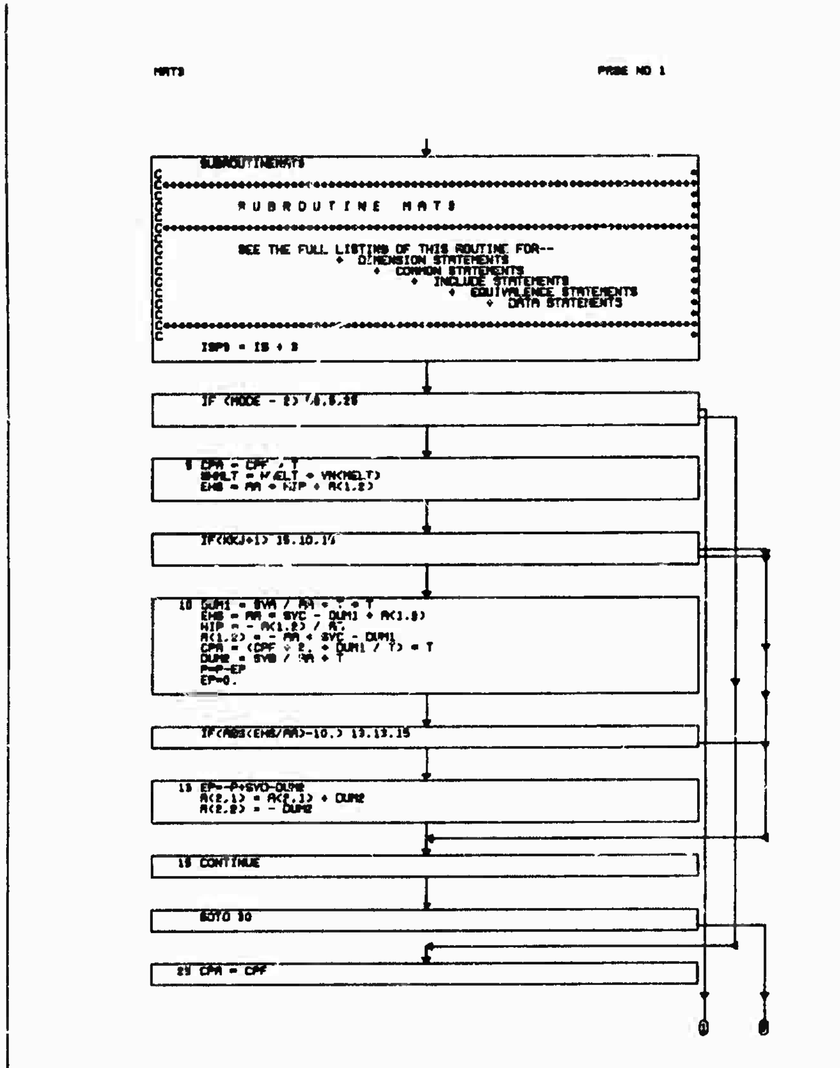


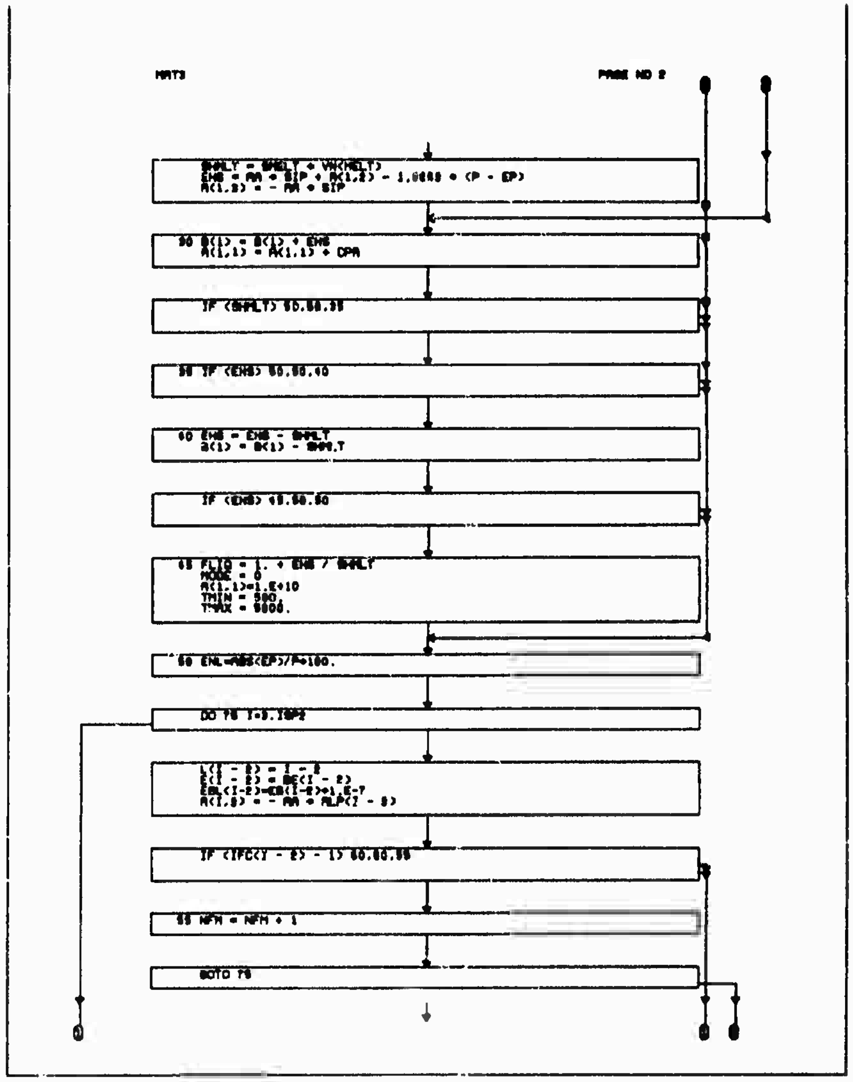

MAT2
PAGE NO 7
205 HOS = SB(J)
210 A(I,IE) = HOS
A(I,2) = A(I,2) - VN(J) * HOS
CPF = CPF + CP(J) * VN(J)
GOTO 235
C******GAS PHASE SPECIES
215 IP(J) = 0
IF (VN(J)) 220,235,220
220 IQ = 0
CPS = CPS + VN(J) * CP(J)
IF (KR(6)) 240,225,230
225 FFJ = FFF / FF(J)
230 DUM1 = WTH(J) / WTS * VN(J)
DUM2 = DUM1 / WTS * WTL
IF(KR(6)) 234,234,245
234 IF(KR(4)) 235,235,240
235 DUM1 = 0.
FFJ = 1.0
GOTO 245

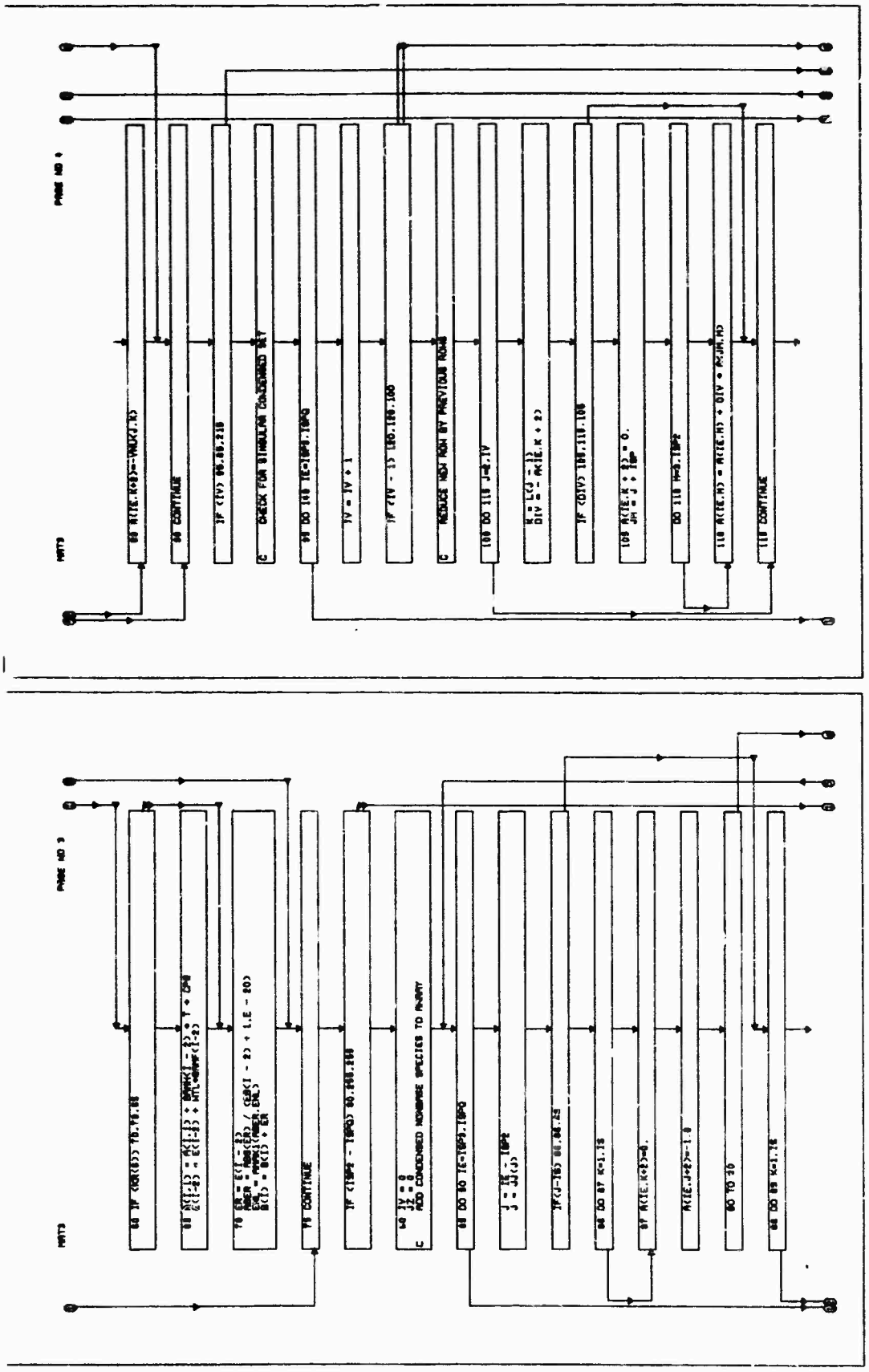

MAT2
PAGE NO 8
240 DUM1 = DUM1 * (1. - FFJ)
I=B-IA(K1)
VR = VN(J,I - 2) * VN(J)
IF(KAY(K1)-88) 247,255,247
247 IF(KR(6)) 255,250,250
250 VR = VR + RV * VN(J) * (VLARK(J,I - 2) + BARH(I - 2) * HKJ)
BE(I - 2) = BE(I - 2) - VR
ABSVR = ABS(VR)
VR = VR + PNUB(I - 2) * DUM2
GOTO 270
260 VR = VR * FFJ
VR = RV * VR + VB
BE(I - 2) = BE(I - 2) - VR
ABSVR = ABS(VR)
VR = VR + SLARK(I - 2) * DUM1 + DUM2 * PNUB(I - 2)
GOTO 270
265 BE(I - 2) = BE(I - 2) - VR
ABSVR = ABS(VR)
270 IF (ABSVR - EBL(I - 2)) 280,280,275
275 IQ = 1
IF (ABSVR - EB(I - 2)) 280,280,285

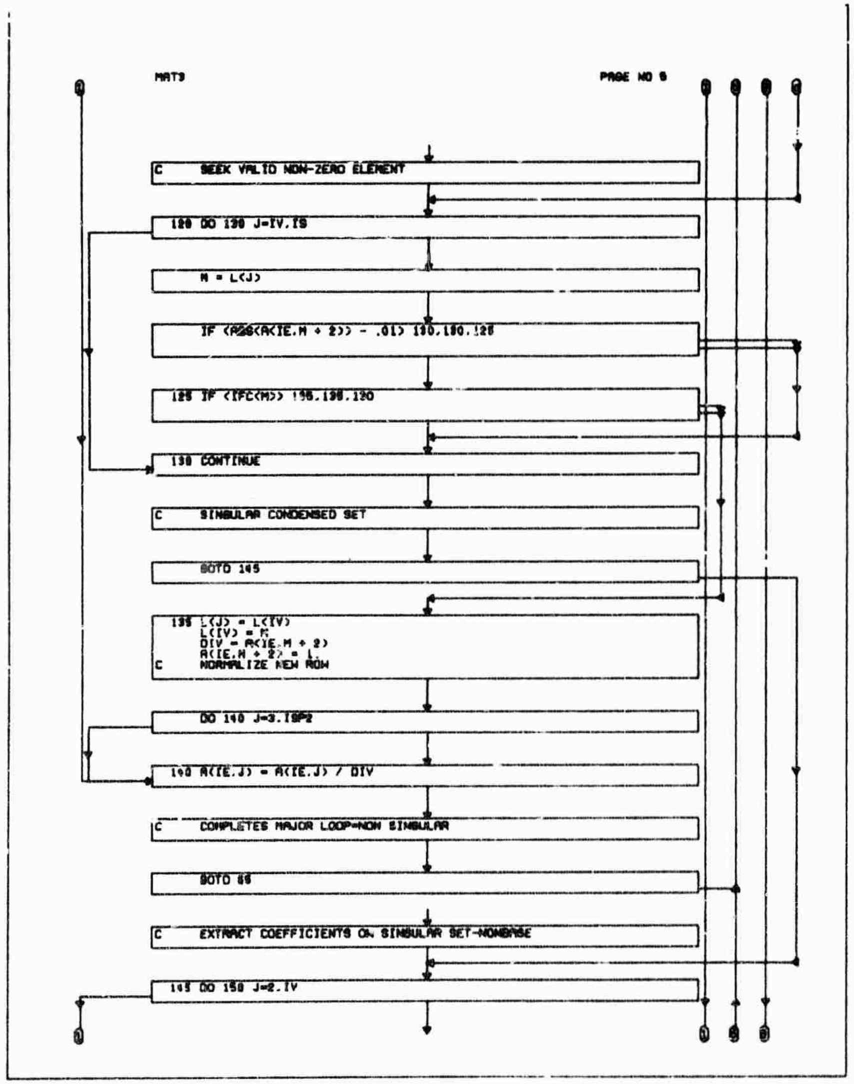

MATZ
PAGE NO 10
930 CPF = CPF + VN(J) + EN(J)
940 EL = EAB
950 CONTINUE
RETURN
END

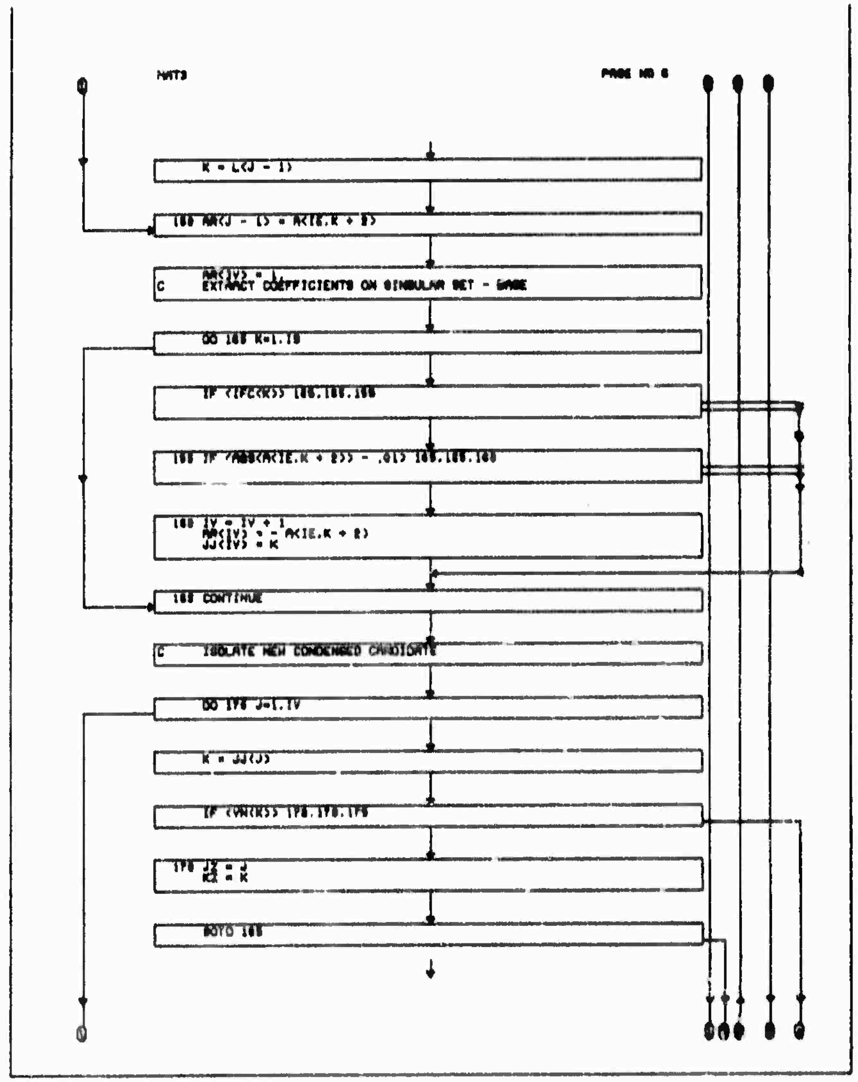

MATZ
PAGE NO 9
300 CONTINUE
GOTO 320

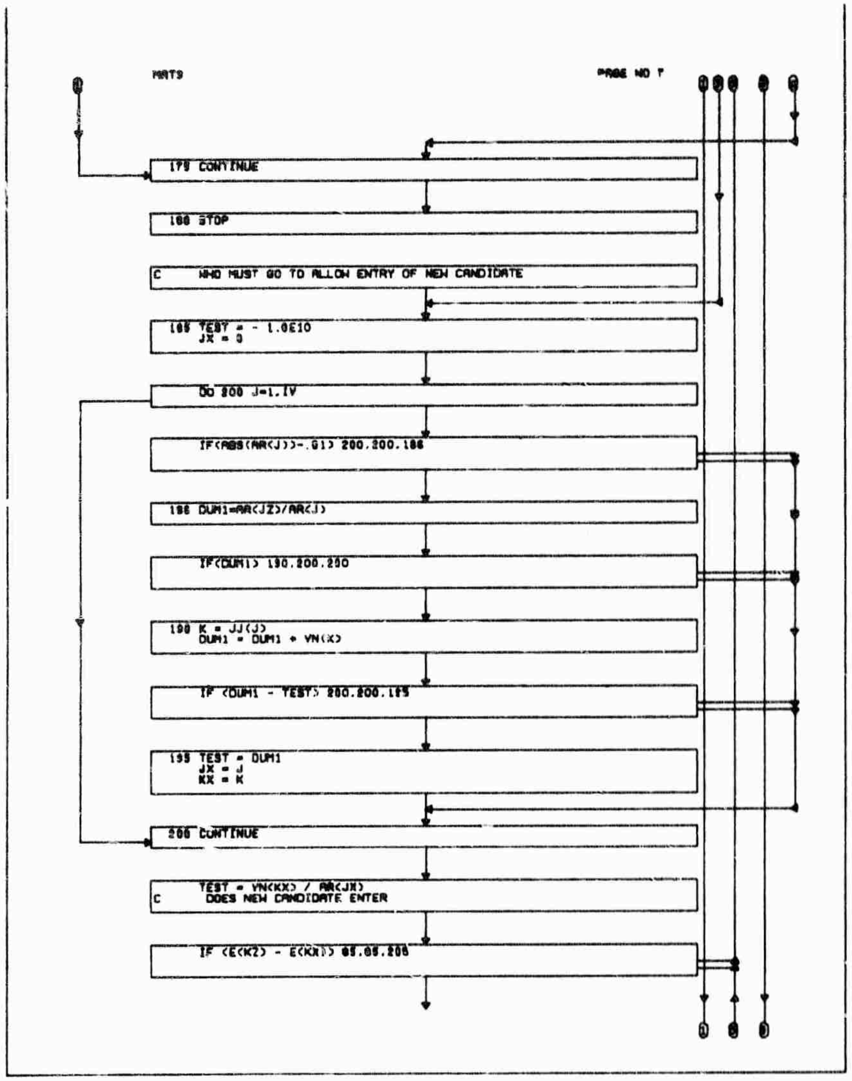

MATS
PAGE NO 1
SUBROUTINEMATS
S U B R O U T I N E   M A T S
SEE THE FULL LISTING OF THIS ROUTINE FOR--
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
ISP9 = IS + 9
IF (MODE - 2) /8.8.28
8 CPA = CPF / T
SHALT = WELT + VN(MELT)
EHS = AA * WIP + A(1.2)
IF(KKJ+1) 19.10.19
10 DUM1 = SVA / AA + T + T
EHS = AA * SYC - DUM1 + A(1.8)
WIP = - A(1.2) / A.
A(1.2) = - AA + SYC - DUM1
CPA = (CPF + 2. + DUM1 / T) + T
DUM2 = SVB / AA + T
P=P-EP
EP=0.
IF(ABS(EHS/AA)-10.) 13.13.15
13 EP=-P+SVC-DUM2
A(2.1) = A(2.1) + DUM2
A(2.2) = - DUM2
15 CONTINUE
GOTO 30
28 CPA = CPF

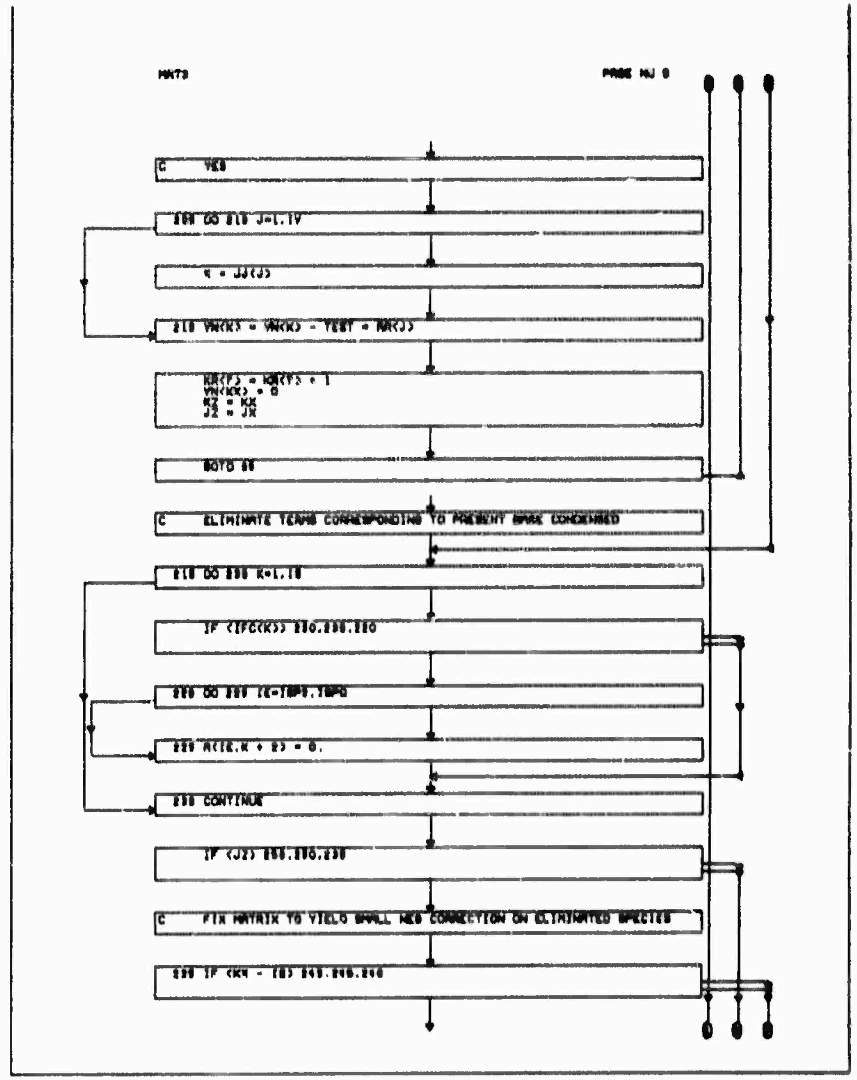

MATS
PAGE NO 2
SHALT = SHALT + VN(MELT)
EHS = AA + SIP + A(1.2) - 1.9889 + (P - EP)
A(1.2) = - AA + SIP
30 B(1) = B(1) + EHS
A(1.1) = A(1.1) + CPA
IF (SHALT) 50.50.35
35 IF (EHS) 50.50.40
40 EHS = EHS - SHALT
B(1) = B(1) - BM0.T
IF (EHS) 45.50.50
45 FLIQ = 1. + EHS / SHALT
MODE = 0
A(1.1)=1.E+10
TMIN = 500.
TMAX = 5000.
50 ENL=ABS(EP)/P*100.
DO 75 I=3.ISP2
L(I - 2) = I - 2
E(I - 2) = BE(I - 2)
EBL(I-2)=EB(I-2)+1.E-7
A(I.2) = - AA + ALP(I - 2)
IF (IFC(I - 2) - 1) 60.60.55
55 NFM = NFM + 1
GOTO 75

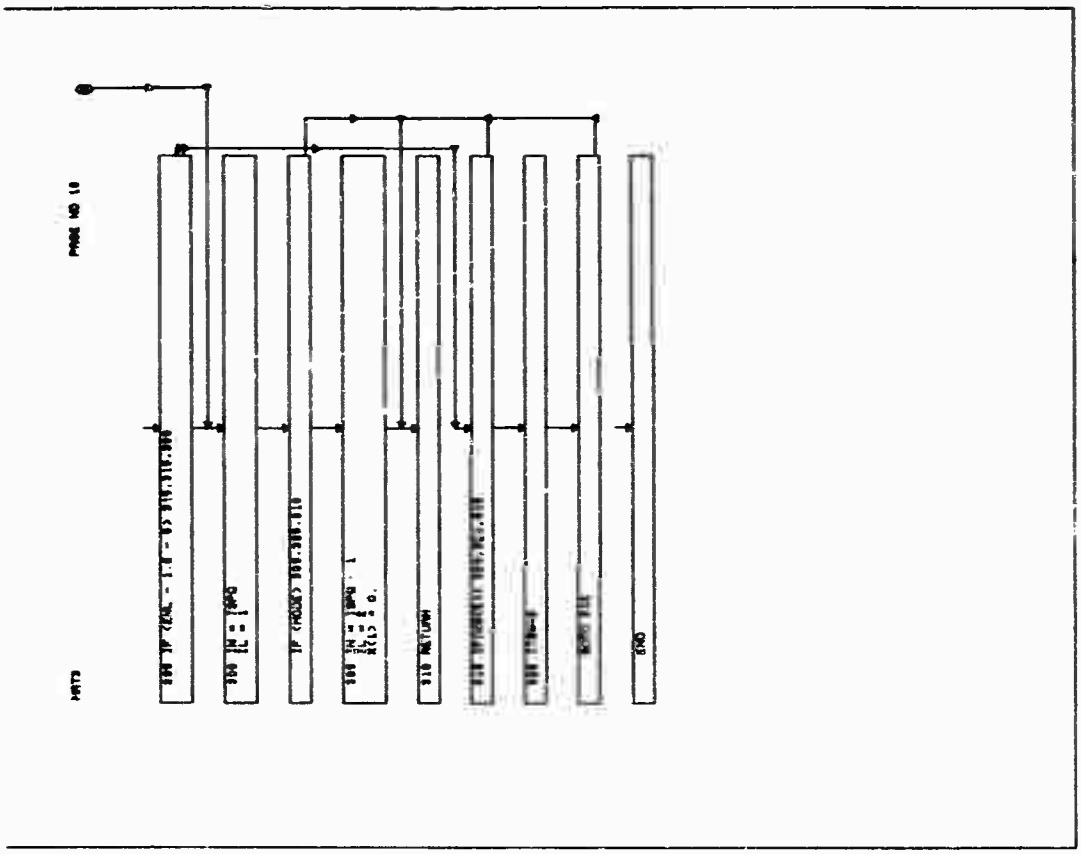


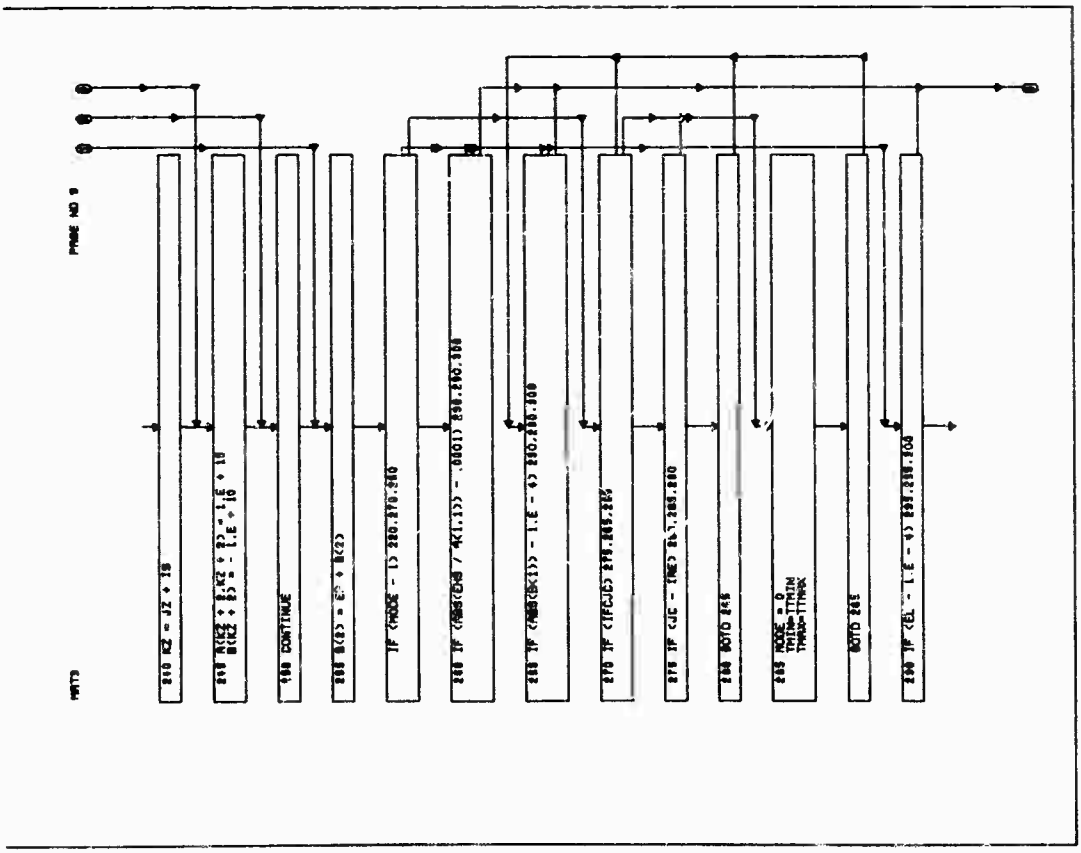

MAT3
PAGE NO 5
C SEEK VALID NON-ZERO ELEMENT
120 DO 130 J=IV,IS
M = L(J)
IF (ABS(A(IE,M + 2)) - .01) 130,130,125
125 IF (IFC(M)) 135,130,130
130 CONTINUE
C SINGULAR CONDENSED SET
GOTO 145
135 L(J) = L(IV)
L(IV) = M
DIV = A(IE,M + 2)
A(IE,M + 2) = 1.
C NORMALIZE NEW ROW
DO 140 J=3,ISP2
140 A(IE,J) = A(IE,J) / DIV
C COMPLETES MAJOR LOOP=NON SINGULAR
GOTO 66
C EXTRACT COEFFICIENTS ON SINGULAR SET-NONBASE
145 DO 150 J=2,IV


MAT3
PAGE NO 6
K = L(J - 1)
AR(J - 1) = A(IE,K + 2)
AR(IV) = 1.
C EXTRACT COEFFICIENTS ON SINGULAR SET - BASE
IF (IFC(K))
IV = IV + 1
AR(IV) = - A(IE,K + 2)
JJ(IV) = K
CONTINUE
C ISOLATE NEW CONDENSED CANDIDATE
K = JJ(J)
JZ = J
KZ = K


MAT3
PAGE NO 7
179 CONTINUE
180 STOP
C WHO MUST GO TO ALLOW ENTRY OF NEW CANDIDATE
185 TEST = - 1.0E10
JX = 0
DO 200 J=1,IV
IF(ABS(AR(J))-.01) 200,200,186
186 DUM1=AR(J2)/AR(J)
IF(DUM1) 190,200,200
190 K = JJ(J)
DUM1 = DUM1 + VN(K)
IF (DUM1 - TEST) 200,200,195
195 TEST = DUM1
JX = J
KX = K
200 CONTINUE
TEST = VN(KX) / AR(JX)
C DOES NEW CANDIDATE ENTER
IF (E(K2) - E(KX)) 65,65,205


MAT3
C YES
K = JJ(J)
C ELIMINATE TERMS CORRESPONDING TO PRESENT BASE CONDENSED
IF (IFC(K))
CONTINUE
IF (J2)
C FIX MATRIX TO YIELD SMALL NEG CORRECTION ON ELIMINATED SPECIES

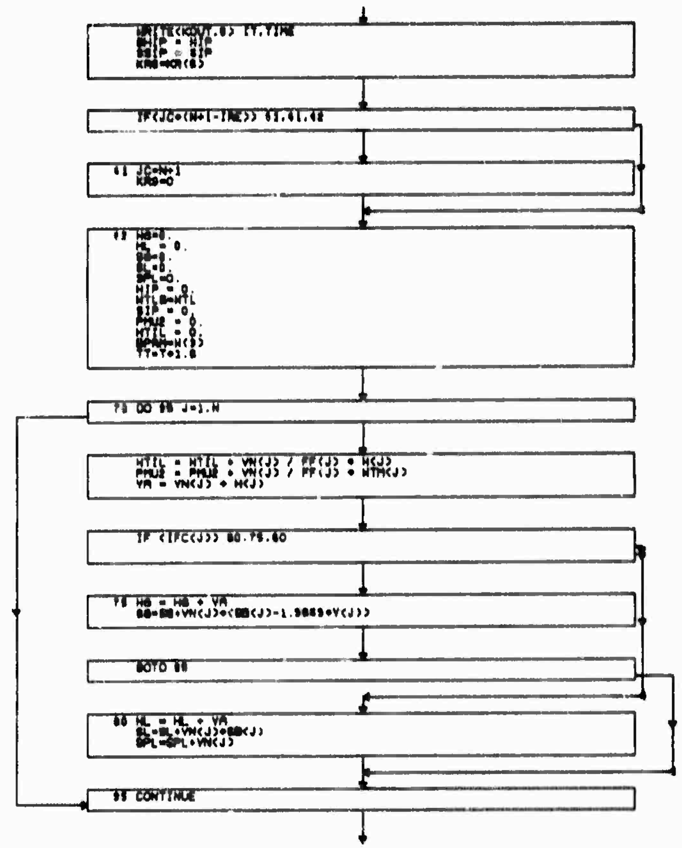


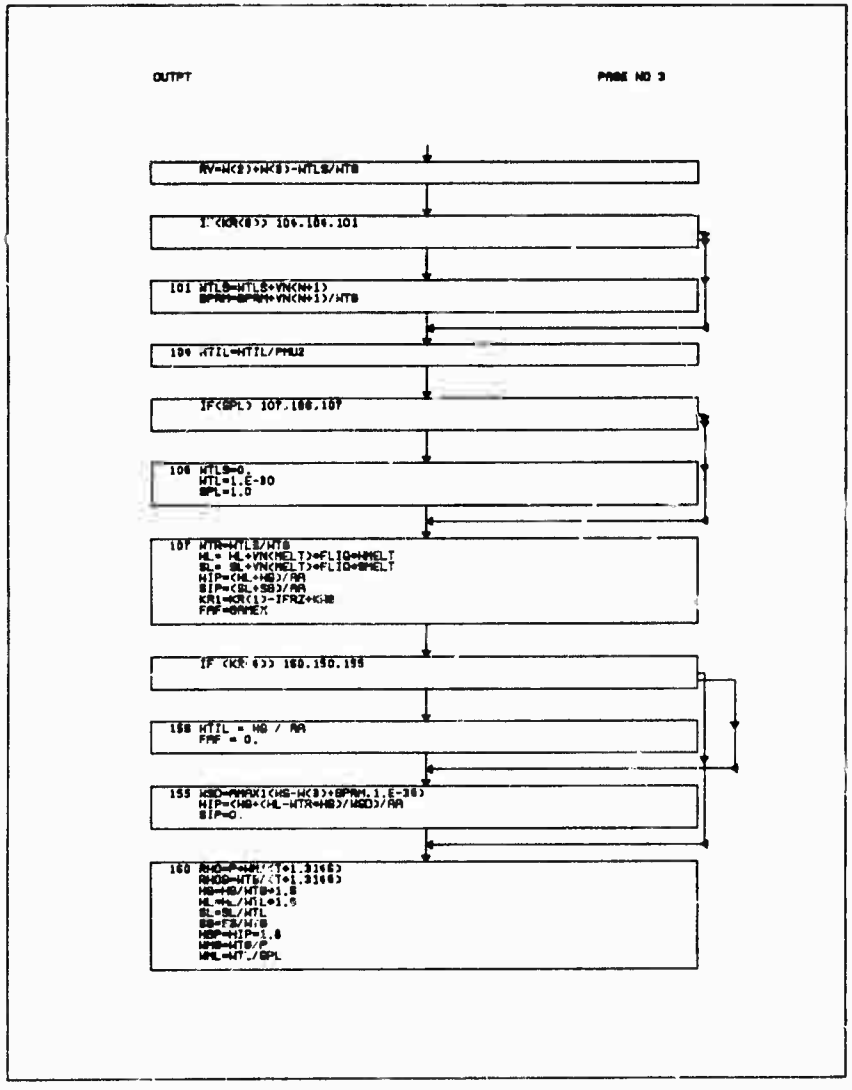


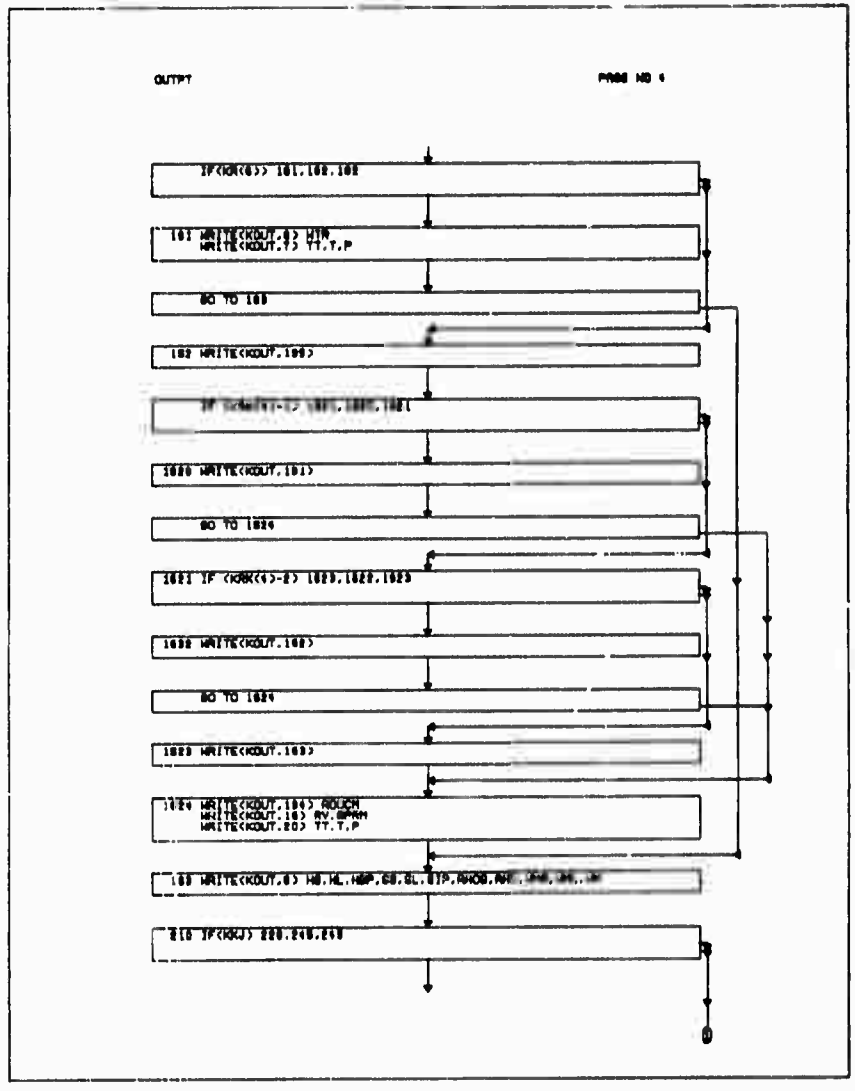
OUTPT PAGE NO 1

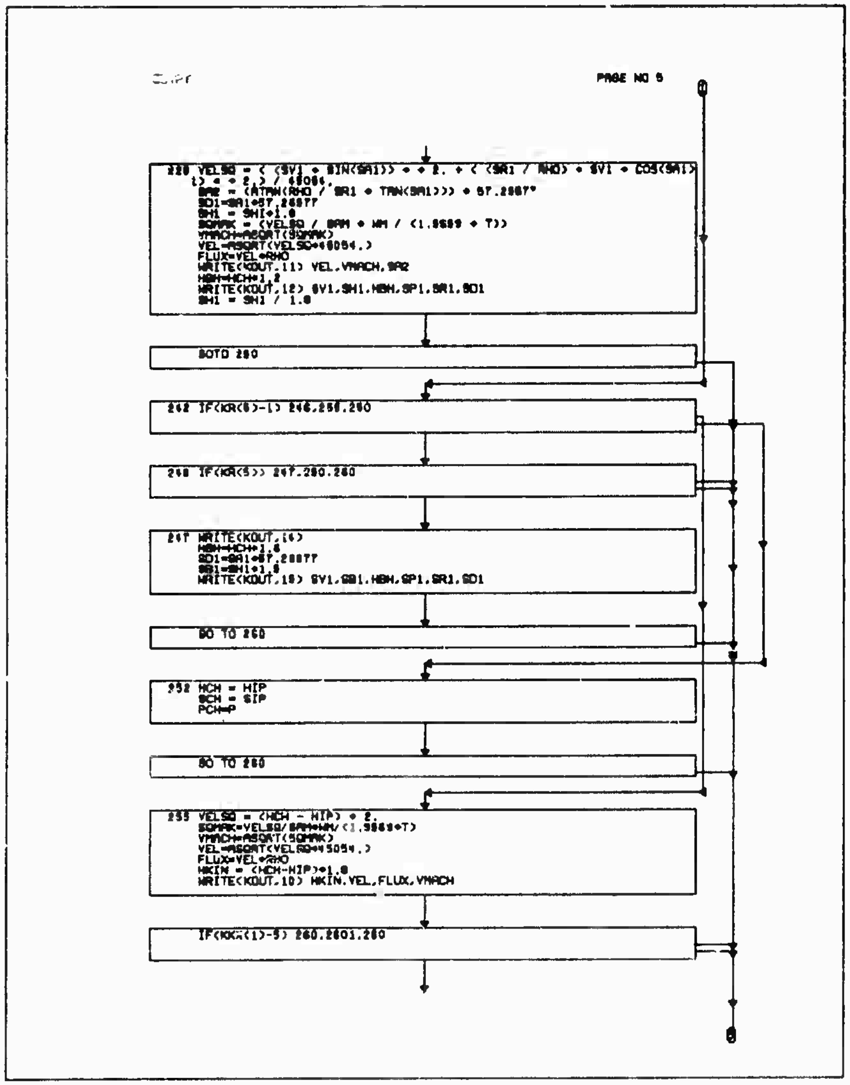
```
      SUBROUTINEOUTPT
C
C**********************************************************************
C
C           S U B R O U T I N E     O U T P T
C
C**********************************************************************
C
C           SEE THE FULL LISTING OF THIS ROUTINE FOR--
C                       + DIMENSION STATEMENTS
C                           + COMMON STATEMENTS
C                               + INCLUDE STATEMENTS
C                                   + EQUIVALENCE STATEMENTS
C                                       + DATA STATEMENTS
C
C**********************************************************************
C
    5 FORMAT(/15H SOLUTION TIMES./10X.13HITERATIONS = .I4.23X.7HTIME = .
     1F8.3.1X.4HSEC.)
    6 FORMAT(/42H CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT.//29H   MASS
     1 CONDENSED/MASS GAS = .E12.5)
    7 FORMAT(3X.7HTEMP = .F10.4.1X.6HDEG R..1X.1H=.1X.F10.4.1X.6HDEG K..
     15X.PRESS = F13.5.6H ATM)
    8 FORMAT(/34X6HGAS              CONDENSED        COMPOSITE/3X.18HENTHA
     1LPY - BTU/LBM.5X.3(5X.E12.5)/3X.23HENTROPY - BTU/LBM DEG R.3(5X.E1
     22.5)/3X.17HDENSITY - LBM/FT3.2(11XE12.5.11X)/3X18HMOLECULAR WEIGHT
     35X.3(5X.F12.4)/)
    9 FORMAT(/2X71HCHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHA
     1SE MOLECULES).....)
   10 FORMAT(2X27HABOVE ARE STATIC PROPERTIES.15X.12HKINETIC = .E12.6.
     11X.7HBTU/LBM/3X.7HVEL. = .E12.4.1X.6HFT/SEC.3X.7 FLUX = .E12.5.1X.
     210HLBM/FT2SEC.3X.7HMACH = .F9.5)
   11 FORMAT(3X.7HVEL2 = .E12.4.1X.6HFT/SEC.5X.8HMACH2 = .F9.5.3X.8HTHET
     1A 2 =.F10.6.1X.3HDEG)
   12 FORMAT(2X.60HABOVE ARE STATIC CONDITIONS DOWNSTREAM OF THE SHOCK F
     1OR ..../3X.6HVEL1 =.E9.3.1X.6HFT/SEC.2X.11HH1-STATIC =.E9.3.1X.18H
     2BTU/LBM  H-TOT =.E9.3.1X. 7HBTU/LBM/3X.6HP1 = .F12.5.1X.13HATM   R
     3HO1 = .E12.5.1X.17HLBM/FT3 THETA 1 =.F10.6.1X.3HDEG)
   13 FORMAT(/2X71HSTATIC CHEMICAL STATE (MOLE FR.=MOLECULES/TOTAL GAS P
     1HASE MOLECULES)...)
   14 FORMAT(2X.76HABOVE ARE ISENTROPIC STAGNATION CONDITIONS DOWNSTREAM
     1 OF THE SHOCK FOR . . . .)
   15 FORMAT(3X.6HVEL1 =.E9.3.1X.19HFT/SEC  H1-STATIC =.E9.3.1X.18HBTU/L
     1BM  H-TOT =.E9.3.1X.7HBTU/LBM/3X.5HP1 = .F12.5.1X.3HATM.3X.7HRHO1
     2= .E12.5.1X.20HLBM/FT3   THETA 1 = .F10.6.1X.3HDEG)
   16 FORMAT(/2X77HISEN. STAG. CHEMICAL STATE (MOLE FR.=MOLECULES / TOTA
     1L GAS PHASE MOLECULES)..)
   17 FORMAT(//9X.13HITERATIONS = .I4.23X.7HTIME = .F8.3.1X.3HSEC)
   18 FORMAT(28H  RHO V WALL/RHOE UE CM = .E12.5.3X.9HBPRIME = .E12.5)
  191 FORMAT(/46H  SURFACE IS LAYER-ORIENTED PYROLYTIC GRAPHITE)
  192 FORMAT(/45H  SURFACE IS EDGE-ORIENTED PYROLYTIC GRAPHITE)
  193 FORMAT(/36H  SURFACE IS BULK PYROLYTIC GRAPHITE)
  194 FORMAT(36H  MASS TRANSFER COEFFICIENT ROUCM = .E12.5)
  195 FORMAT(/46H OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT)
   20 FORMAT(/39H  STATE ADJACENT TO THE SURFACE . . . ./3X.7HTEMP = .
     1F10.4.1X.7HDEG R = .F11.4.1X17HDEG K      PRESS = .F13.5.1X3HATM)
   21 FORMAT(/2X.40HPUNCHED CARD OUTPUT (80 COLUMNS) . . . . .)
   22 FORMAT(/2X.38HCHEMICAL STATE ADJACENT TO THE SURFACE/3X.54H(MOLE F
     1R FOR GASES - MOLECULES / TOTAL GAS MOLECULES )/3X.50H(MOLE FR FOR
     2 CONDENSED = BPRIME CONDENSED ). . . . .)
   23 FORMAT(8X2A4.2H1SF8.5.11H LIQUID ANDF8.5.8H SOLID)
   24 FORMAT(/94H  NET FORWARD RATE OF KINETICALLY CONTROLLED REACTIONS/
     1 70H   (MOLES OF REACTION / UNIT SURFACE AREA / TIME / RHOE UE CM)
     2. . . . /(I4.1H=E12.5.I3.1H=E12.5.I3.1H=E12.5.I3.1H=E1
     32.5))
   25 FORMAT( /87H  SPECIES  MOL.FRAC.   D-LN-KP/D-LN-T  LOG-PP
     1G-KP     FLAG   ERROR            CP  /(1X2A4.4E12.5.I5.2E12.5))
      ASQRT(Q)=SIGN(SQRT(ABS(Q)).Q)
      TAN(Q) = SIN(Q) / COS(Q)
      HEPS = 0.01
C     FIND VKIN AS FIRST NONZERO FKF(M)
      VKIN=ROUCM
  703 CONTINUE
   35 WM = AA / P
      CALL ETIMEF(TIME)
```

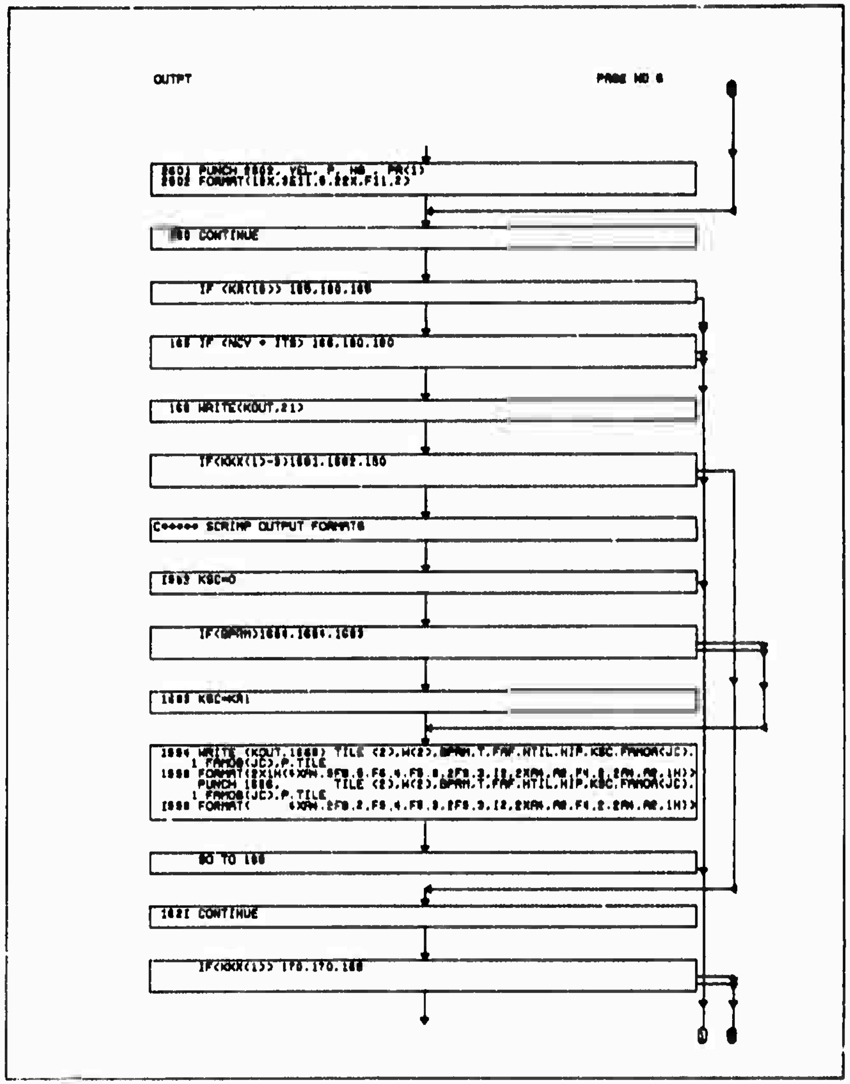
OUTPT PAGE NO 2

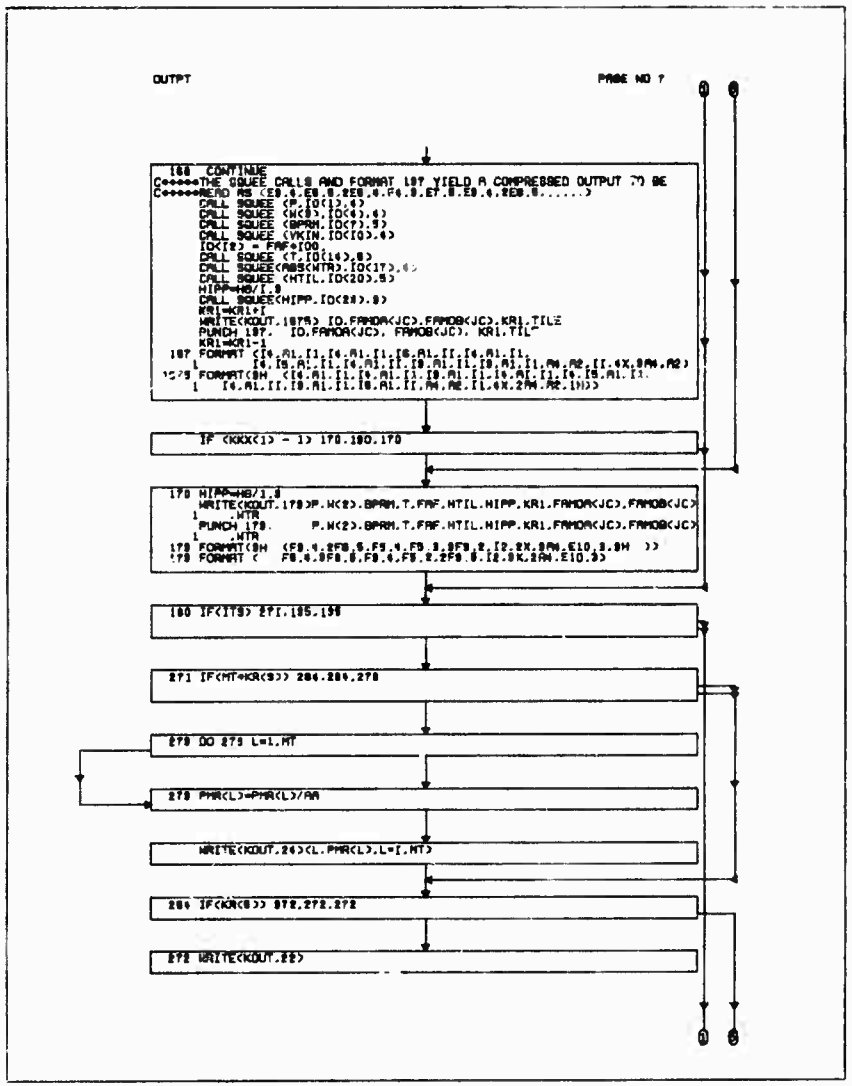


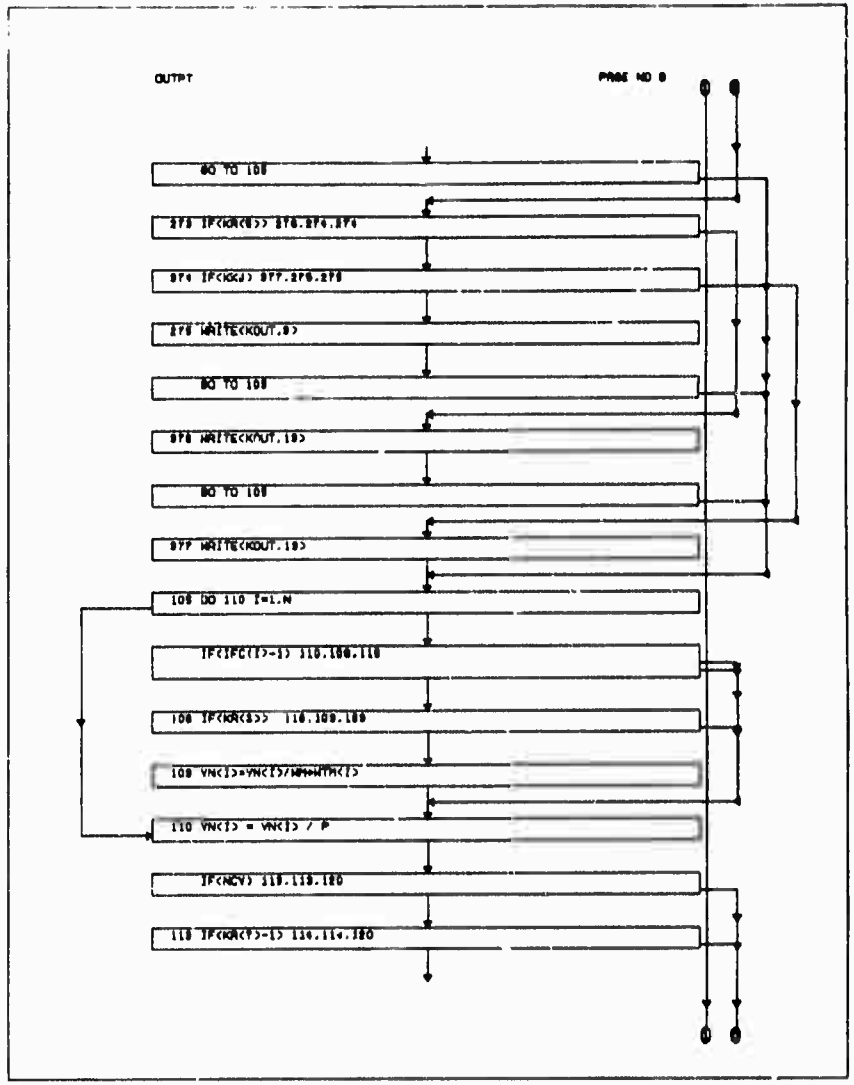

OUTPT
PAGE NO 3
RV=W(3)+W(8)-WTLB/WTB
IF(KK(8)) 104.104.101
101 WTLB=WTLB+VN(N+1)
BPRM=BPRM+VN(N+1)/WTB
104 WTIL=WTIL/PMU2
IF(BPL) 107.106.107
106 WTLB=0.
WTL=1.E-30
BPL=1.0
107 WTB=WTLB/WTB
ML= ML+VN(MELT)*FLIQ*WMELT
BL= BL+VN(MELT)*FLIQ*BMELT
WIP=(ML+MB)/RA
BIP=(BL+SB)/RA
KR1=KR(1)-IFRZ+KHB
FRF=BMMEX
IF (KK(6)) 150.150.155
158 WTIL = MB / RA
FRF = 0.
155 WSD=AMAX1(HS-W(3)+BPRM.1.E-30)
WIP=(MB+(ML-WTR+MB)/WSD)/RA
BIP=0.
160 RHO=P*WM/(T*1.3166)
RHOB=WTB/(T*1.3166)
MB=MB/WTB*1.8
ML=ML/WTL*1.8
BL=BL/WTL
SB=FB/W(8
MBP=WIP*1.8
MPB=WTB/P
MRL=WT./BPL

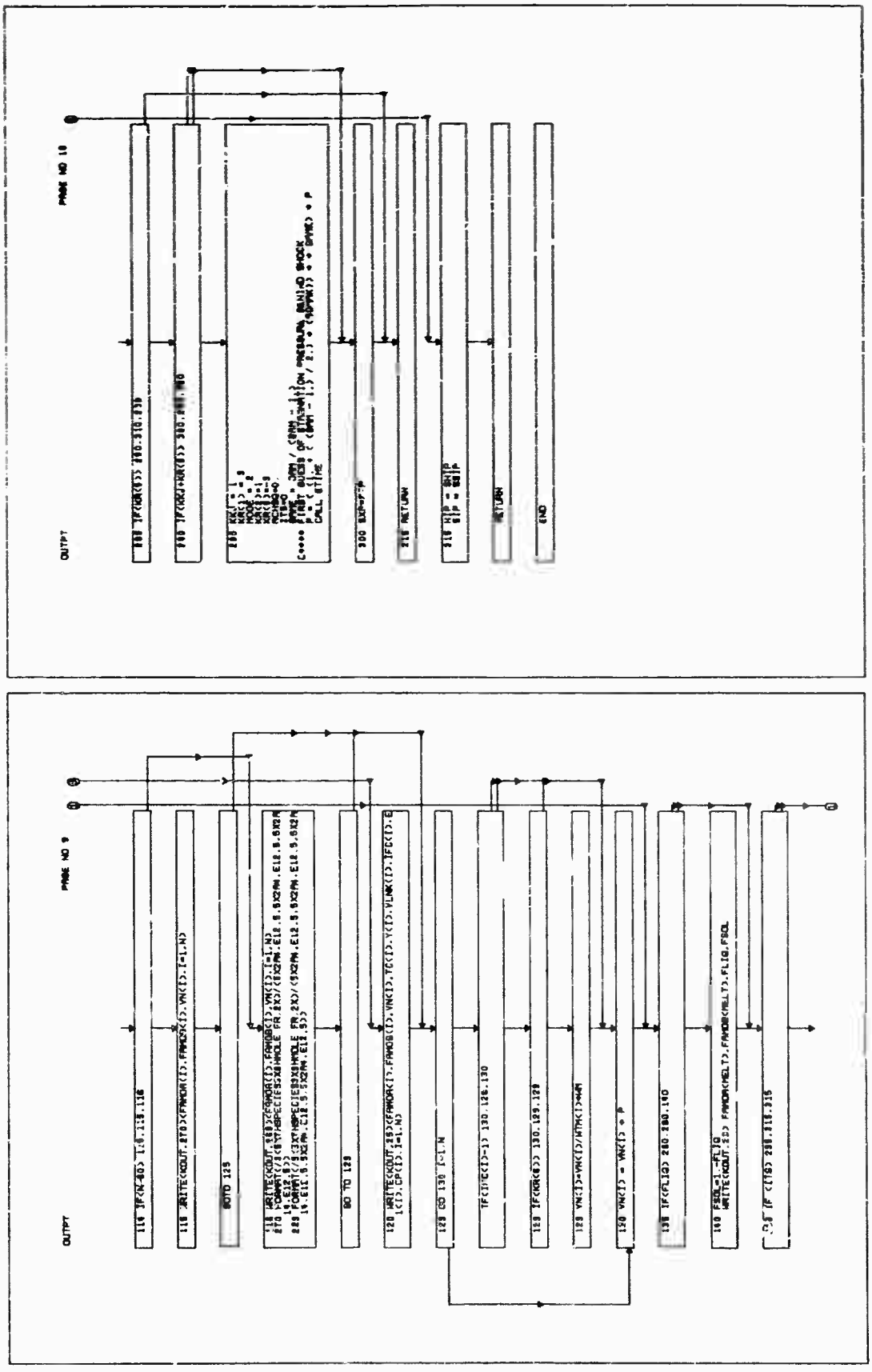

OUTPT
PAGE NO 4
IF(KK(6)) 101.102.102
101 WRITE(KOUT.6) HIN
WRITE(KOUT.7) TT.T.P
GO TO 103
102 WRITE(KOUT.100)
1000 WRITE(KOUT.101)
GO TO 1024
1001 IF (KKK(4)-2) 1023.1020.1023
1002 WRITE(KOUT.102)
GO TO 1024
1023 WRITE(KOUT.103)
1024 WRITE(KOUT.104) ROUCH
WRITE(KOUT.16) RV.BPRM
WRITE(KOUT.20) TT.T.P
103 WRITE(KOUT.6) MB.ML.MBP.SB.BL.BIP.RHOB.RHE
210 IF(KKJ) 220.240.240

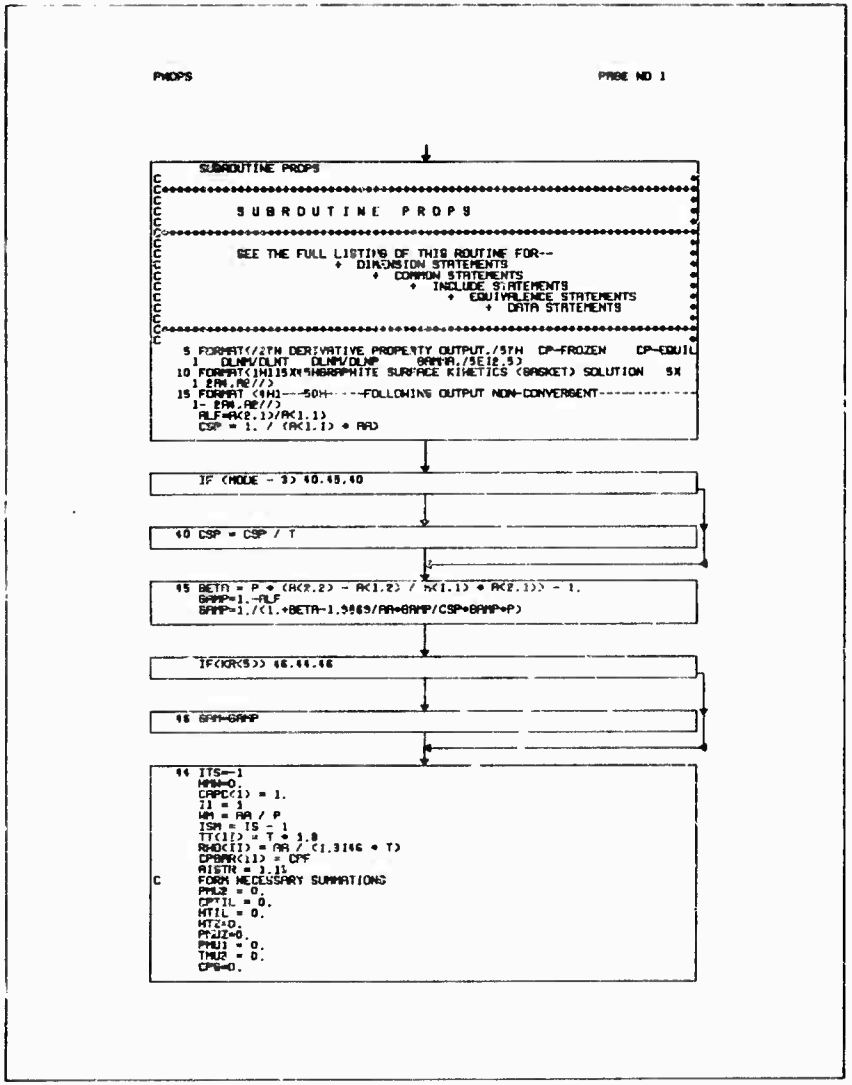

PAGE NO 5
220 VELSQ = ((SV1 * SIN(SA1)) * * 2. + ((SR1 / RHO) * SV1 * COS(SA1)
1) * * 2.) / 45054.
SA2 = (ATAN(RHO / SR1 * TAN(SA1))) * 57.2957*
SD1=SA1*57.29577
SH1 = SHI*1.8
SQMAK = (VELSQ / BAM * WM / (1.9869 * T))
VMACH=ASQRT(SQMAK)
VEL=ASQRT(VELSQ*45054.)
FLUX=VEL*RHO
WRITE(KOUT,11) VEL,VMACH,SA2
HBH=HCH*1.8
WRITE(KOUT,12) SV1,SH1,HBH,SP1,SR1,SD1
SH1 = SH1 / 1.8
GOTO 260
242 IF(KR(6)-1) 246,250,260
246 IF(KR(5)) 247,250,260
247 WRITE(KOUT,14)
HBH=HCH*1.8
SD1=SA1*57.29577
SB1=SH1*1.8
WRITE(KOUT,18) SV1,SB1,HBH,SP1,SR1,SD1
GO TO 260
252 HCH = HIP
SCH = SIP
PCH=P
GO TO 260
255 VELSQ = (HCH - HIP) * 2.
SQMAK=VELSQ/BAM*WM/(1.9869*T)
VMACH=ASQRT(SQMAK)
VEL=ASQRT(VELSQ*45054.)
FLUX=VEL*RHO
HKIN = (HCH-HIP)*1.8
WRITE(KOUT,10) HKIN,VEL,FLUX,VMACH
IF(KKX(1)-5) 260,2601,260

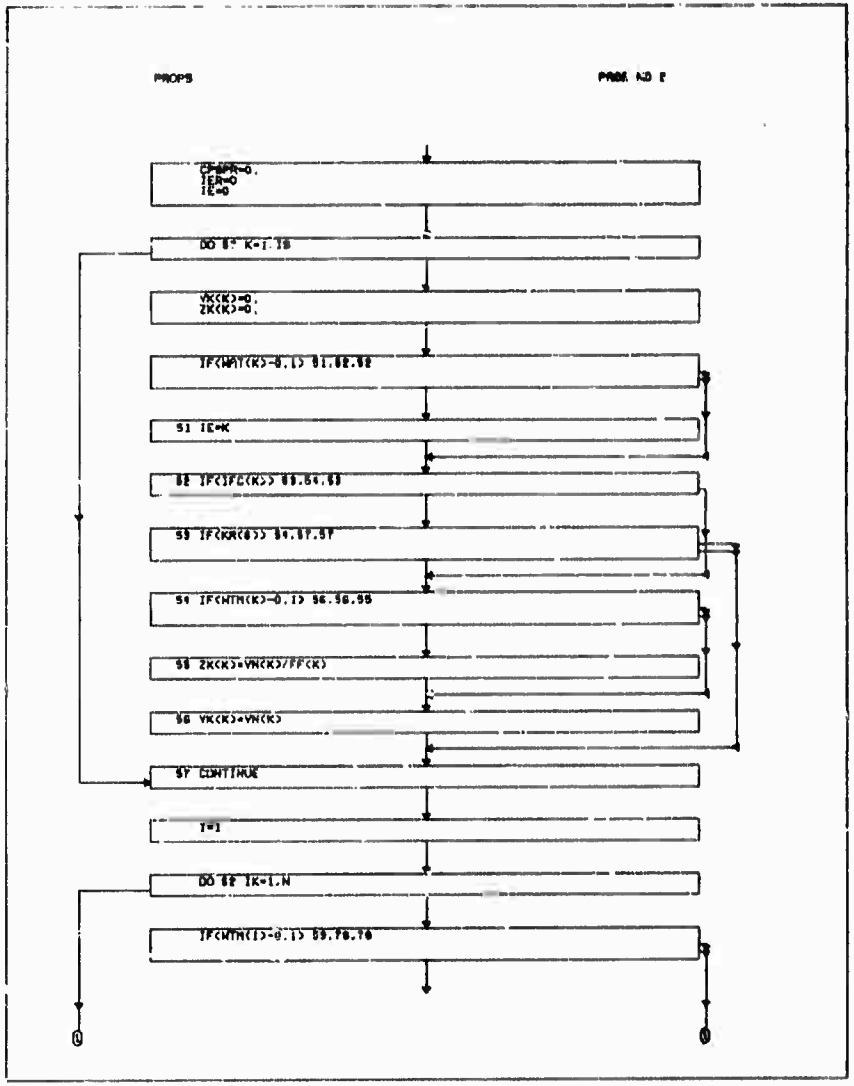

OUTPT
PAGE NO 6
2601 PUNCH 2602, VEL, P, HB, PR(1)
2602 FORMAT(10X,3E11.6,22X,F11.2)
160 CONTINUE
IF (KR(10)) 160,160,160
168 IF (NCV * ITS) 166,180,180
166 WRITE(KOUT,21)
IF(KKX(1)-3)1601,1602,180
C***** SCRIMP OUTPUT FORMATS
1602 KSC=0
IF(BPRM)1604,1604,1603
1603 KSC=KR1
1604 WRITE (KOUT,1608) TILE (2),H(2),BPRM,T,FAF,HTIL,HIP,KSC,FAMOA(JC),
1 FAMOB(JC),P,TILE
1608 FORMAT(2X1H(4XA4,8F8.0,F6.4,F8.0,2F8.3,I2,2XA4,A8,F4.0,2A4,A8,1H))
PUNCH 1606, TILE (2),H(2),BPRM,T,FAF,HTIL,HIP,KSC,FAMOA(JC),
1 FAMOB(JC),P,TILE
1606 FORMAT(4XA4,2F8.2,F8.4,F8.0,2F8.3,I2,2XA4,A8,F4.2,2A4,A8,1H))
GO TO 180
1601 CONTINUE
IF(KKX(1)) 170,170,180

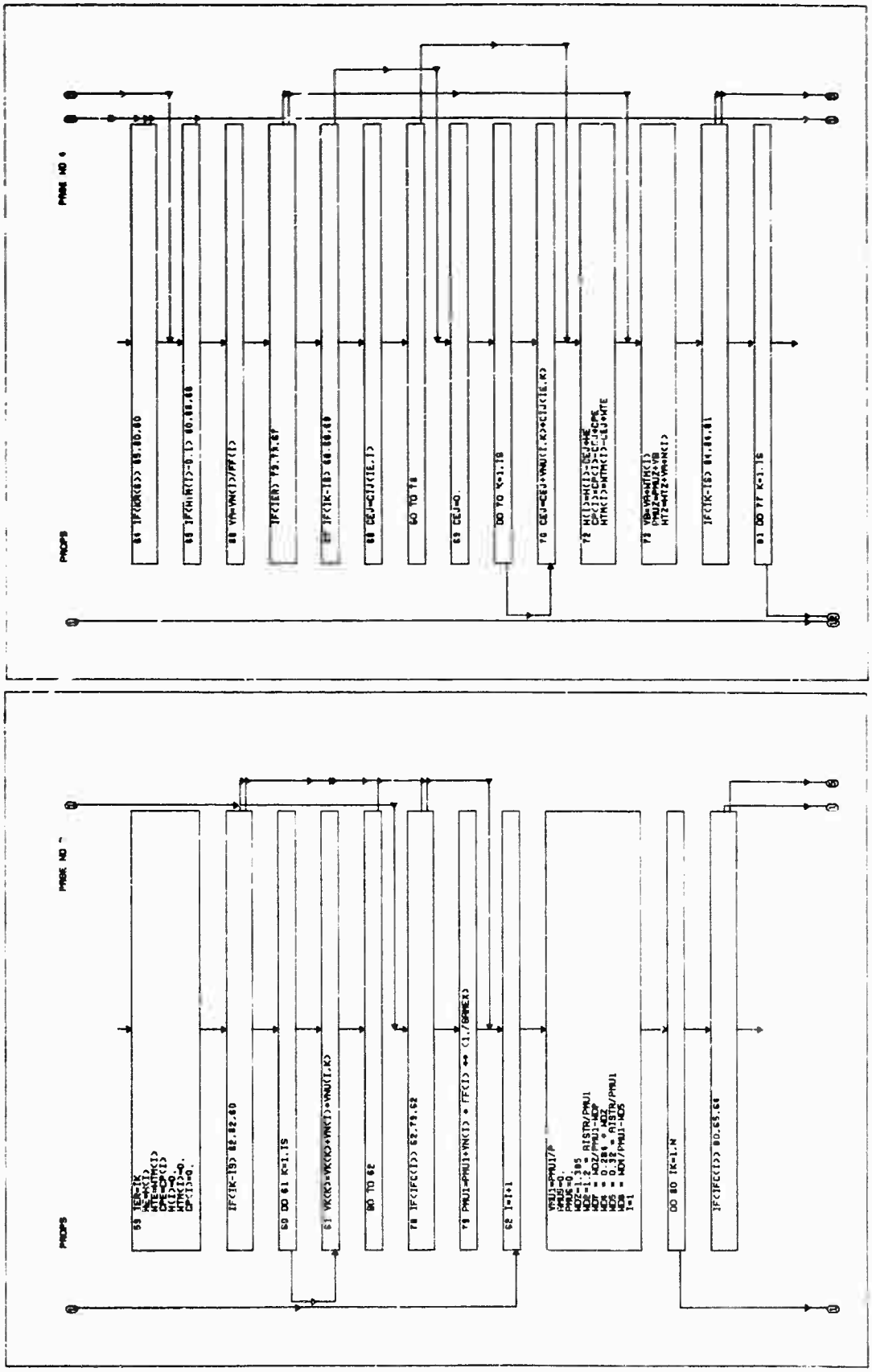

OUTPT
PAGE NO 7
168 CONTINUE
C+++++THE SQUEE CALLS AND FORMAT LST YIELD A COMPRESSED OUTPUT TO BE
C+++++READ AS (E8.4,E8.0,2E8.4,F4.0,E7.0,E8.4,2E8.0,.....)
CALL SQUEE (P,IO(1),4)
CALL SQUEE (W(2),IO(4),4)
CALL SQUEE (BPRM,IO(7),5)
CALL SQUEE (YKIN,IO(10),4)
IO(18) = FAF+100
CALL SQUEE (T,IO(14),8)
CALL SQUEE(ABS(HTR),IO(17),6)
CALL SQUEE (HTIL,IO(20),5)
HIPP=HB/1.8
CALL SQUEE(HIPP,IO(28),8)
KR1=KR1+1
WRITE(KOUT,1875) IO,FAMOA(JC),FAMOB(JC),KR1,TILE
PUNCH 187, IO,FAMOA(JC), FAMOB(JC), KR1,TILE
KR1=KR1-1
187 FORMAT (1X,A1,I1,I4,A1,I1,I8,A1,I1,I4,A1,I1,
1 I4,I8,A1,I1,I4,A1,I1,I8,A1,I1,I8,A1,I1,A4,A2,(I,4X,8A4,A2)
1875 FORMAT(8H (I4,A1,I1,I4,A1,I1,I8,A1,I1,I4,A1,I1,I4,I8,A1,I1,
1 I4,A1,I1,I8,A1,I1,I8,A1,I1,A4,A2,I1,4X,2A4,A2,1H))
IF (KXX(1) - 1) 170,180,170
170 HIPP=HB/1.8
WRITE(KOUT,178)P,W(2),BPRM,T,FAF,HTIL,HIPP,KR1,FAMOA(JC),FAMOB(JC)
1 ,HTR
PUNCH 178, P,W(2),BPRM,T,FAF,HTIL,HIPP,KR1,FAMOA(JC),FAMOB(JC)
1 ,HTR
178 FORMAT(8H (F8.4,2F8.6,F5.4,F5.3,8F8.2,I2,2X,8A4,E10.3,8H))
178 FORMAT (F8.4,8F8.6,F8.4,F5.2,2F8.6,I2,8X,2A4,E10.3)
180 IF(IT9) 271,185,198
271 IF(MT+KR(9)) 284,284,278
279 DO 279 L=1,MT
278 PHR(L)=PHR(L)/AA
WRITE(KOUT,24)(L,PHR(L),L=1,MT)
284 IF(KR(8)) 272,272,272
272 WRITE(KOUT,22)

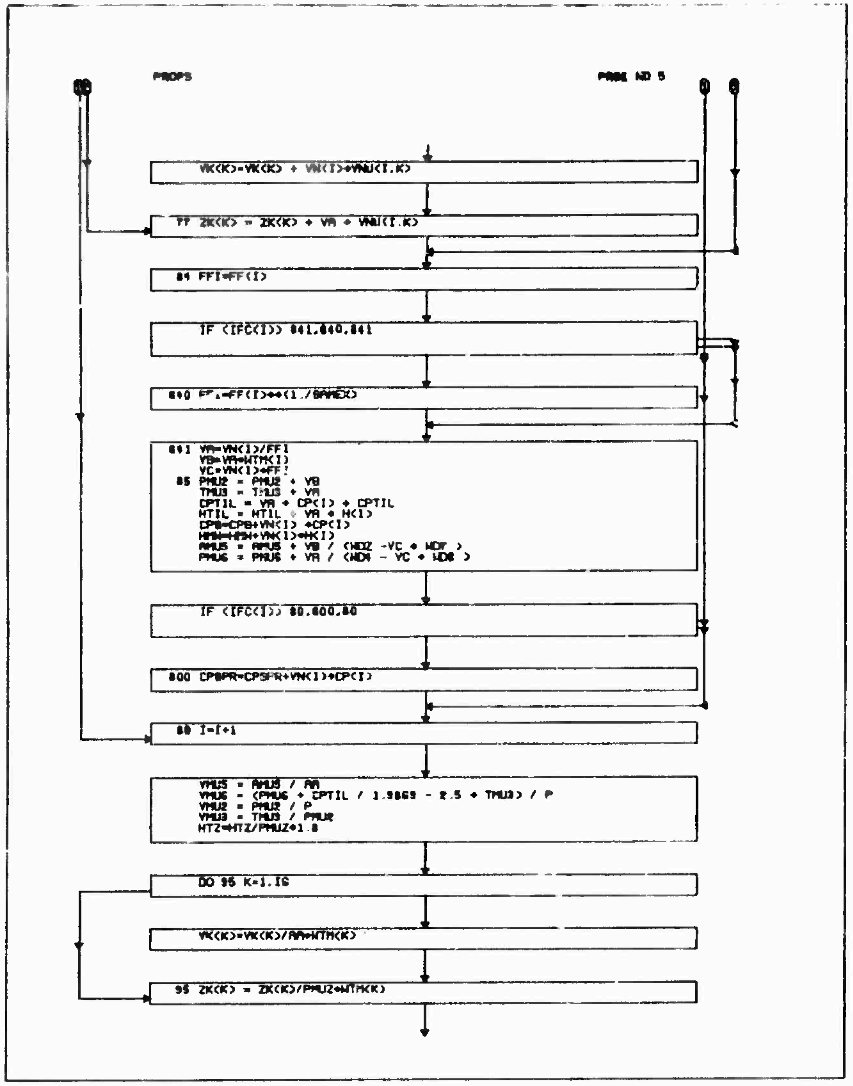

OUTPT
PAGE NO 8
GO TO 108
273 IF(KR(8)) 276,274,274
274 IF(KKJ) 277,275,275
275 WRITE(KOUT,8)
GO TO 108
276 WRITE(KOUT,18)
GO TO 108
277 WRITE(KOUT,19)
108 DO 110 I=1,N
IF(IFC(I)-1) 110,109,110
109 IF(KR(3)) 110,109,109
109 VN(I)=VN(I)/WM+WTM(I)
110 VN(I) = VN(I) / P
IF(NCV) 113,113,180
113 IF(KR(7)-1) 114,114,180

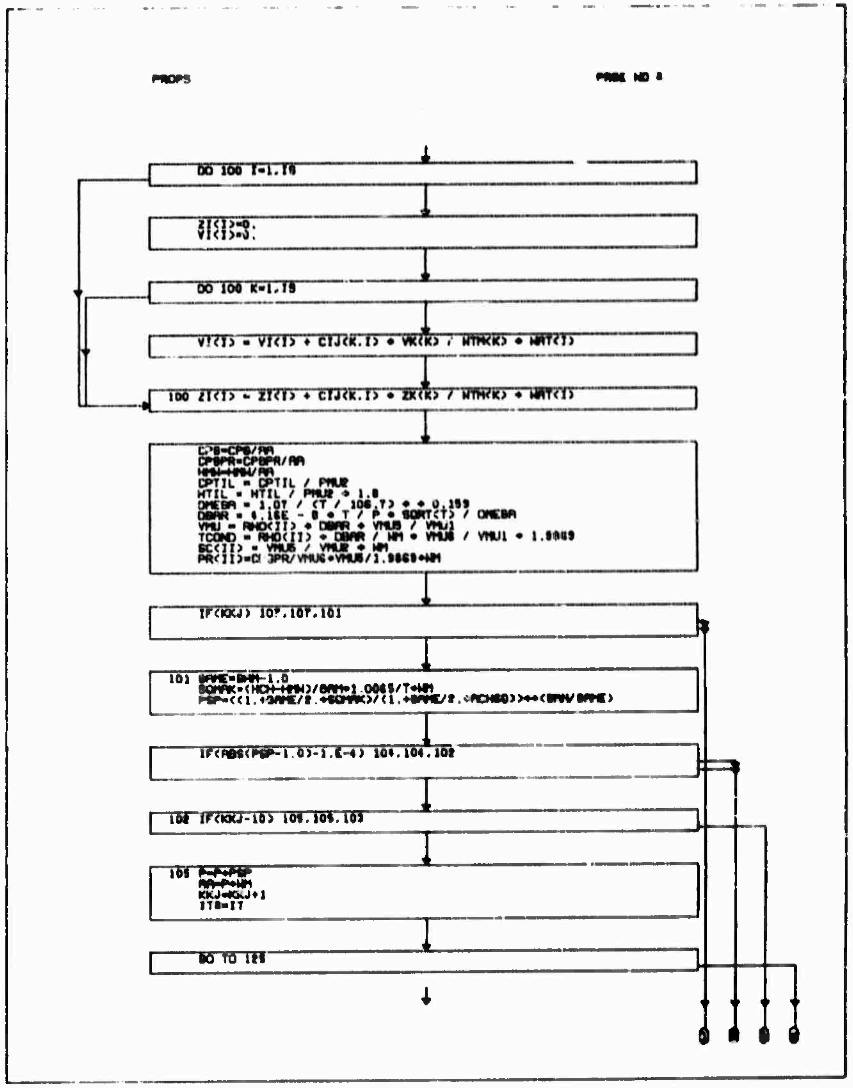

OUTPT
PAGE NO 10
OUTPT
PAGE NO 9

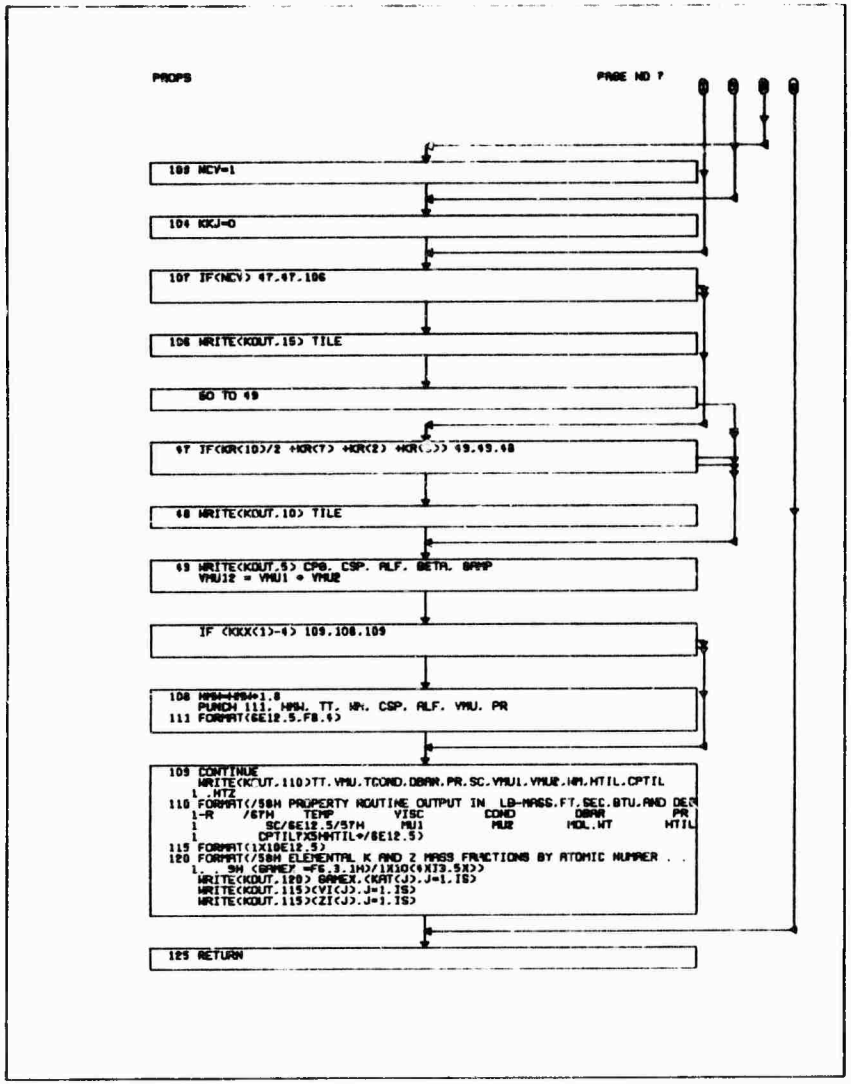

PROPS
PAGE NO 1
SUBROUTINE PROPS
C
C
C SUBROUTINE PROPS
C
C SEE THE FULL LISTING OF THIS ROUTINE FOR--
C + DIMENSION STATEMENTS
C + COMMON STATEMENTS
C + INCLUDE STATEMENTS
C + EQUIVALENCE STATEMENTS
C + DATA STATEMENTS
C
5 FORMAT(//27H DERIVATIVE PROPERTY OUTPUT./57H CP-FROZEN CP-EQUIL
1 DLNP/DLNT DLNP/DLNP GAMMA,/5E12.5)
10 FORMAT(1H1I5X49HGRAPHITE SURFACE KINETICS (BASKET) SOLUTION 9X
1 2PM,A2//)
15 FORMAT (4H1---50H----FOLLOWING OUTPUT NON-CONVERGENT----------
1- 2PM,A2//)
ALF=AK2,1)/AK1,1)
CSP = 1. / (AK1,1) * AA)
IF (MODE - 3) 40,45,40
40 CSP = CSP / T
45 BETA = P * (AK2,2) - AK1,2) / AK1,1) * AK2,1)) - 1.
GAMP=1.-ALF
GAMP=1./(1.+BETA-1.9869/AA*GAMP/CSP*GAMP*P)
IF(KK(5)) 46,44,46
46 GAM=GAMP
44 ITS=-1
MMM=0.
CAPC(1) = 1.
II = 1
MM = AA / P
ISM = IS - 1
TT(II) = T * 1.8
RHOK(I) = AA / (1.3146 * T)
CPGAM(I) = CPF
AISTR = 1.15
C FORM NECESSARY SUMMATIONS
PMU2 = 0.
CPTIL = 0.
MTIL = 0.
MT2=0.
PMJZ=0.
PMJJ = 0.
TMJ2 = 0.
CPG=0.

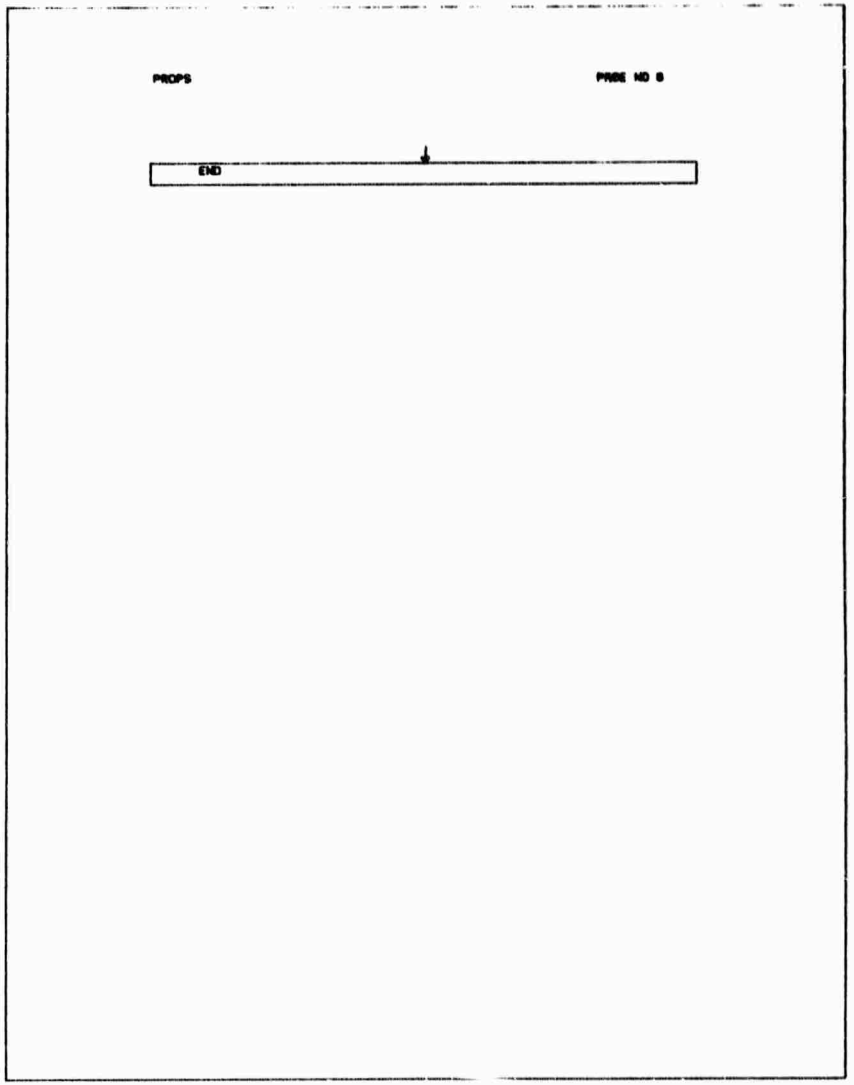

PROPS
PAGE NO 2
CPGAM=0.
IEM=0
IE=0
DO 8? K=1,IS
VK(K)=0.
ZK(K)=0.
IF(WAT(K)-0.1) 81,82,82
81 IE=K
82 IF(IFG(K)) 83,84,83
83 IF(KK(6)) 84,87,87
84 IF(WTN(K)-0.1) 86,86,85
85 ZK(K)=VN(K)/FF(K)
86 VK(K)=VN(K)
87 CONTINUE
I=1
DO 88 IK=1,N
IF(WTN(I)-0.1) 89,90,90

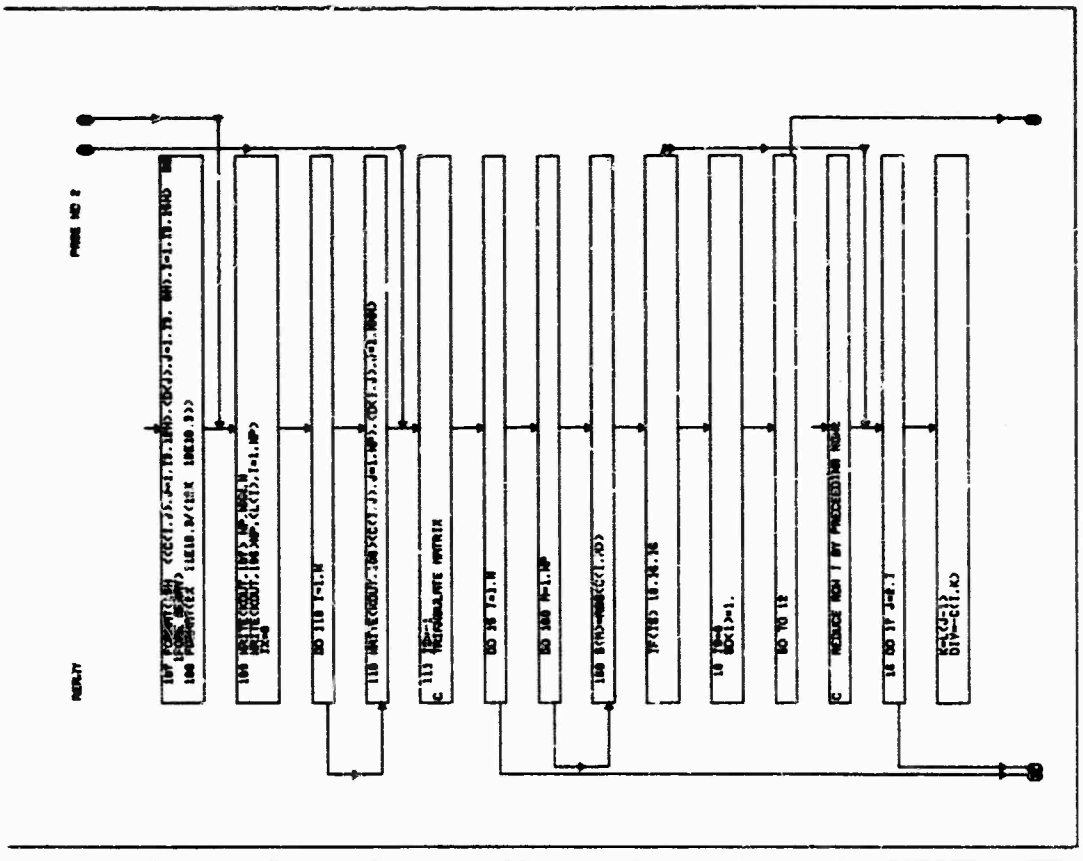

PROPS
PAGE NO 1
PROPS
PAGE NO 2

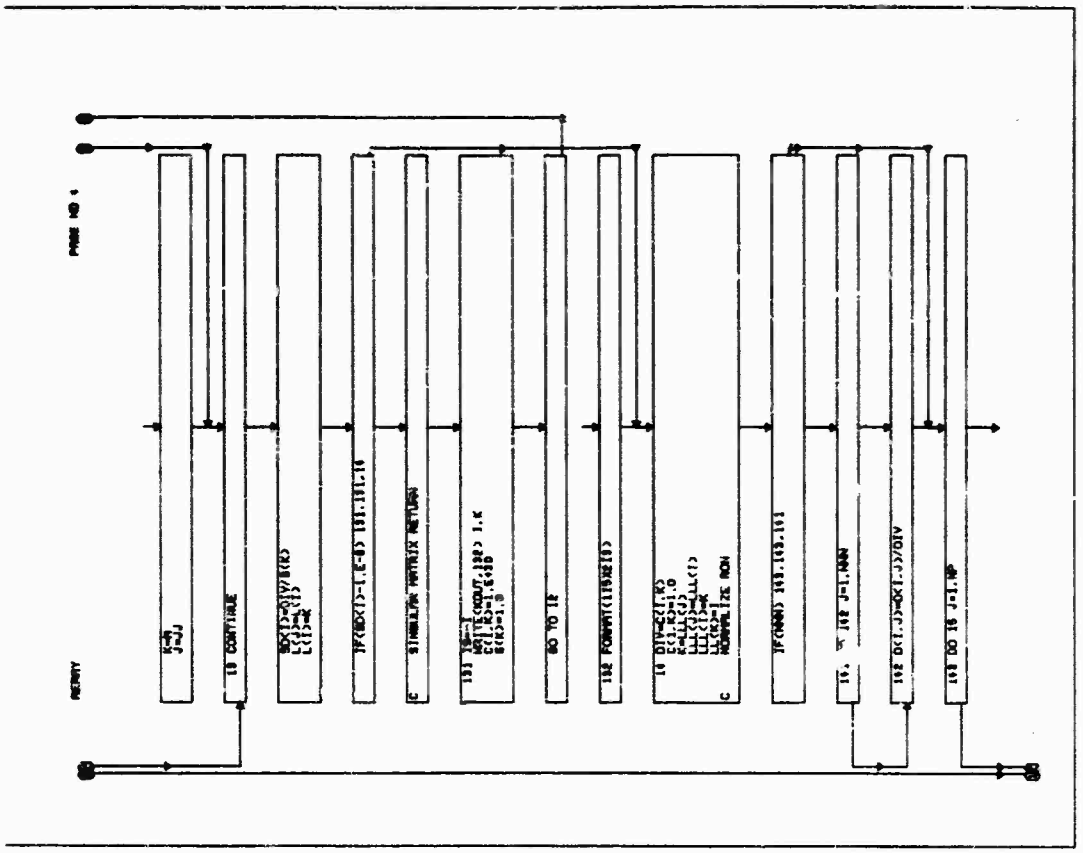

PROPS
PAGE NO 5
VK(K)=VK(K) + VN(I)*VNU(I,K)
77 ZK(K) = ZK(K) + VA * VNU(I,K)
84 FFI=FF(I)
IF (IFC(I)) 841,840,841
841 VA=VN(I)/FFI
VB=VA*WTM(I)
85 PMU2 = PMU2 + VB
CPTIL = VA * CP(I) + CPTIL
IF (IFC(I)) 80,800,80
80 I=I+1
VMU5 = AMU5 / AA
VMU2 = PMU2 / P
VMU3 = TMU3 / PMU2
DO 95 K=1,IS
VK(K)=VK(K)/AA*WTM(K)
95 ZK(K) = ZK(K)/PMU2*WTM(K)

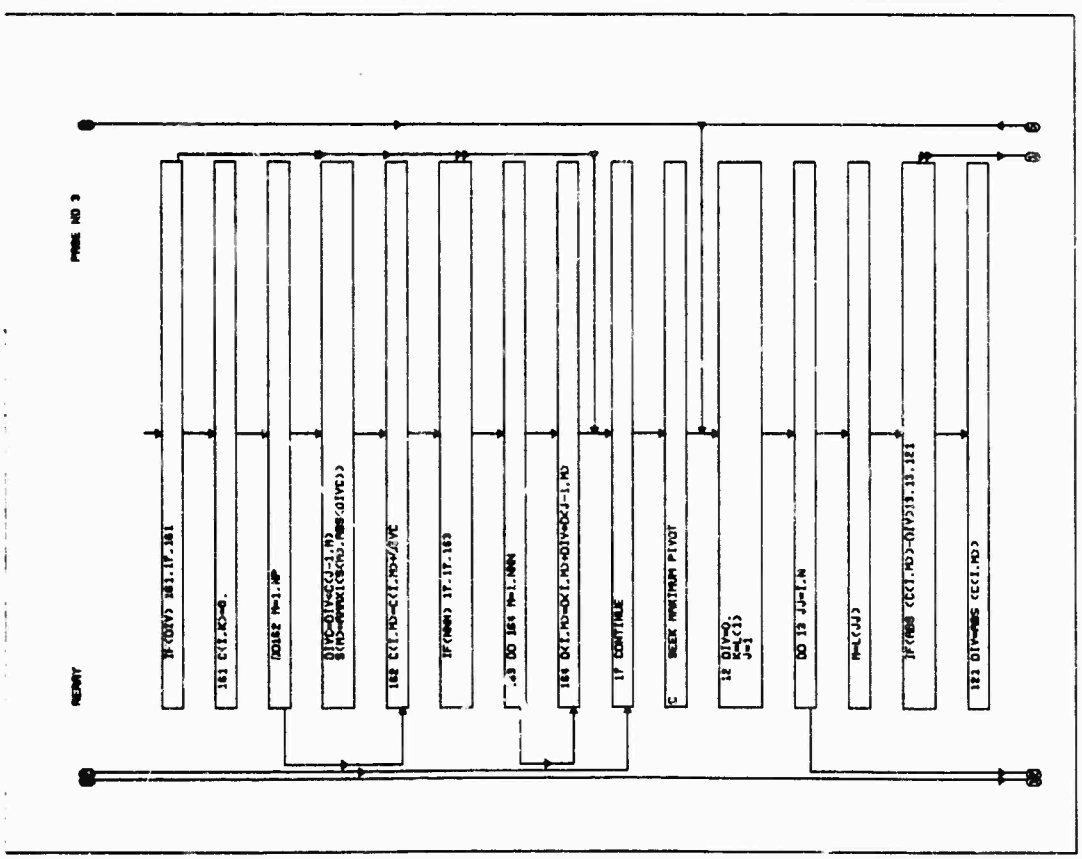

PROPS
DO 100 I=1,IS
DO 100 K=1,IS
100 ZI(I) = ZI(I) + CIJ(K,I) * ZK(K) / WTM(K) * WAT(I)
CPBPR=CPBPR/AA
CPTIL = CPTIL / PMU2
HTIL = HTIL / PMU2 * 1.8
SC(II) = VMU5 / VMU2 * WM
IF(ABS(PSP-1.0)-1.E-4) 104,104,102
KKJ=KKJ+1

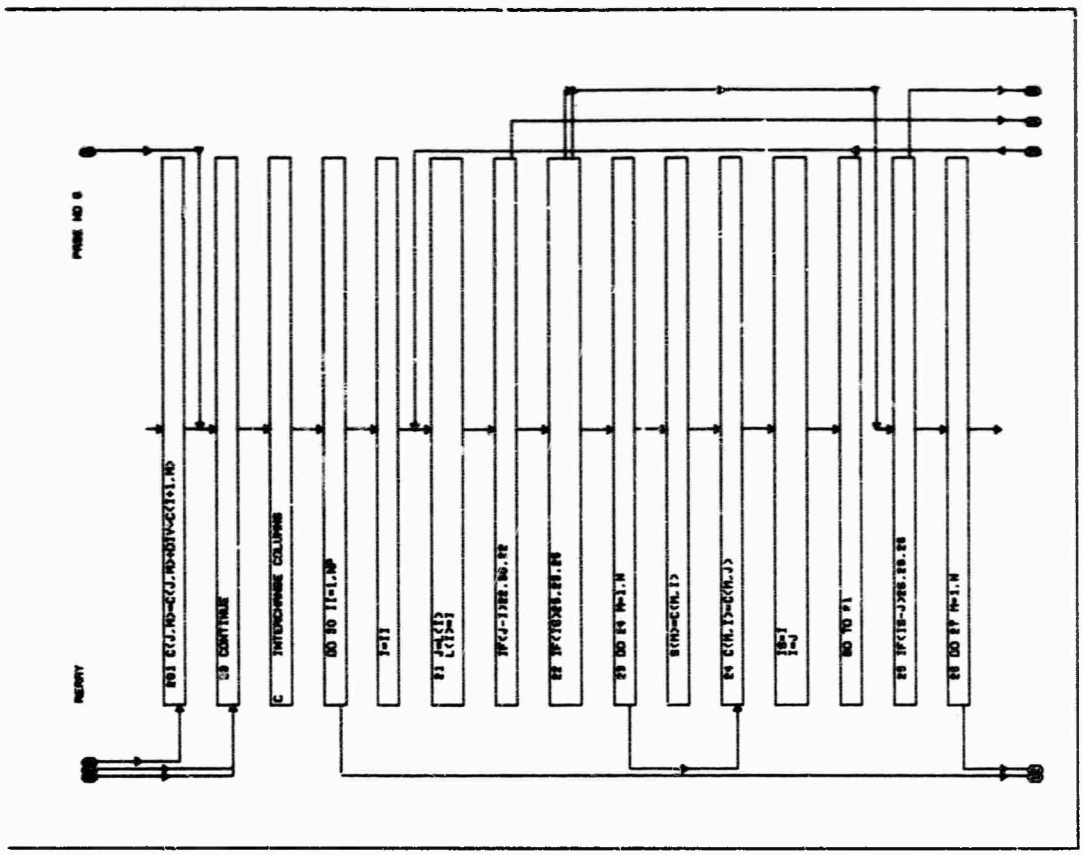

PROPS
PAGE NO 7
100 NCV=1
104 KKJ=0
107 IF(NCV) 47,47,106
106 WRITE(KOUT,15) TILE
GO TO 49
47 IF(KR(10)/2 +KR(7) +KR(2) +KR(
48 WRITE(KOUT,10) TILE
49 WRITE(KOUT,5) CP0, CSP, ALF, BETA, GAMP
VMU12 = VMU1 + VMU2
IF (KKX(1)-4) 109,108,109
108
PUNCH 111, HMW, TT, HN, CSP, ALF, VMU, PR
111 FORMAT(6E12.5,F8.6)
109 CONTINUE
WRITE(KOUT,110)TT,VMU,TCOND,DBAR,PR,SC,VMU1,VMU2,HM,HTIL,CPTIL
1 ,HTZ
110 FORMAT(/58H PROPERTY ROUTINE OUTPUT IN LB-MASS,FT,SEC,BTU,AND DE
1-R /6TH TEMP VISC COND DBAR PR
1 SC/6E12.5/57H MU1 MU2 MOL.WT HTIL
1 CPTILTXSHATIL+/6E12.5)
115 FORMAT(1X10E12.5)
120 FORMAT(/58H ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . .
1 . 9H (GAMEF =F6.3,1H)/1X10(4XI3.5X))
WRITE(KOUT,120) GAMEX,(KAT(J),J=1,IS)
WRITE(KOUT,115)(VI(J),J=1,IS)
WRITE(KOUT,115)(ZI(J),J=1,IS)
125 RETURN

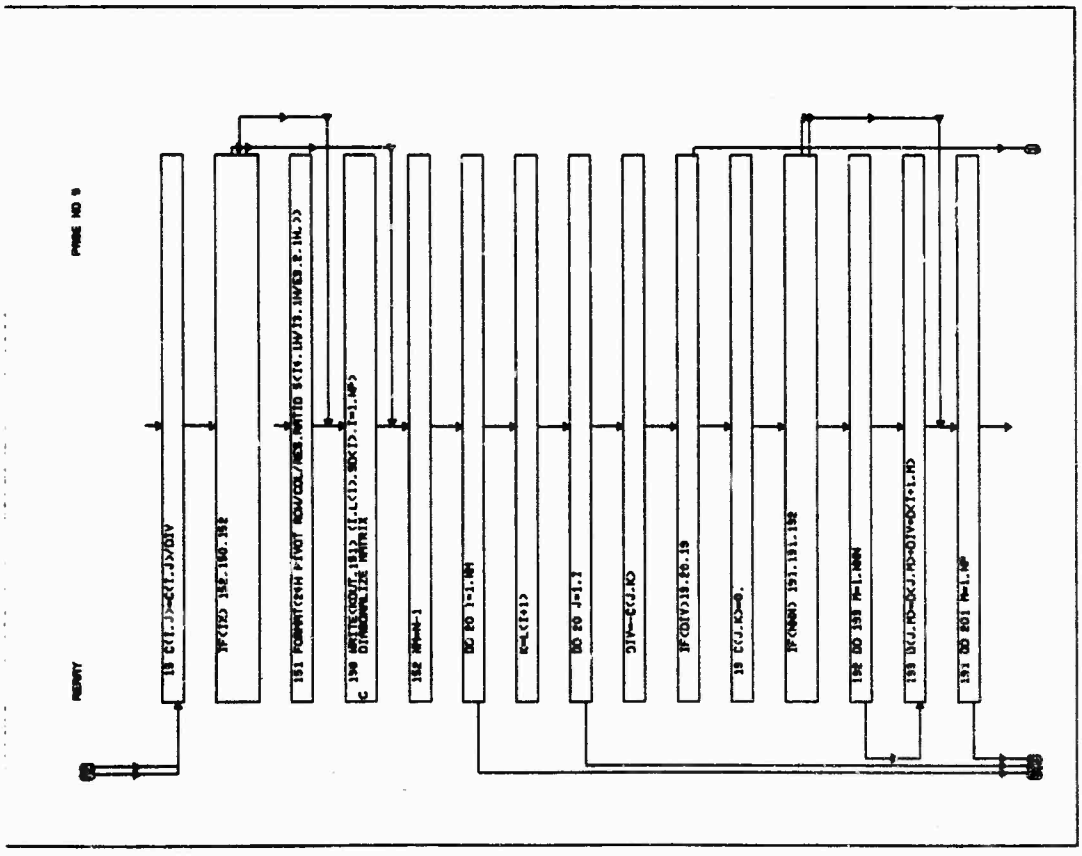

PROPS
PAGE NO 8
END

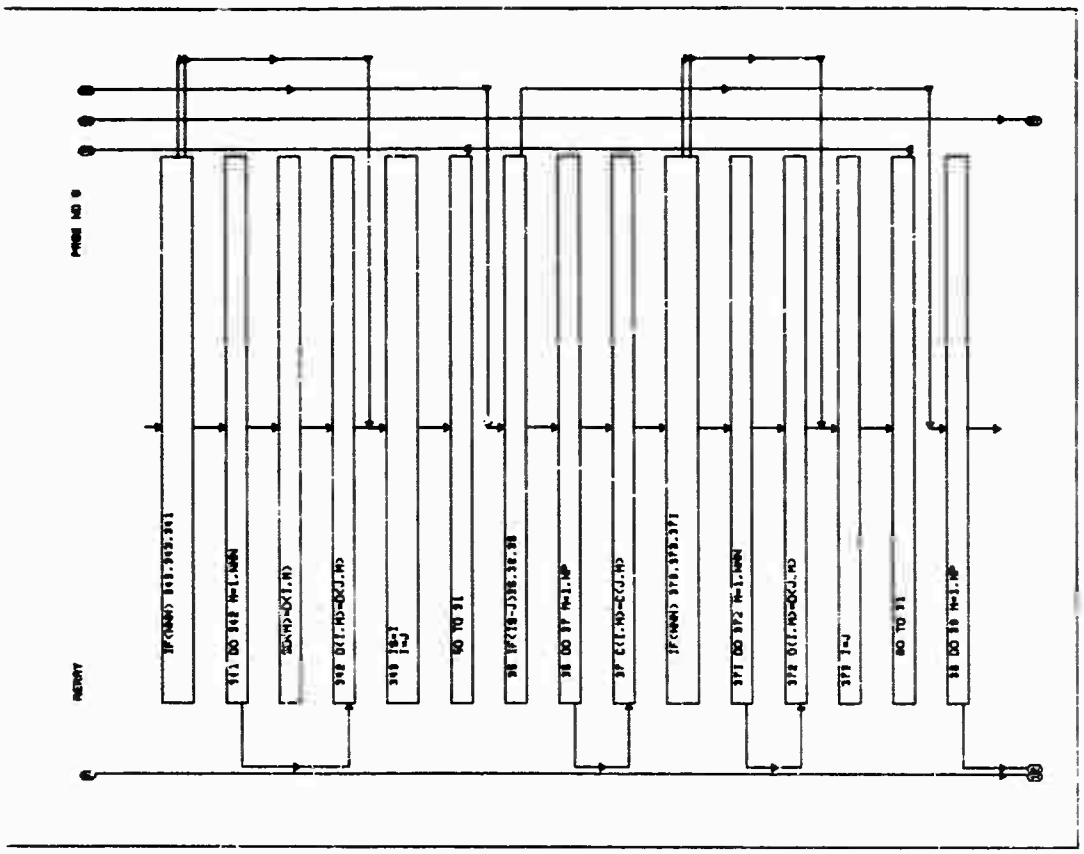

PHASE NO 2
RERAY
SUBROUTINE RERAY
SEE THE FULL LISTING OF THIS ROUTINE FOR--
DIMENSION STATEMENTS
COMMON STATEMENTS
INCLUDE STATEMENTS
EQUIVALENCE STATEMENTS
DATA STATEMENTS
PHASE NO 1
RERAY
SUBROUTINE RERAY
SEE THE FULL LISTING OF THIS ROUTINE FOR--
DIMENSION STATEMENTS
COMMON STATEMENTS
INCLUDE STATEMENTS
EQUIVALENCE STATEMENTS
DATA STATEMENTS

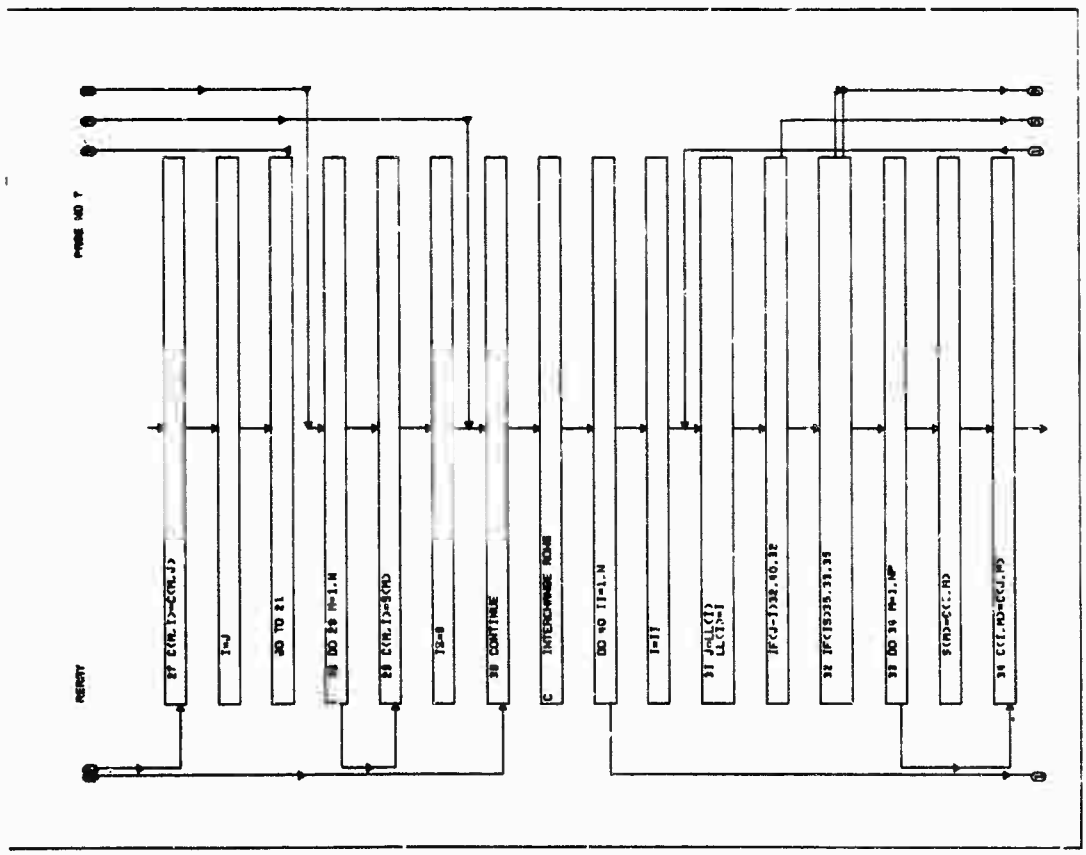


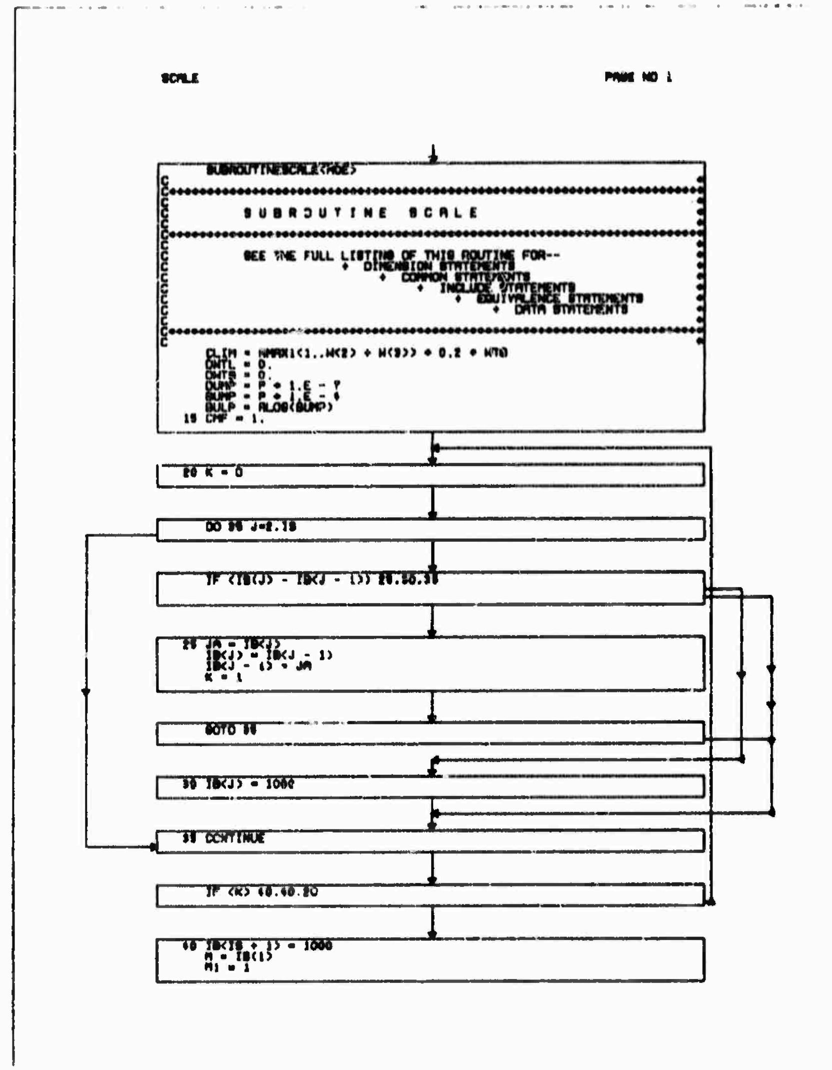


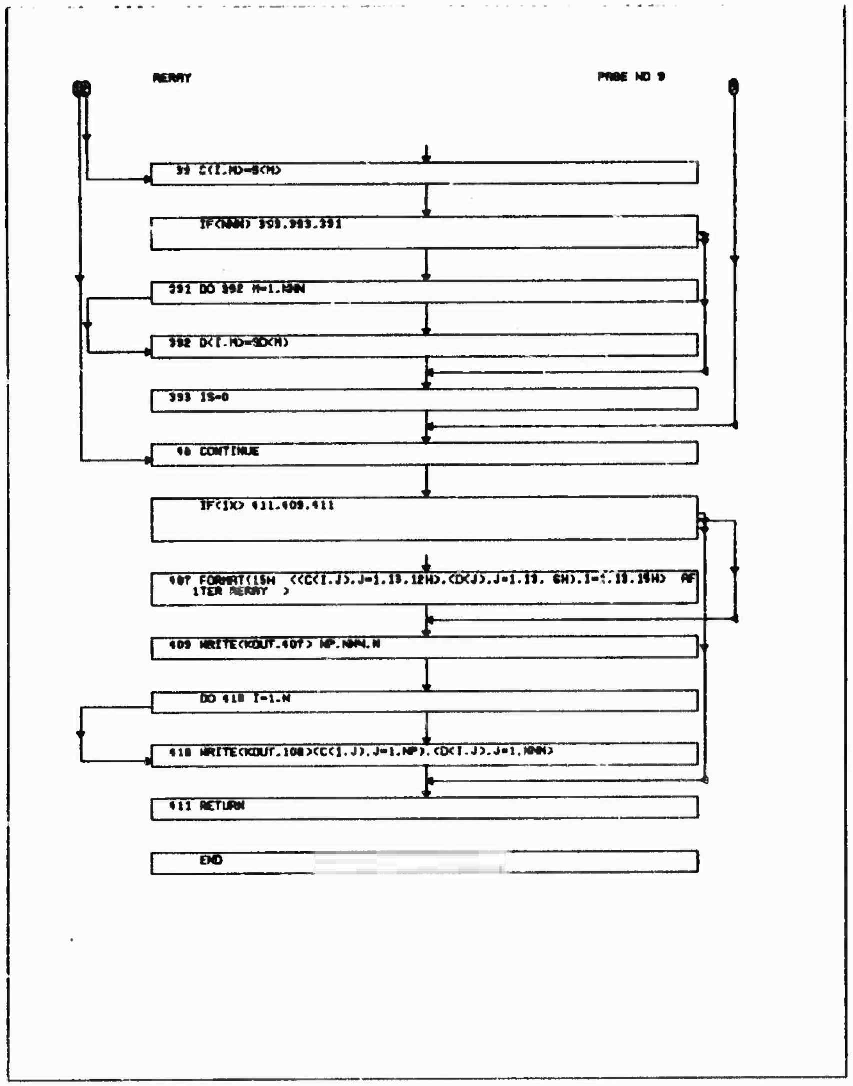


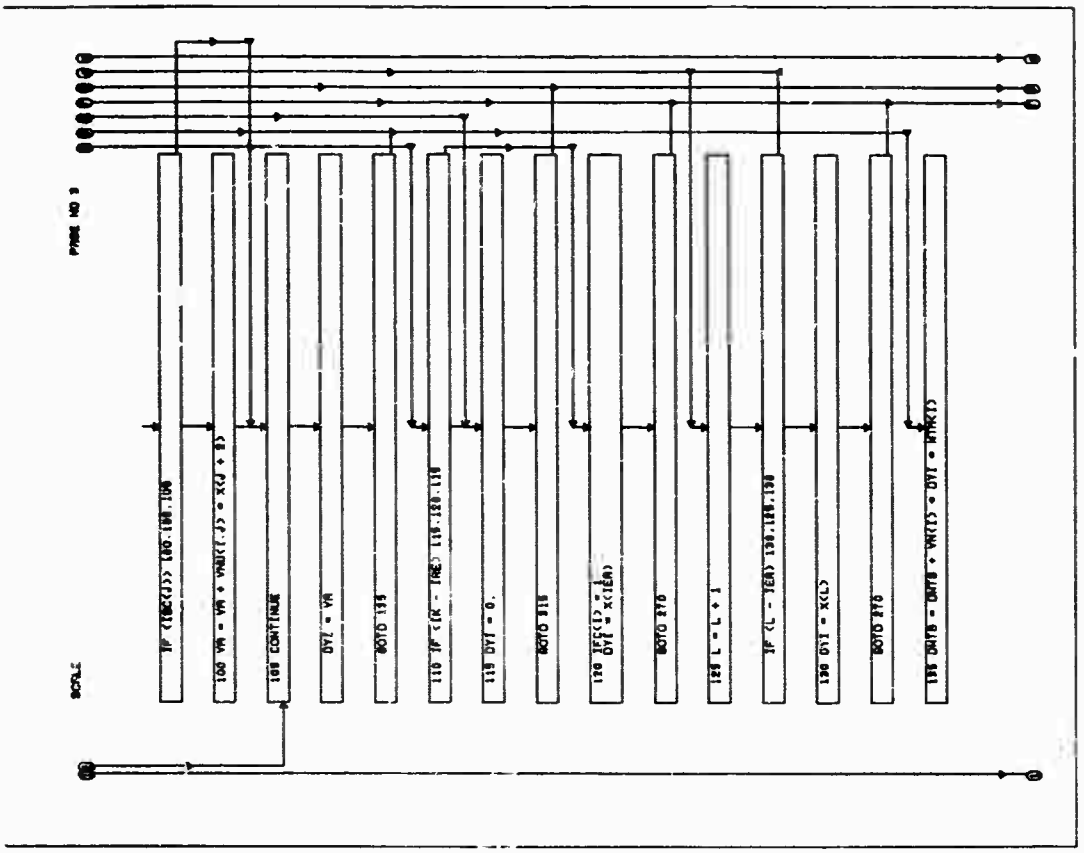


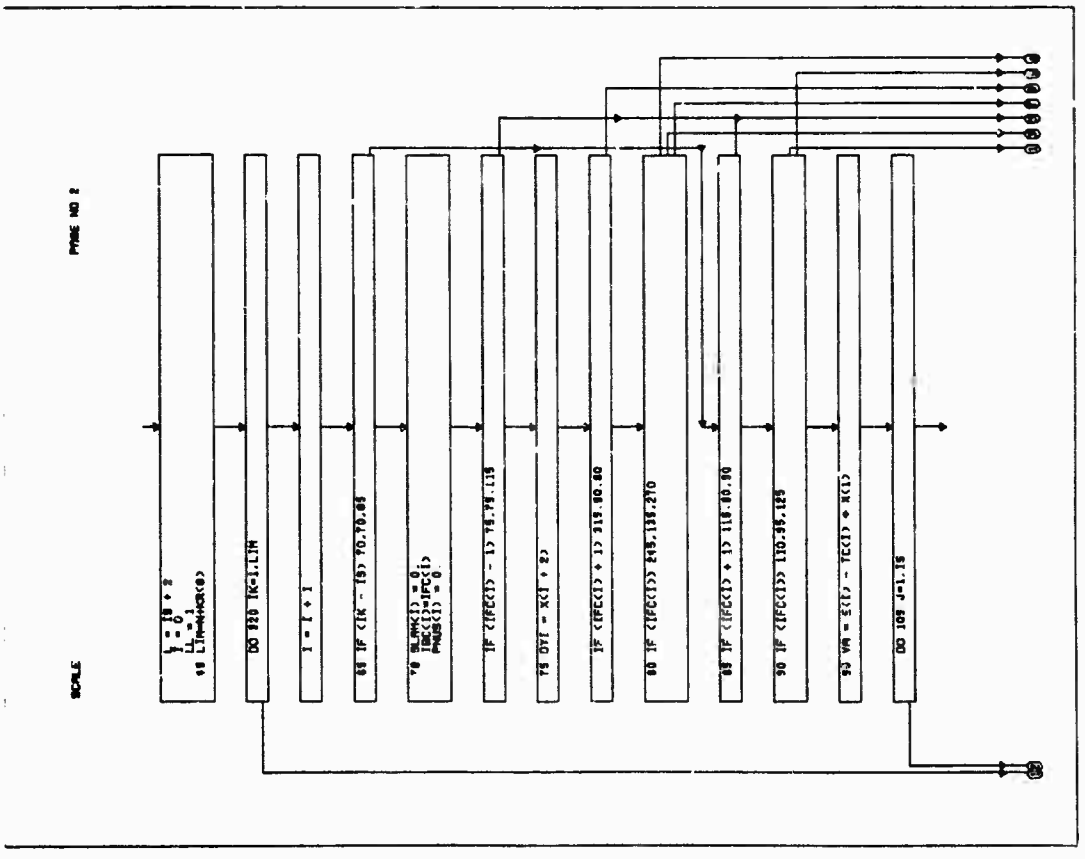


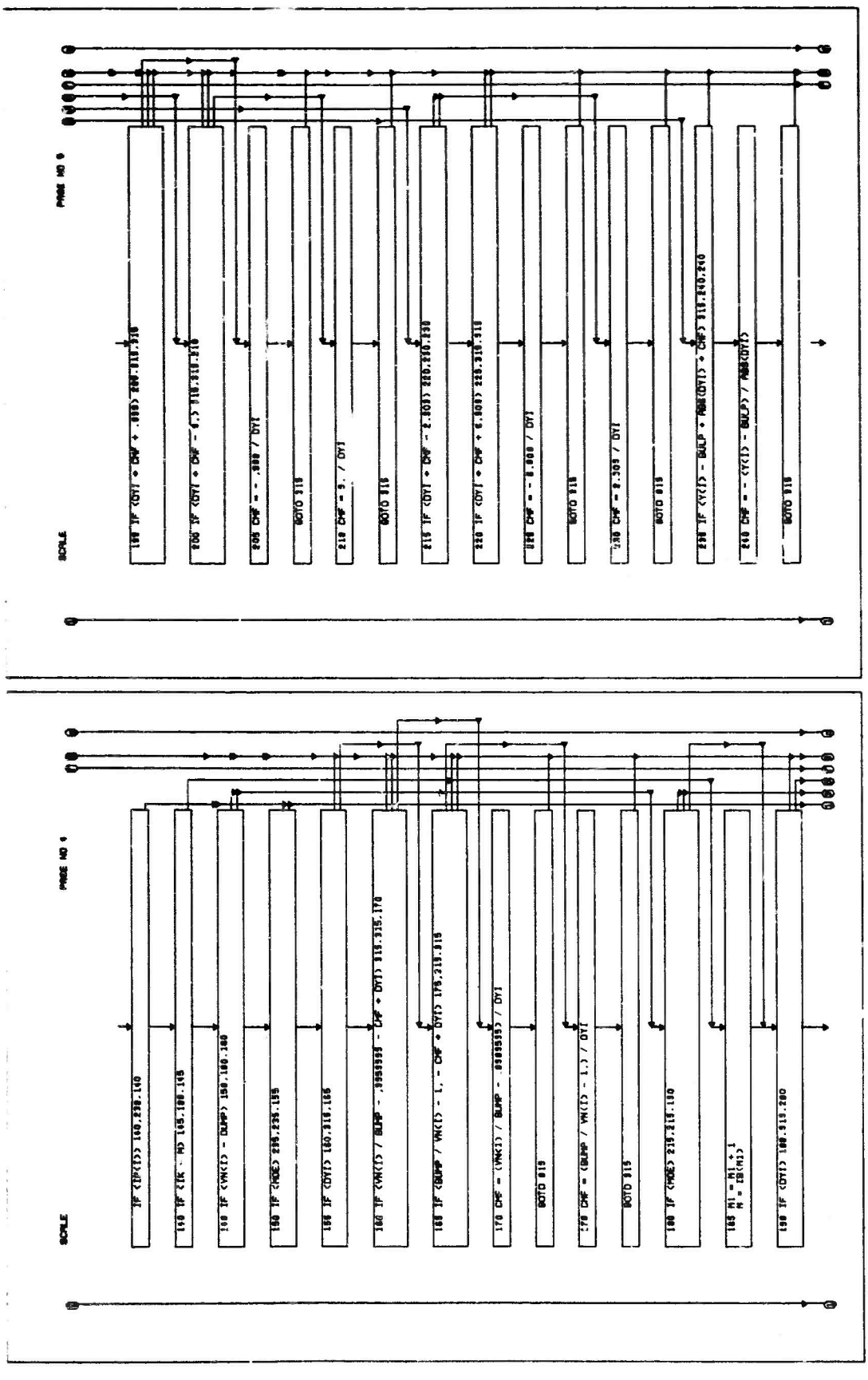


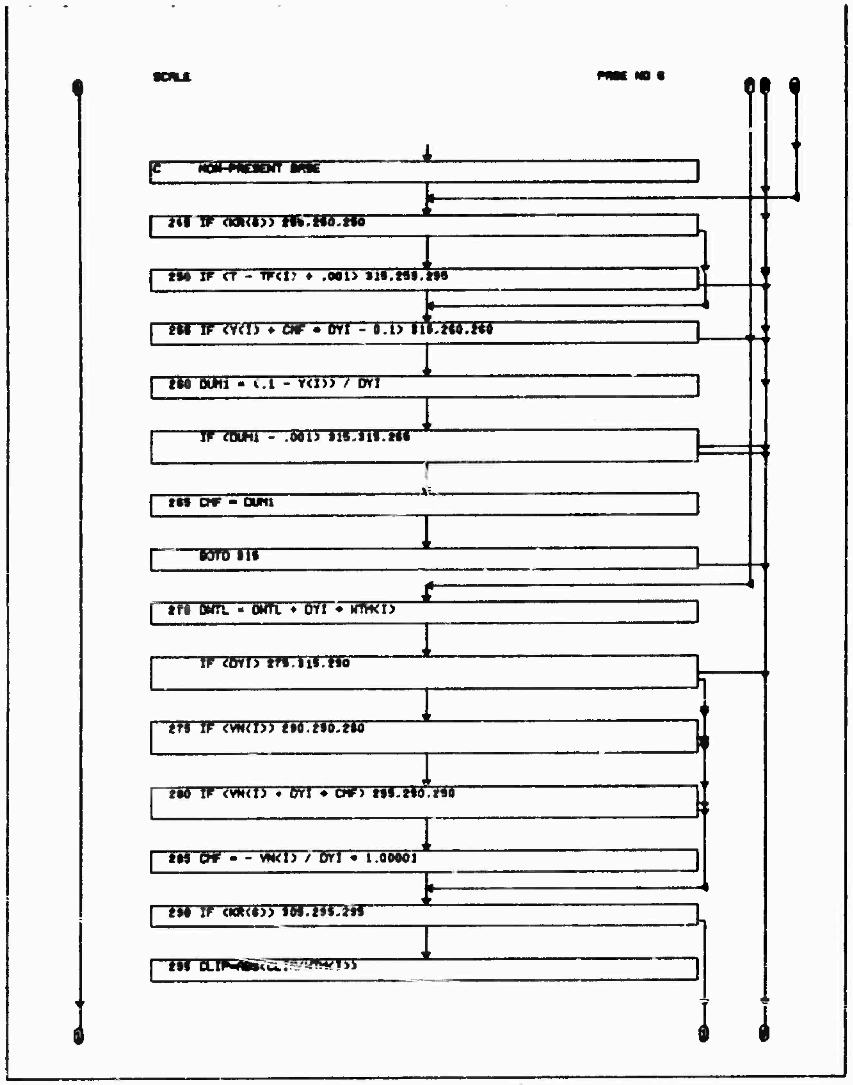

SCALE
PAGE NO 1
SUBROUTINESCALE(MDE)
SUBROUTINE SCALE
SEE THE FULL LISTING OF THIS ROUTINE FOR--
+ DIMENSION STATEMENTS
+ COMMON STATEMENTS
+ INCLUDE STATEMENTS
+ EQUIVALENCE STATEMENTS
+ DATA STATEMENTS
CLIM = AMAX1(1.,W(2) + W(3)) + 0.2 + WTO
ONTL = 0.
ONTS = 0.
DUMP = P + 1.E - 7
BUMP = P + 1.E - 6
BULP = ALOG(BUMP)
15 CMF = 1.
20 K = 0
DO 35 J=2,15
IF (IB(J) - IB(J - 1)) 25,30,35
25 JA = IB(J)
IB(J) = IB(J - 1)
IB(J - 1) = JA
K = 1
GOTO 35
30 IB(J) = 1000
35 CONTINUE
IF (K) 40,40,20
40 IB(15 + 1) = 1000
M = IB(1)
M1 = 1

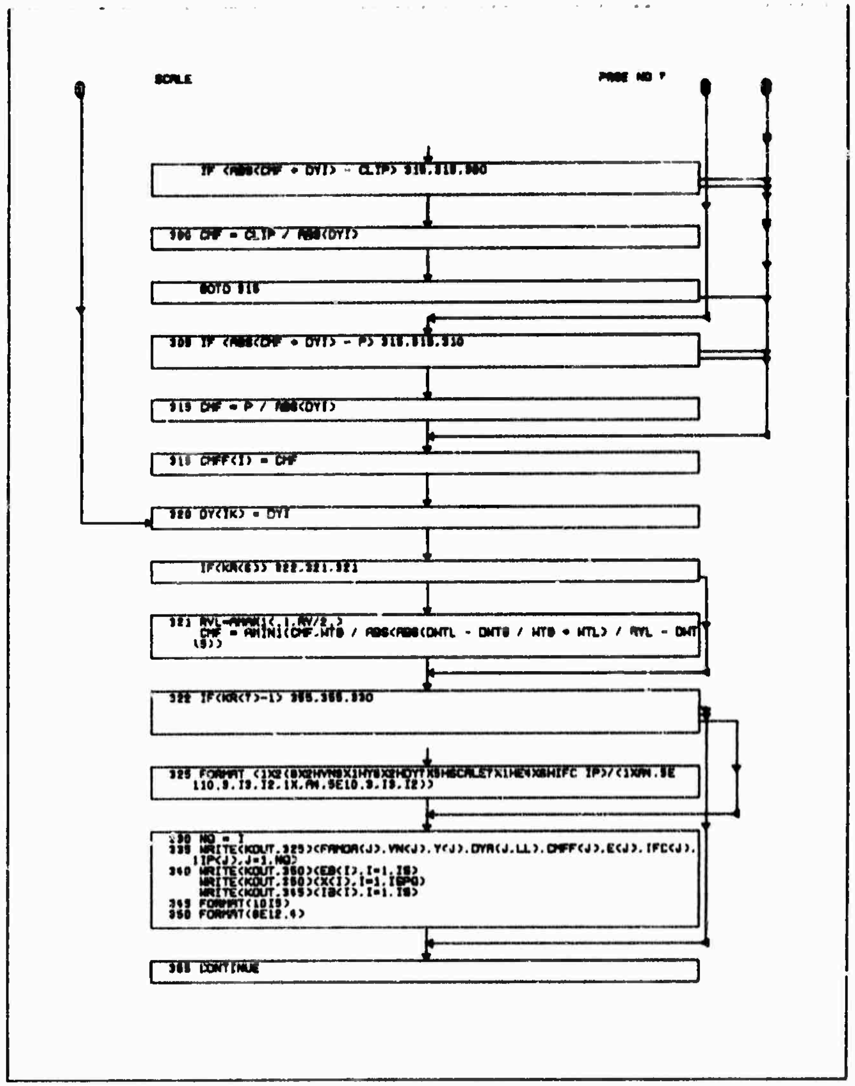

MERRY
PAGE NO 9
39 C(I,M)=B(M)
IF(NNN) 393,393,391
391 DO 392 M=1,NNN
392 D(I,M)=SD(M)
393 IS=0
40 CONTINUE
IF(IX) 411,409,411
407 FORMAT(15H ((C(I,J),J=1,13,12H),(D(J),J=1,13, 6H),I=(,13,15H) AF
1TER MERRY)
409 WRITE(KOUT,407) NP,NNN,N
DO 410 I=1,N
410 WRITE(KOUT,108)(C(I,J),J=1,NP),(D(I,J),J=1,NNN)
411 RETURN
END

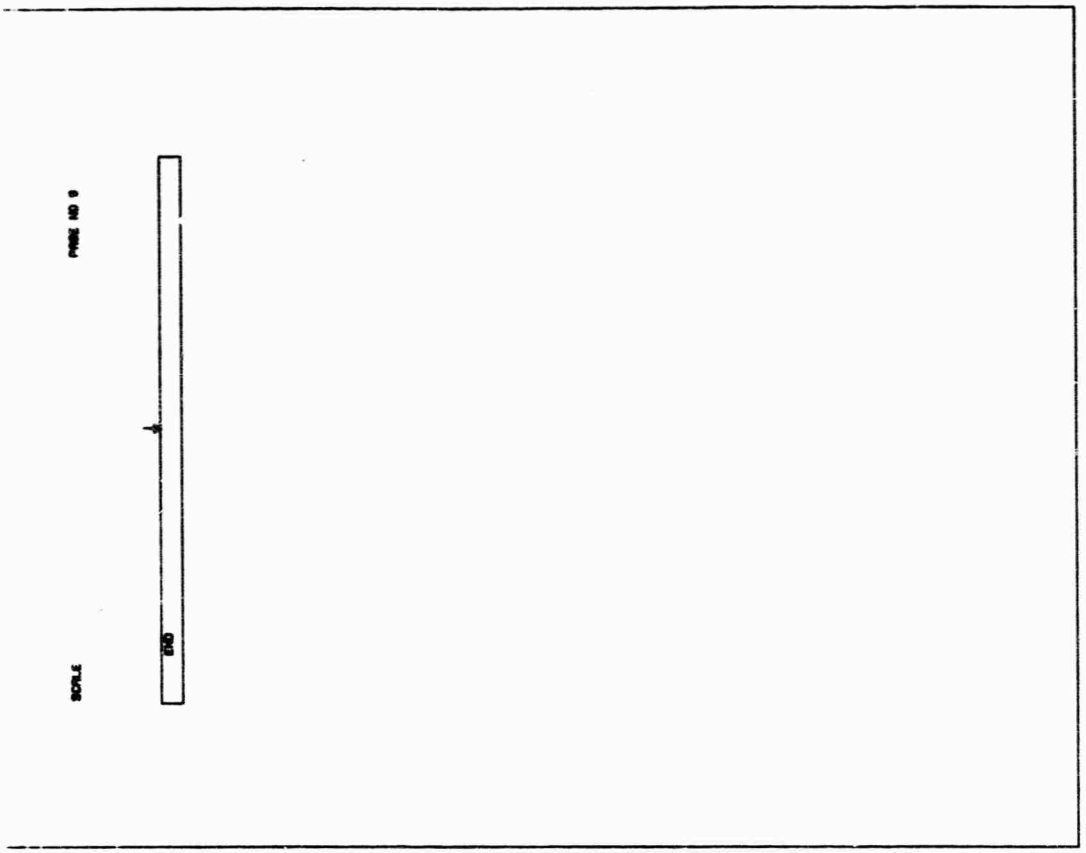


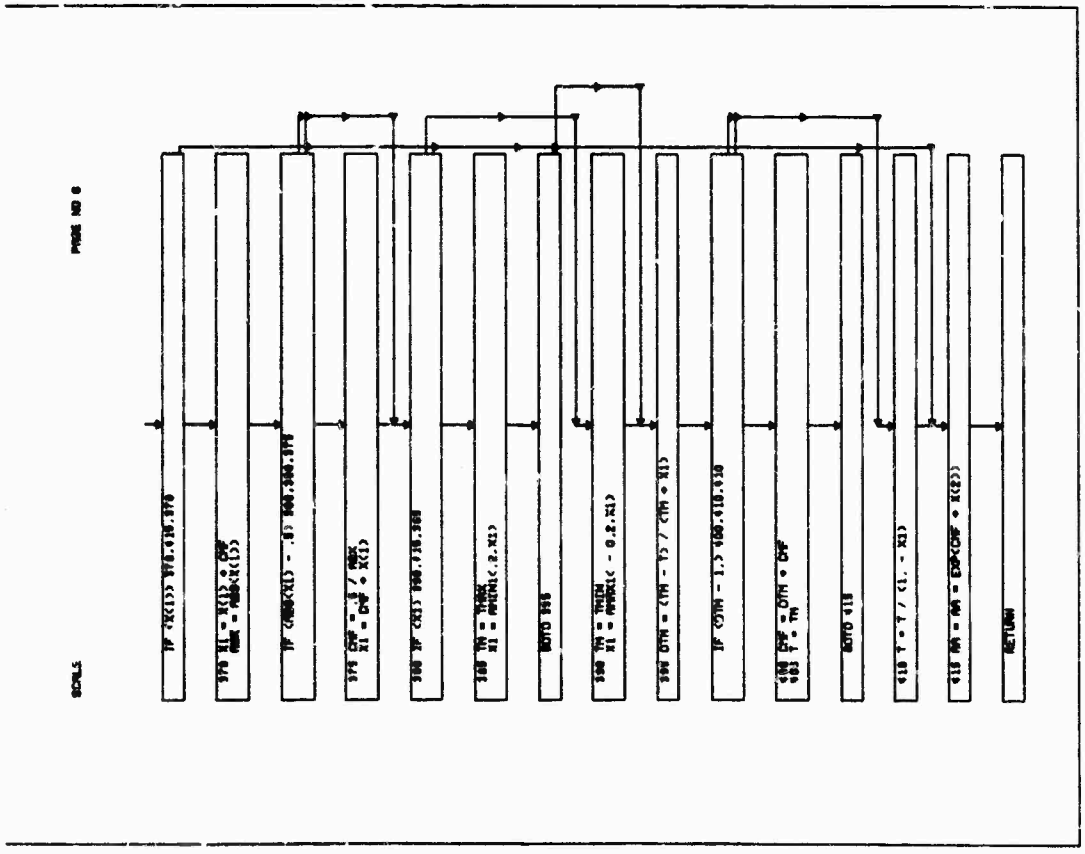


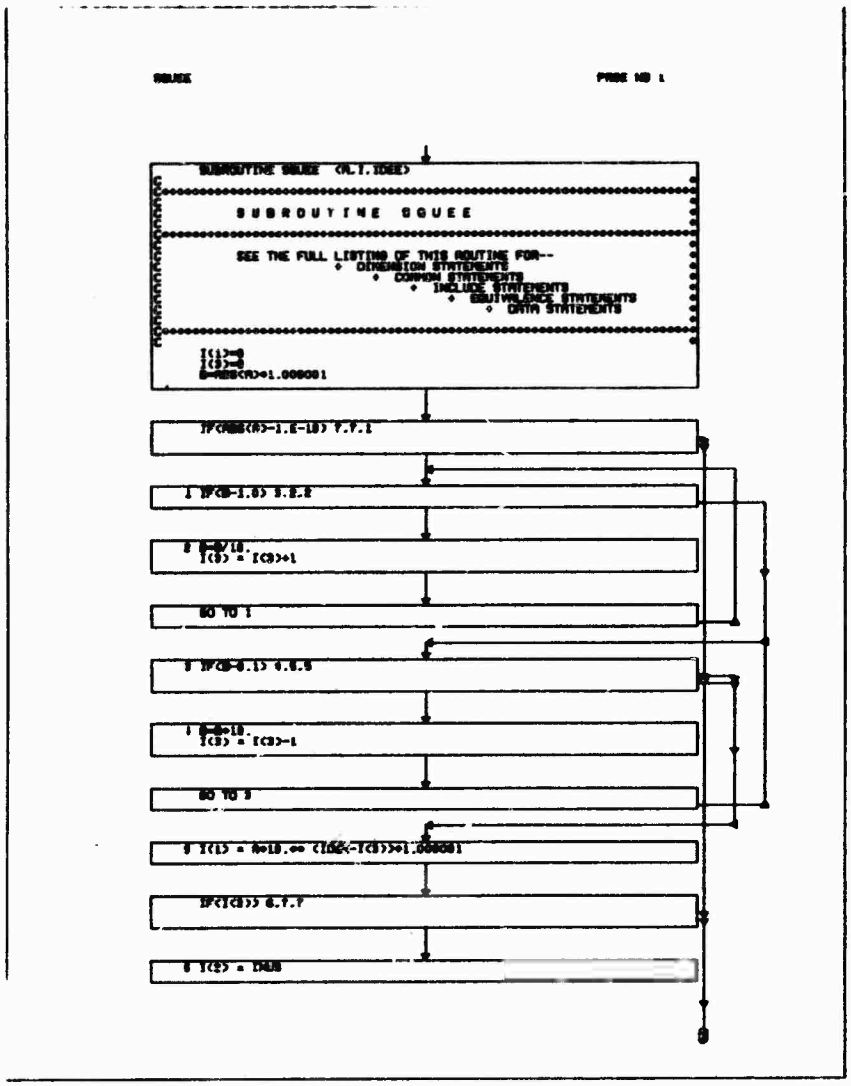


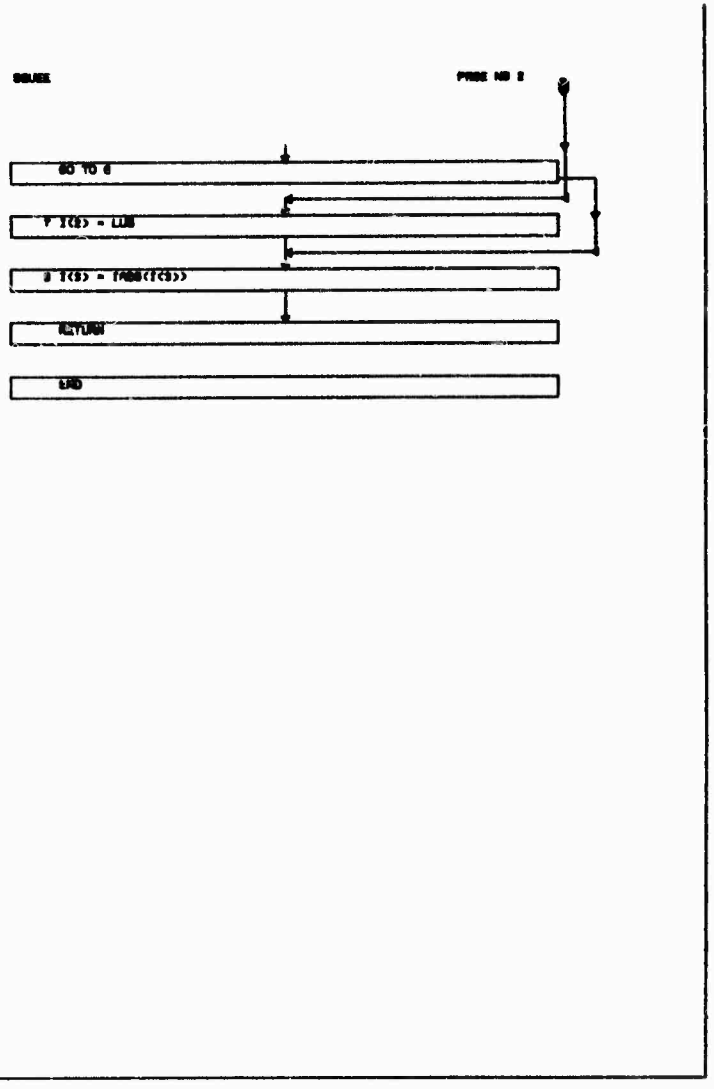

SCALE
PAGE NO 6
C NON-PRESENT BASE
245 IF (KR(6)) 255,250,250
250 IF (T - TF(I) + .001) 315,255,255
255 IF (Y(I) + CHF * DYI - 0.1) 315,260,260
260 DUM1 = (.1 - Y(I)) / DYI
IF (DUM1 - .001) 315,315,265
265 CHF = DUM1
GOTO 315
270 DNTL = DNTL + DYI * WTH(I)
IF (DYI) 275,315,290
275 IF (VN(I)) 290,290,280
280 IF (VN(I) + DYI * CHF) 295,290,290
285 CHF = - VN(I) / DYI * 1.00001
290 IF (KR(6)) 305,295,295
295 CLIP=ABS(

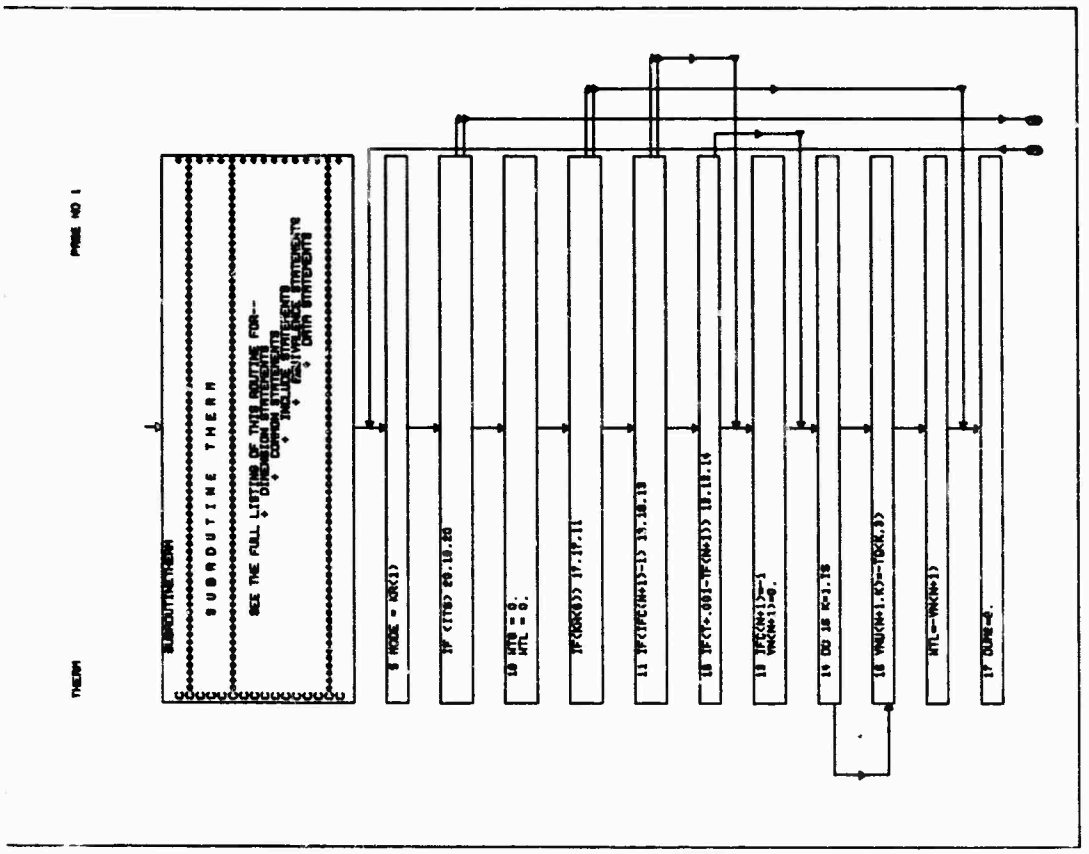

SCALE
PAGE NO 7
IF (ABS(CHF * DYI) - CLIP) 315,315,300
300 CHF = CLIP / ABS(DYI)
GOTO 315
305 IF (ABS(CHF * DYI) - P) 315,315,310
310 CHF = P / ABS(DYI)
315 CHFF(I) = CHF
320 DY(IK) = DYI
IF(KR(6)) 322,321,321
321 AVL=AMAX1(.1,AV/2.)
CHF = AMIN1(CHF,WT8 / ABS(ABS(DNTL - DNT8 / WT8 + WTL) / AVL - DNT
(5))
322 IF(KR(7)-1) 365,365,330
325 FORMAT (1X2(8X2HVN8X1HY8X2HDYT X5HSCALE7X1HE4X8HIFC IP)/(1XA4,3E
110.3,I3,I2,1X,A4,3E10.3,I3,I2))
330 NQ = I
335 WRITE(KOUT,325)(FAMOR(J),VN(J),Y(J),DYR(J,LL),CHFF(J),E(J),IFC(J),
1IP(J),J=1,NQ)
340 WRITE(KOUT,350)(EB(I),I=1,IS)
WRITE(KOUT,350)(X(I),I=1,ISPG)
WRITE(KOUT,345)(IB(I),I=1,IS)
345 FORMAT(10I5)
350 FORMAT(8E12.4)
365 CONTINUE

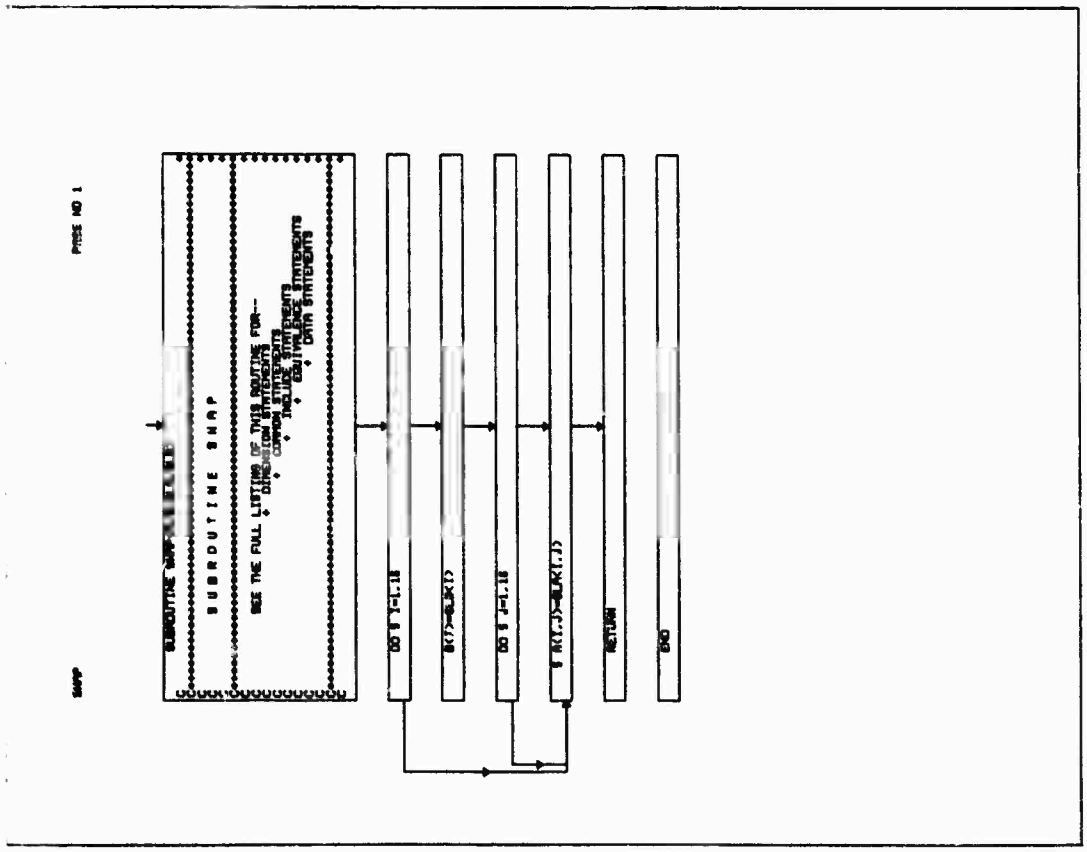

SCALE
PAGE NO 0
END

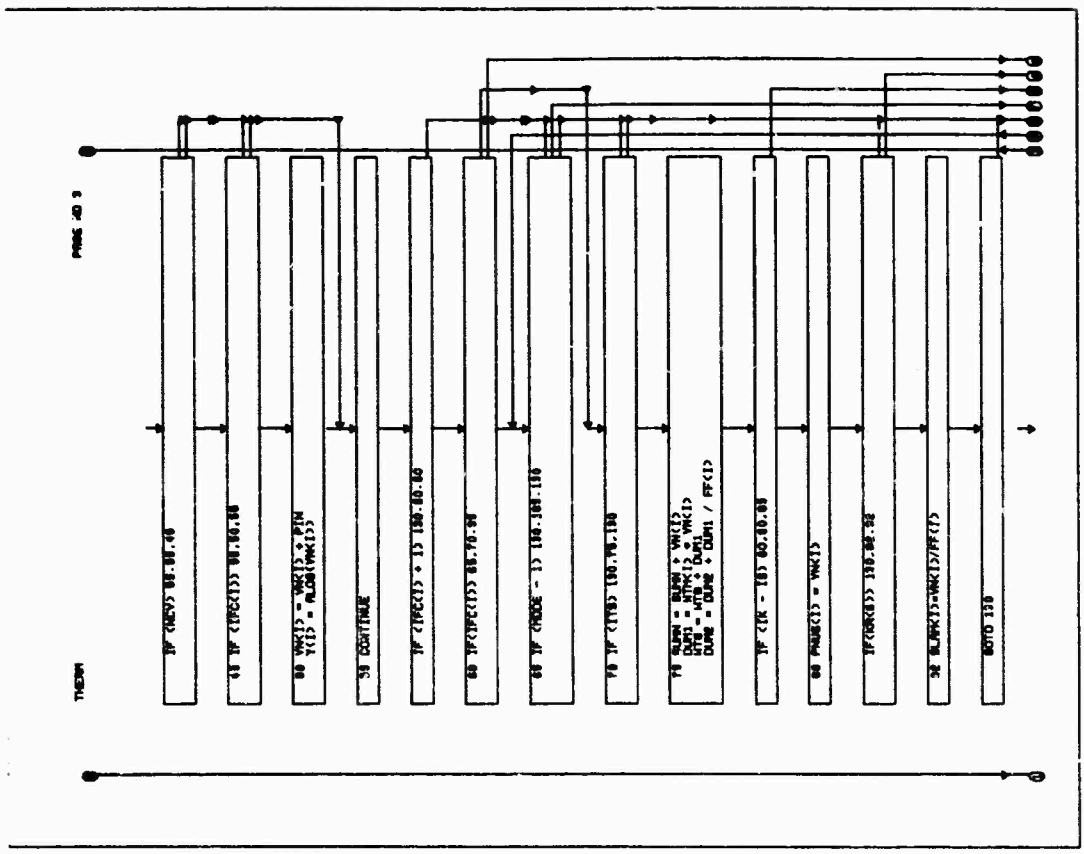

SCALE
PAGE NO 0
RETURN

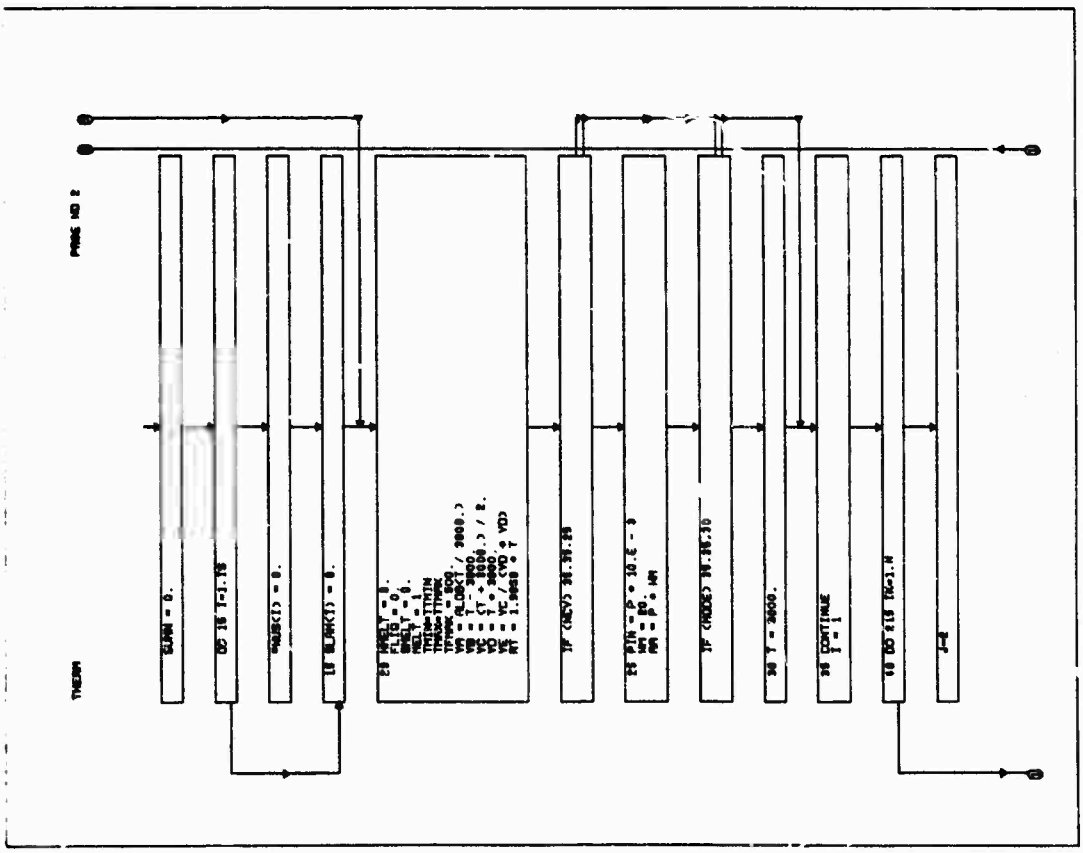

SQUEE
PAGE NO 1
SUBROUTINE SQUEE (N,I,SQEE)
SUBROUTINE SQUEE
SEE THE FULL LISTING OF THIS ROUTINE FOR--
◊ DIMENSION STATEMENTS
◊ COMMON STATEMENTS
◊ INCLUDE STATEMENTS
◊ EQUIVALENCE STATEMENTS
◊ DATA STATEMENTS
I(1)=0
I(2)=0
B=ABS(A)+1.000001
IF(ABS(B)-1.E-18) 7,7,1
1 IF(B-1.0) 3,2,2
2 B=B/10.
I(2) = I(2)+1
GO TO 1
3 IF(B-0.1) 4,6,6
4 B=B*10.
I(2) = I(2)-1
GO TO 3
5 I(1) = B*10.** (ISGN(-I(2))+1.000001
IF(I(2)) 6,7,7
6 I(2) = IABS

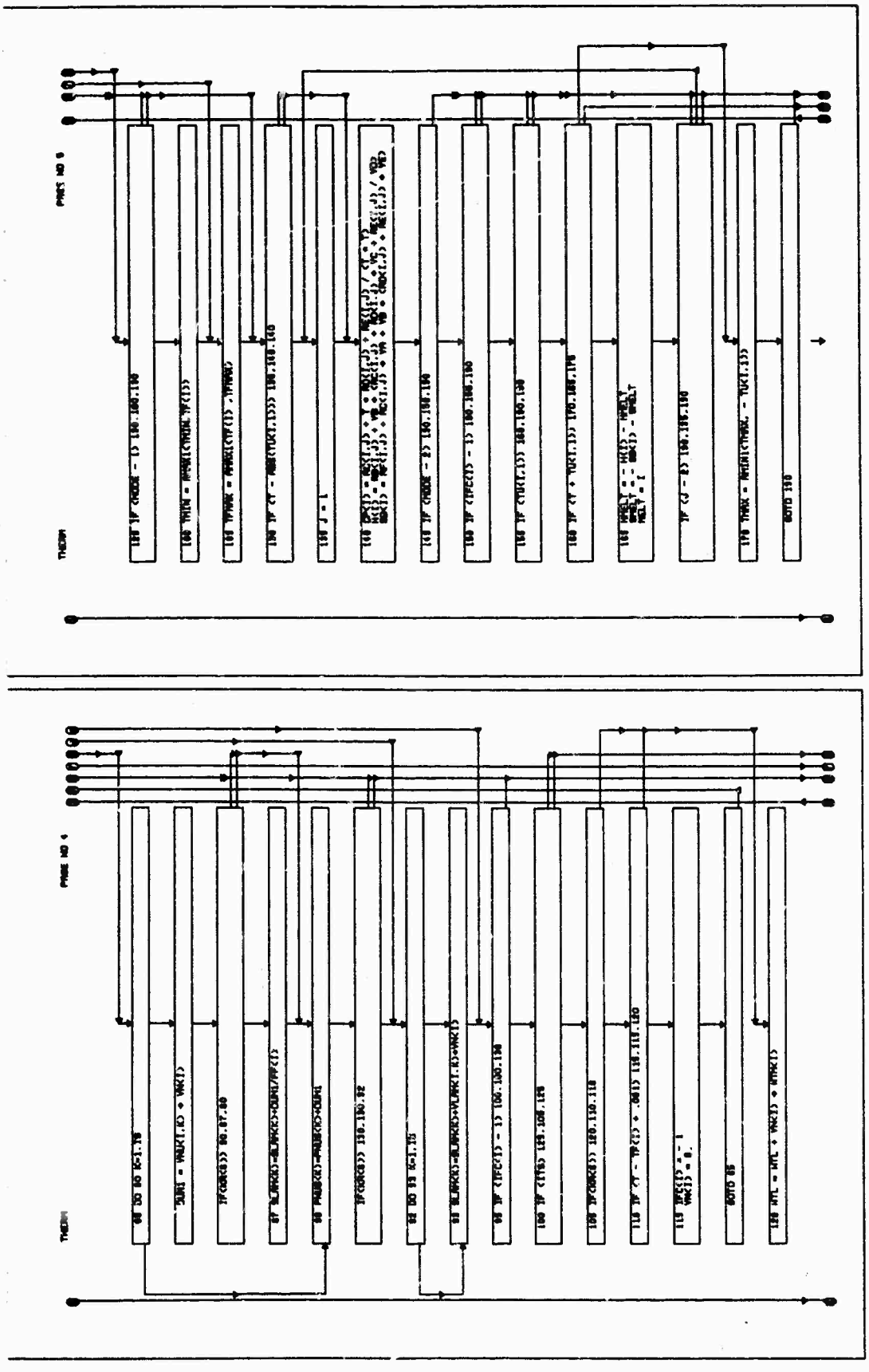

SQUEE
PAGE NO 2
GO TO 6
7 I(2) = LUB
8 I(2) = IABS(I(2))
RETURN
END

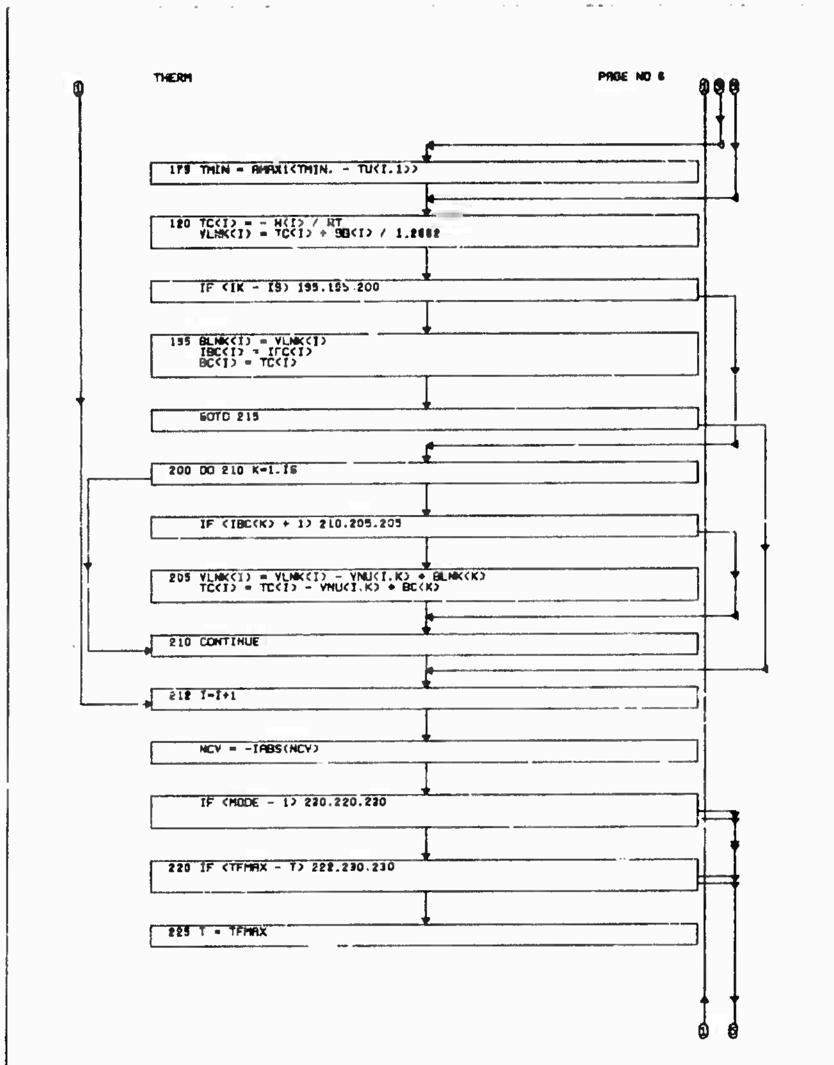

THERM
PASS NO 1
SUBROUTINE THERM
SUBROUTINE THERM
SEE THE FULL LISTING OF THIS ROUTINE FOR--
DIMENSION STATEMENTS
COMMON STATEMENTS
INCLUDE STATEMENTS
EQUIVALENCE STATEMENTS
DATA STATEMENTS
6 MODE = KR(1)
IF (ITH) 8,9,10,8
10 WTL = 0.
WTL = 0.
IF(KR(6)) 11,11,11
11 IF(IPC(N+1)-1) 13,12,13
12 IF(F-.001-WF(N+1)) 18,18,14
13 IPC(N+1)=-1
WK(N+1)=0.
14 DO 16 K=1,15
16 WK(N+1,K)=TBCK(K)
WTL=WK(N+1)
17 DUM2=0.

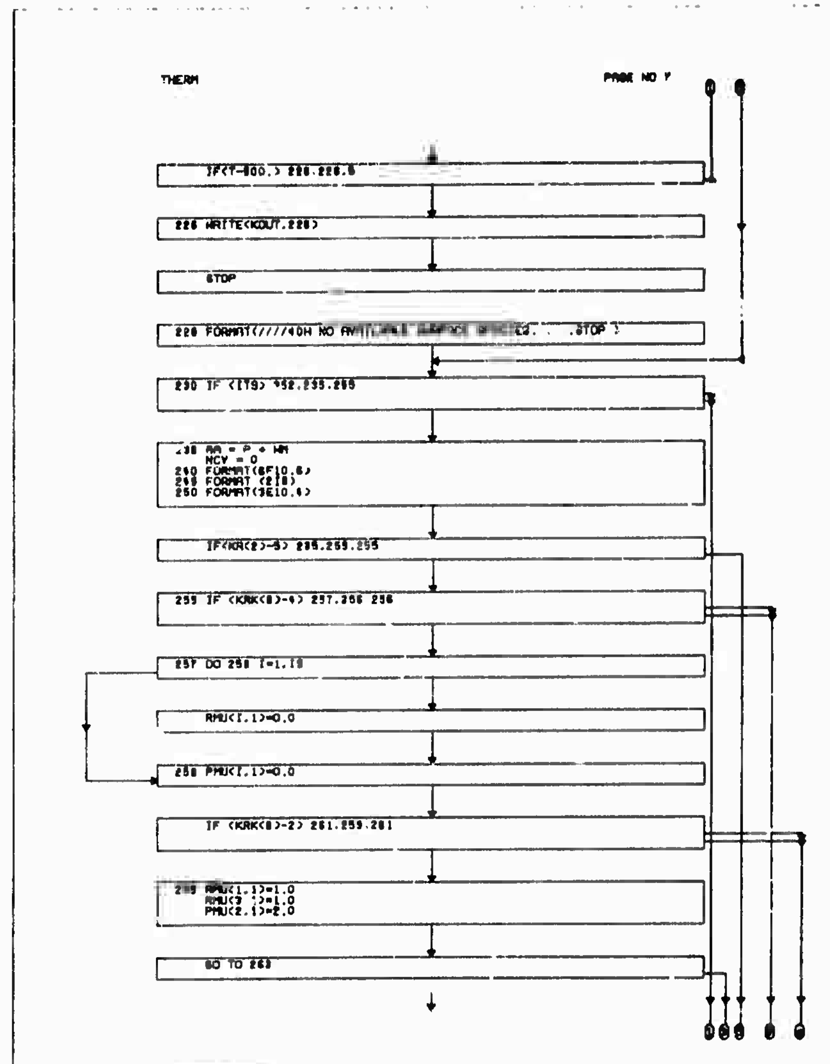

SNAP
PASS NO 1
SUBROUTINE SNAP
SUBROUTINE SNAP
SEE THE FULL LISTING OF THIS ROUTINE FOR--
DIMENSION STATEMENTS
COMMON STATEMENTS
INCLUDE STATEMENTS
EQUIVALENCE STATEMENTS
DATA STATEMENTS
DO 5 I=1,18
BK(I)=BLK(I)
DO 5 J=1,18
5 BK(I,J)=BLK(I,J)
RETURN
END

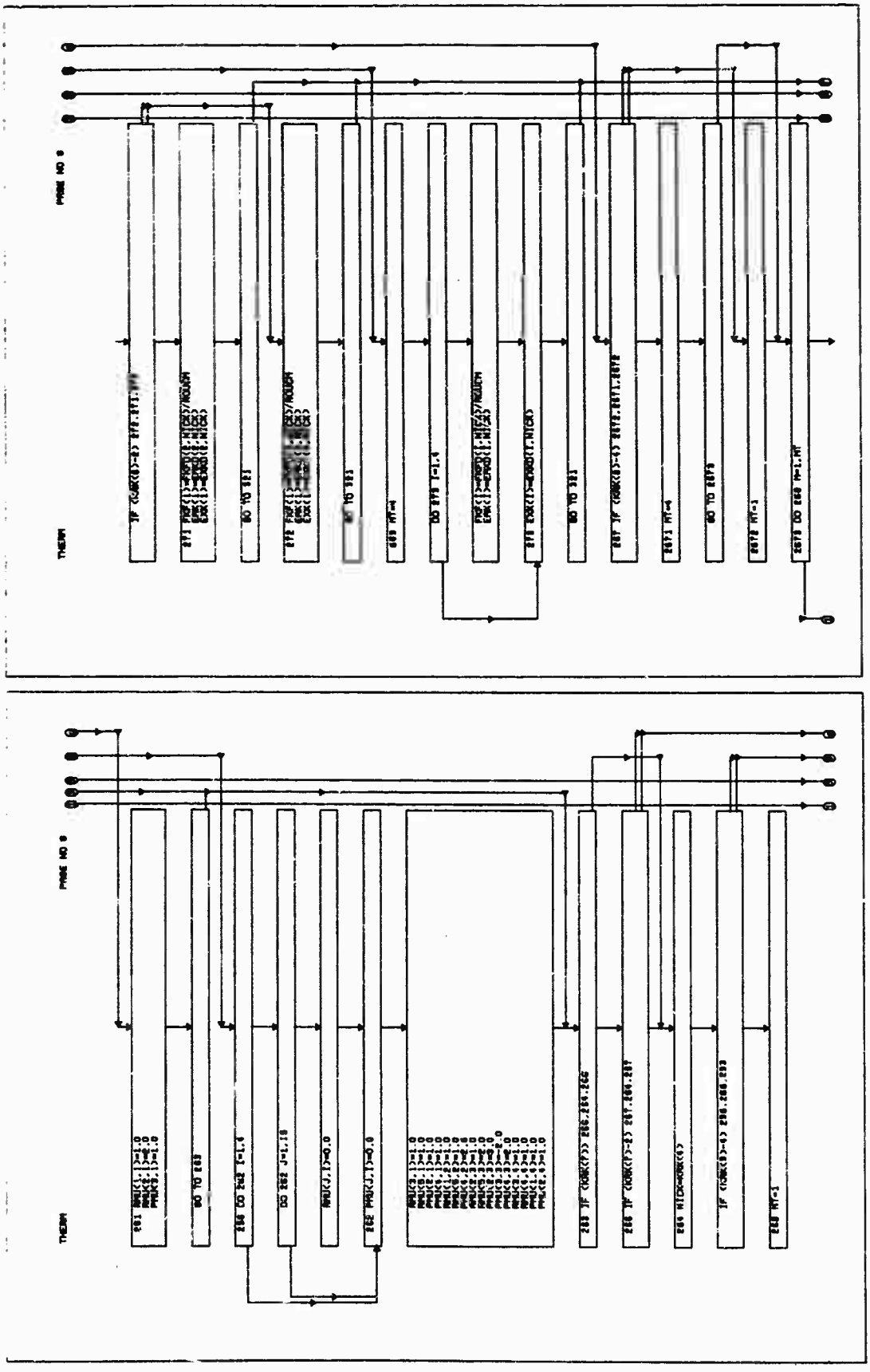


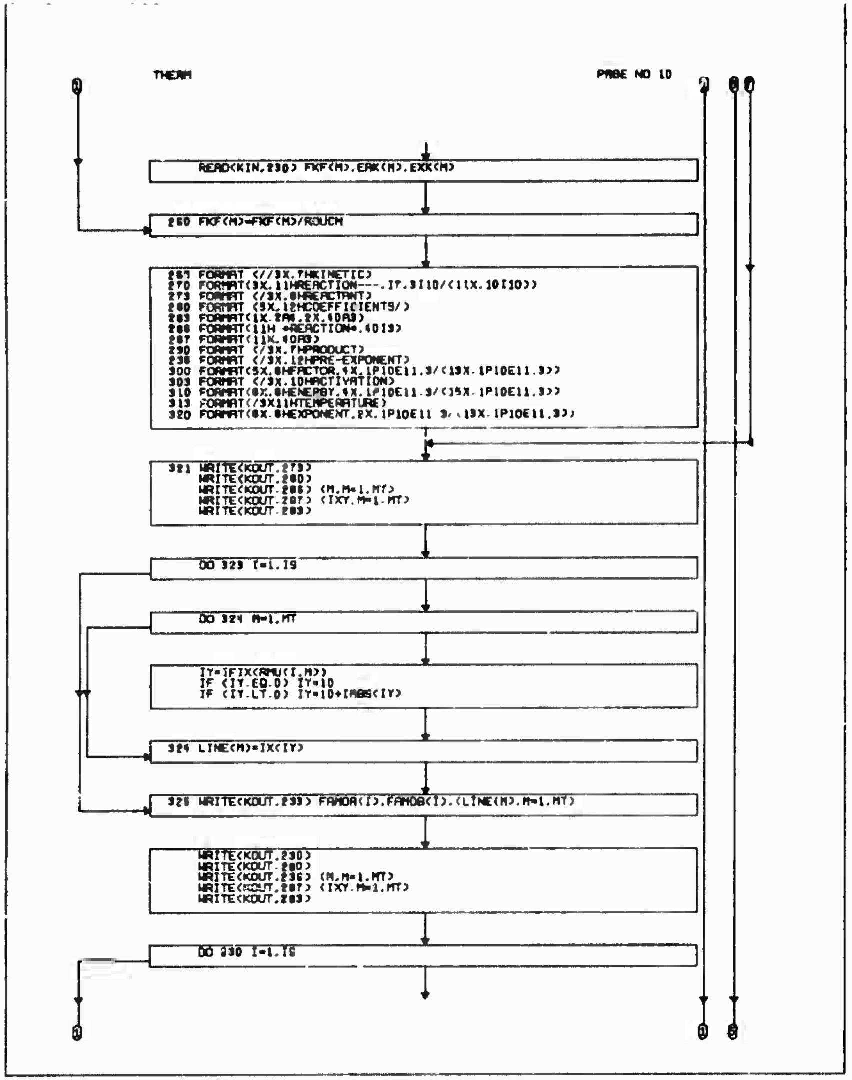


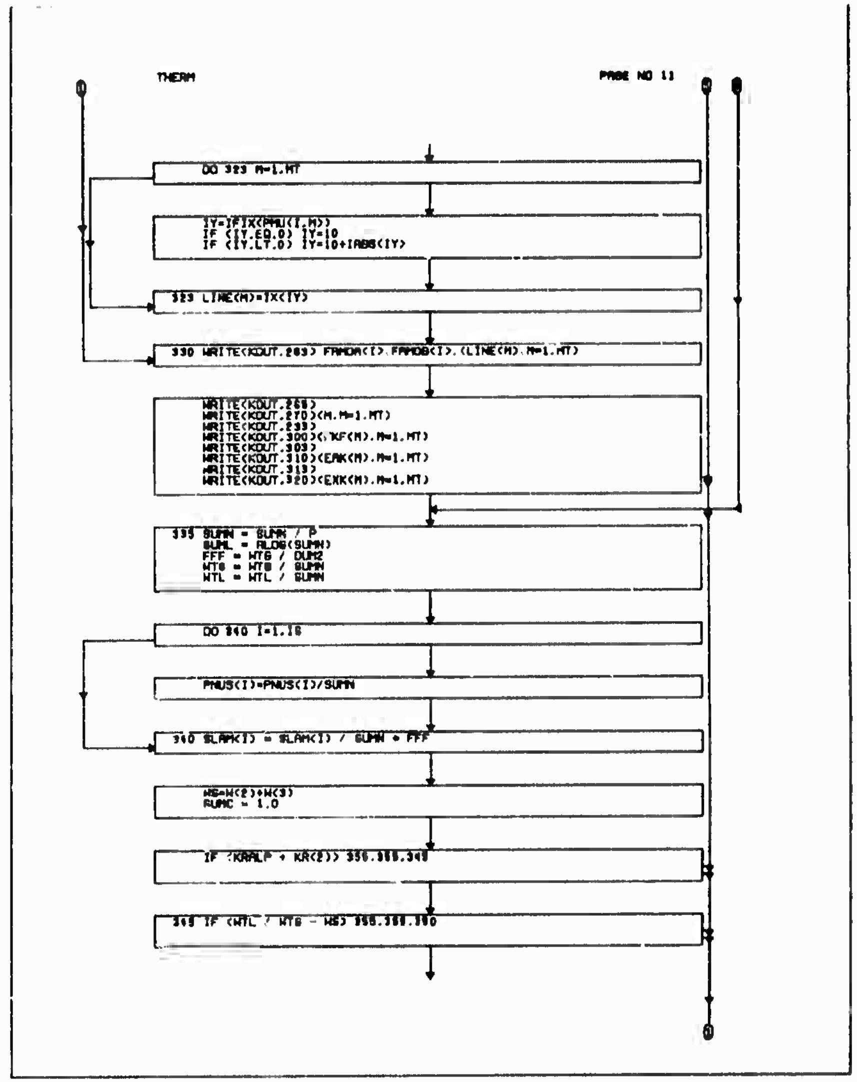



THERM
PAGE NO 6
179 THIN = AMAX1(THIN. - TU(I.1))
120 TC(I) = - H(I) / RT
VLNK(I) = TC(I) + SB(I) / 1.2082
IF (IK - IS) 195.195.200
195 BLNK(I) = VLNK(I)
IBC(I) = IFC(I)
BC(I) = TC(I)
GOTO 215
200 DO 210 K=1.IS
IF (IBC(K) + 1) 210.205.205
205 VLNK(I) = VLNK(I) - VNU(I.K) + BLNK(K)
TC(I) = TC(I) - VNU(I.K) + BC(K)
210 CONTINUE
212 I=I+1
NCV = -IABS(NCV)
IF (MODE - 1) 230.220.230
220 IF (TFMAX - T) 222.230.230
225 T = TFMAX


THERM
PAGE NO 7
IF(T-800.) 228.228.8
226 WRITE(KOUT.228)
STOP
228 FORMAT(////40H NO AVAILABLE SURFACE SPECIES. . . .STOP)
230 IF (ITS) 952.235.255
238 AA = P + WM
NCV = 0
240 FORMAT(8F10.6)
245 FORMAT (2I8)
250 FORMAT(3E10.4)
IF(KR(2)-5) 255.255.255
255 IF (KRK(8)-4) 257.256 256
257 DO 258 I=1.IS
RMU(I.1)=0.0
258 PMU(I.1)=0.0
IF (KRK(8)-2) 261.259.261
259 RMU(1.1)=1.0
RMU(2.1)=1.0
PMU(2.1)=2.0
GO TO 263




THERM
PAGE NO 10
READ(KIN,230) FKF(M),EAK(M),EXK(M)
260 FKF(M)=FKF(M)/ROUCM
267 FORMAT (//3X,7HKINETIC)
270 FORMAT(3X,11HREACTION---,I7,3I10/(11X,10I10))
273 FORMAT (/3X,8HREACTANT)
280 FORMAT (3X,12HCOEFFICIENTS/)
283 FORMAT(1X,2A4,2X,40A3)
286 FORMAT(11H +REACTION+,40I3)
287 FORMAT(11X,40A3)
290 FORMAT (/3X,7HPRODUCT)
236 FORMAT (/3X,12HPRE-EXPONENT)
300 FORMAT(5X,6HFACTOR,4X,1P10E11.3/(13X,1P10E11.3))
303 FORMAT (/3X,10HACTIVATION)
310 FORMAT(6X,6HENERGY,4X,1P10E11.3/(15X,1P10E11.3))
313 FORMAT(/3X11HTEMPERATURE)
320 FORMAT(6X,8HEXPONENT,2X,1P10E11.3/(13X,1P10E11.3))
321 WRITE(KOUT,273)
WRITE(KOUT,280)
WRITE(KOUT,286) (M,M=1,MT)
WRITE(KOUT,287) (IXY,M=1,MT)
WRITE(KOUT,283)
DO 323 I=1,IS
DO 324 M=1,MT
IY=IFIX(RMU(I,M))
IF (IY.EQ.0) IY=10
IF (IY.LT.0) IY=10+IABS(IY)
324 LINE(M)=IX(IY)
325 WRITE(KOUT,233) FAMOA(I),FAMOB(I),(LINE(M),M=1,MT)
WRITE(KOUT,230)
WRITE(KOUT,280)
WRITE(KOUT,236) (M,M=1,MT)
WRITE(KOUT,287) (IXY,M=1,MT)
WRITE(KOUT,283)
DO 330 I=1,IS


THERM
PAGE NO 11
DO 323 M=1,MT
IY=IFIX(PMU(I,M))
IF (IY.EQ.0) IY=10
IF (IY.LT.0) IY=10+IABS(IY)
323 LINE(M)=IX(IY)
330 WRITE(KOUT,283) FAMOA(I),FAMOB(I),(LINE(M),M=1,MT)
WRITE(KOUT,268)
WRITE(KOUT,270)(M,M=1,MT)
WRITE(KOUT,233)
WRITE(KOUT,300)(FKF(M),M=1,MT)
WRITE(KOUT,303)
WRITE(KOUT,310)(EAK(M),M=1,MT)
WRITE(KOUT,313)
WRITE(KOUT,320)(EXK(M),M=1,MT)
335 SUMN = SUMN / P
SUML = ALOG(SUMN)
FFF = WTG / DUM2
WTG = WTG / SUMN
WTL = WTL / SUMN
DO 340 I=1,IS
PNUS(I)=PNUS(I)/SUMN
340 SLAM(I) = SLAM(I) / SUMN + FFF
WS=W(2)+W(3)
RUMC = 1.0
IF (KRALP + KR(2)) 350,355,345
345 IF (WTL / WTG - WS) 350,355,350

THERM PAGE NO 12

```
390 SUMC = WTL / (HTS + HS)
    WTL = WTL / SUMC

350 RETURN

    END
```

ZIPIN PAGE NO 1

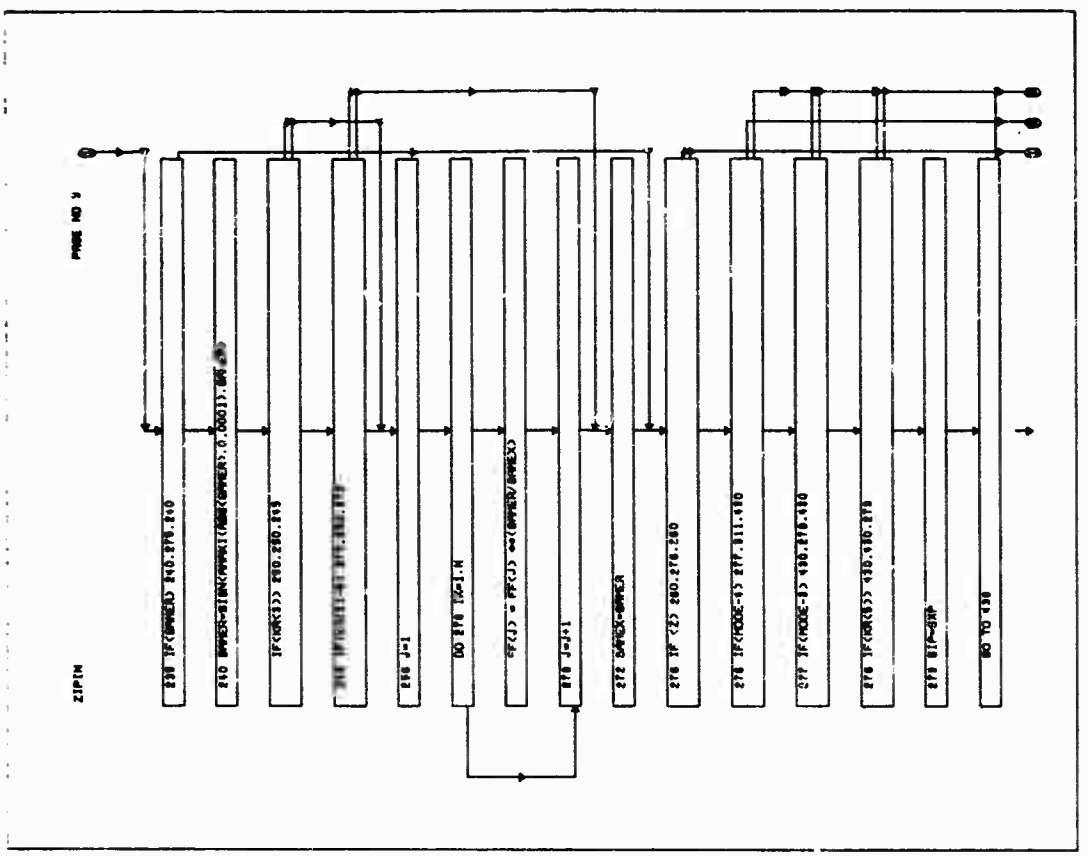
```
    SUBROUTINE ZIPIN
C****************************************************************
C
C         S U B R O U T I N E   Z I P I N
C
C****************************************************************
C
C         SEE THE FULL LISTING OF THIS ROUTINE FOR--
C                  +  DIMENSION STATEMENTS
C                     +  COMMON STATEMENTS
C                        +  INCLUDE STATEMENTS
C                           +  EQUIVALENCE STATEMENTS
C                              +  DATA STATEMENTS
C
C****************************************************************
C
  5 FORMAT(10I1.6F10.5.2A4.A2)
 10 FORMAT (2I3)
 15 FORMAT (8F10.5)
    CALL ETIME
    MFF = 0
    TTMIN=300.
    TTMAX=20000.
    Z = 0.0
    PR = 0.0
    KKJ=0
    PSV=P
    II=0

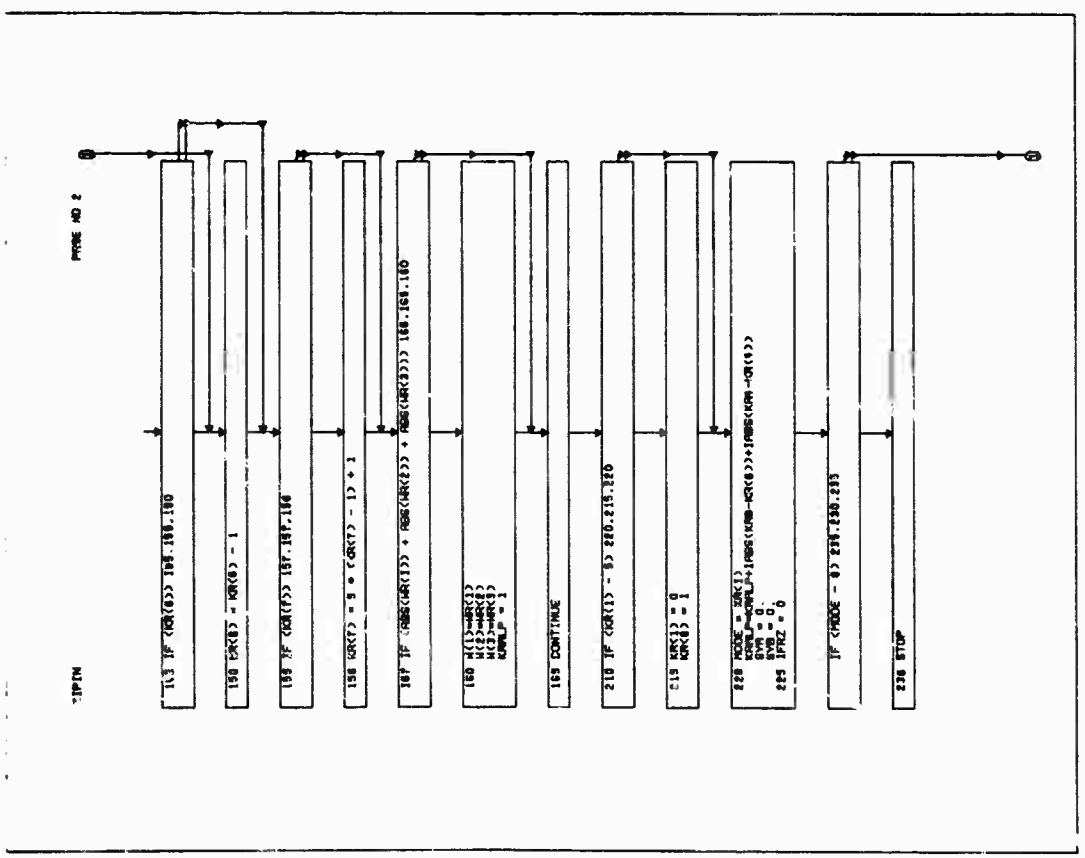
    IF (ITS + 1) 20.25.20

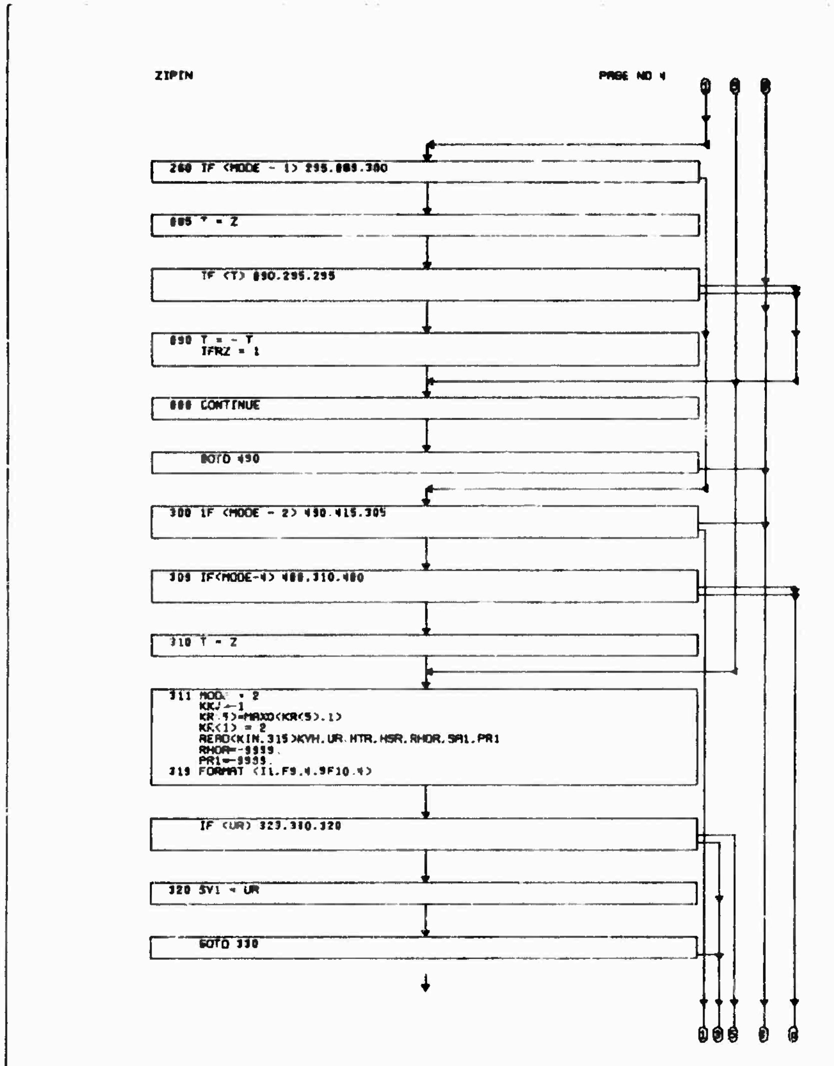
 20 GAMEX=0.6666667
    H(1) = 1.0
    H(2)=0.
    H(3)=0.
    MT=0
    MX = - 1
    NCY = 0
    NOAT = 0
    HM = 20.
    T=300.
    HIP = 0.
    SIP = 0.
    KR(10) = 0

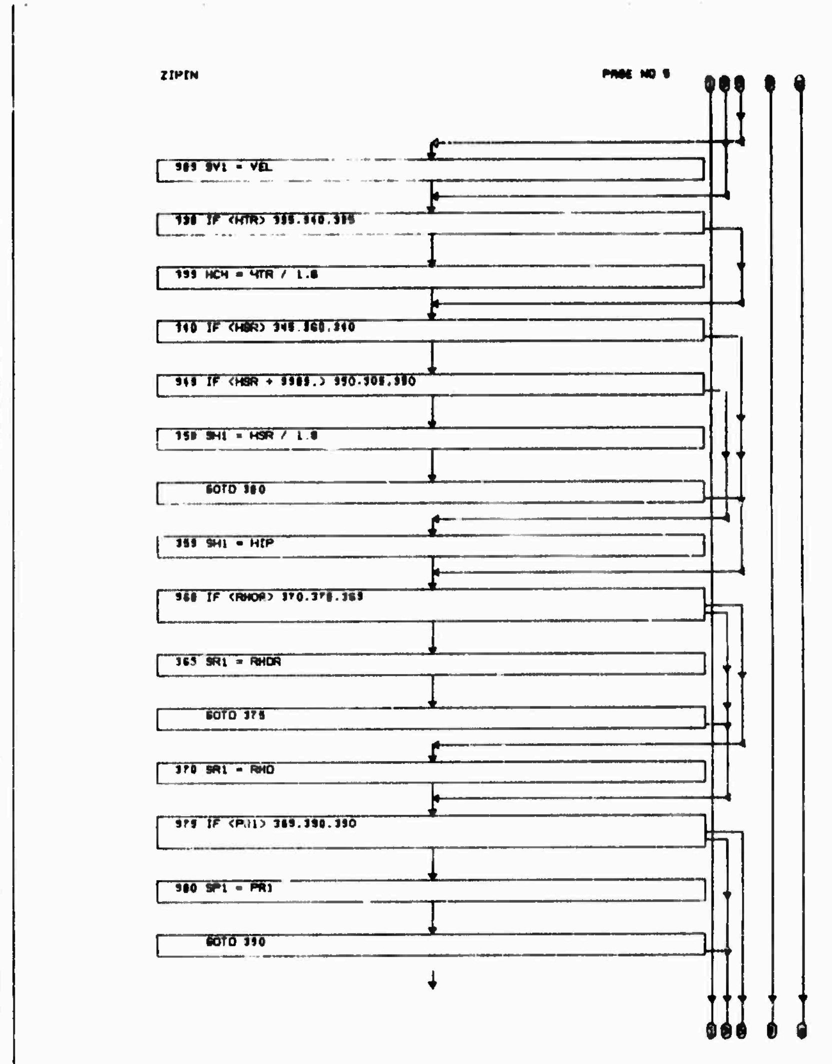
 25 ITS = 0
    IDC = 1
    KRALP = 0
    KKJ = 0
 30 HS = 1.0
135 KR8=KR(8)
    KR4=KR(4)
    CALL KININ
    KKX(1) = KR(8)
    WRITE(KOUT.140)TILE.KR
    KR(8) = 0
140 FORMAT (1H19X35HGRAPHITE SURFACE KINETICS (BASKET) 2A4.A2.5X10I1)
    KRZZ = 0
    TBT = 801.
    KR(4) = KR(4) - 1

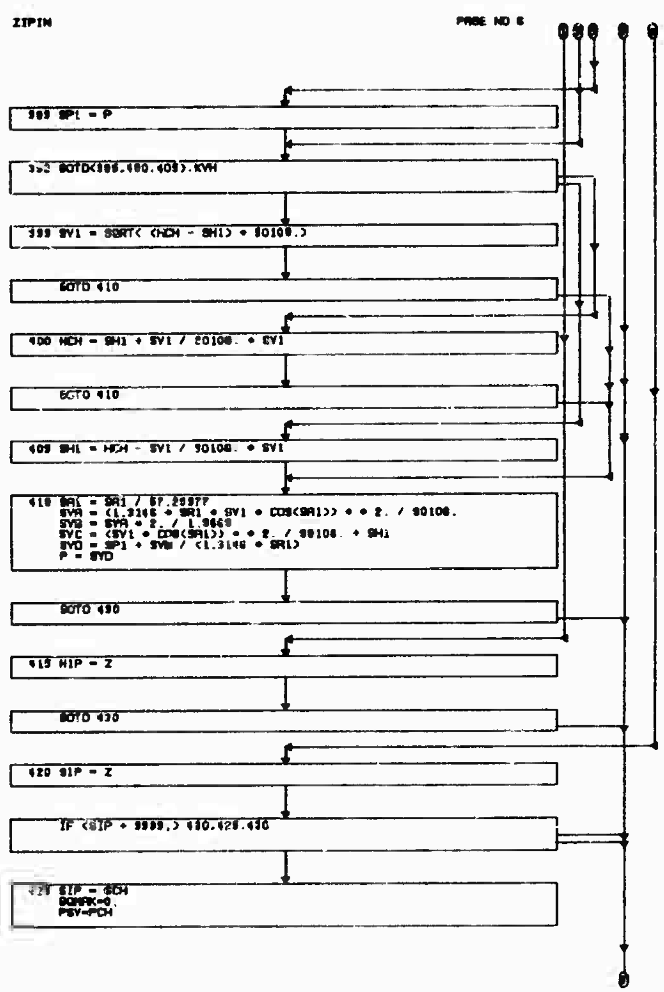
    IF (KR(4)) 150.145.145
```

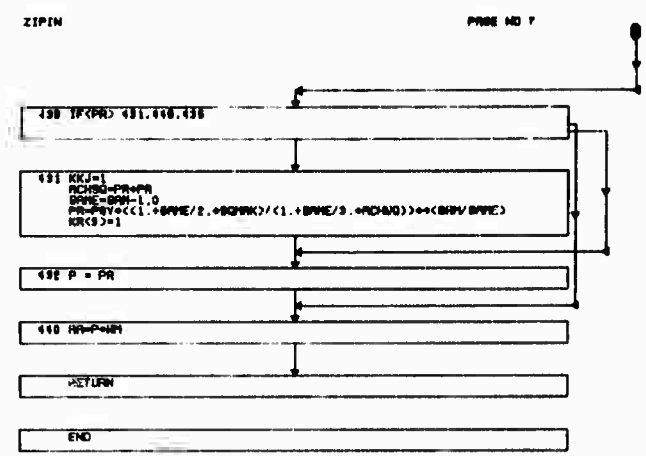





ZIPIN
PAGE NO 4
260 IF (MODE - 1) 295.885.300
885 T = Z
IF (T) 890.295.295
890 T = - T
IFRZ = 1
888 CONTINUE
GOTO 490
300 IF (MODE - 2) 490.415.305
305 IF(MODE-4) 480.310.480
310 T = Z
311 MODE = 2
KKJ = -1
KR(5)=MAX0(KR(5).1)
KR(1) = 2
READ(KIN.315)KVH.UR.HTR.HSR.RHOR.SR1.PR1
RHOR=-9999.
PR1=-9999.
315 FORMAT (I1.F9.4.9F10.4)
IF (UR) 323.330.320
320 SV1 = UR
GOTO 330


ZIPIN
PAGE NO 5
323 SV1 = VEL
330 IF (HTR) 335.340.335
335 HCH = HTR / 1.8
340 IF (HSR) 345.360.340
345 IF (HSR + 9999.) 350.355.350
350 SH1 = HSR / 1.8
GOTO 360
355 SH1 = HIP
360 IF (RHOR) 370.370.365
365 SR1 = RHOR
GOTO 375
370 SR1 = RHO
375 IF (PR1) 385.380.380
380 SP1 = PR1
GOTO 390


ZIPIN
PAGE NO 6
389 SP1 = P
392 GOTO(395,400,405),KVH
395 SV1 = SQRT((HCH - SH1) * 90100.)
GOTO 410
400 HCH = SH1 + SV1 / 20100. * SV1
GOTO 410
405 SH1 = HCH - SV1 / 90100. * SV1
410 SR1 = SR1 / 57.29577
SVA = (1.3146 * SR1 * SV1 * COS(SR1)) * * 2. / 90100.
SVB = SVA * 2. / 1.9669
SVC = (SV1 * COS(SR1)) * * 2. / 90100. + SH1
SVD = SP1 + SVB / (1.3146 * SR1)
P = SVD
GOTO 430
415 HIP = Z
GOTO 430
420 SIP = Z
IF (SIP + 9999.) 430,425,430
425 SIP = SCH
BGMAK=0.
PSV=PCH


ZIPIN
PAGE NO 7
430 IF(PR) 431,440,435
431 KKJ=1
ACHSQ=PR*PR
BAME=BAM-1.0
PR=PSV*((1.+BAME/2.*BGMAK)/(1.+BAME/2.*ACHSQ))**(BAMV/BAME)
KR(3)=1
435 P = PR
440 HA=P*WM
RETURN
END

SECTION 4

LISTINGS OF FORTRAN IV SOURCE DECKS

Listings of Fortran IV source code decks are presented in this section. The main routine is presented first and is then followed in alphabetic order by all program subroutines.

```
C
      INCLUDE INC1,L15T                                                 ACE    1
C
      INCLUDE INC3,L15T                                                 ACE    2
C                                                                       ACE    3
      COMMON/CARKIN/ KRK(10),ROUCM,NCC                                  ACE    4
    5 FORMAT(/41A,I3,F8.2,1P4E10.2/(1P10E12.5))                         ACE    5
C   I/O SPECIFICATIONS ALSO IN RERAY                                    ACE    6
      KIN=5                                                             ACE    7
      KOUT=6                                                            ACE    8
      JAN=18                                                            ACE    9
      NCC=0                                                             ACE   10
      REWIND JAN                                                        ACE   11
      IT5 = 0                                                           ACE   12
   10 CALL ZIPIN                                                        ACE   13
      IF (KR(2) + KR(3)) 15,15,20                                       ACE   14
   15 IF (KRALP) 45,45,40                                               ACE   15
   20 II = 0                                                            ACE   16
      IF (KR(2)) 30,30,25                                               ACE   17
   25 CALL IMELM                                                        ACE   18
      IF (KR(3)) 40,40,30                                               ACE   19
   30 IF (KR(3) - 9) 35,40,40                                           ACE   20
   35 CALL INPUT                                                        ACE   21
      CALL BELCH                                                        ACE   22
      CALL INPUT                                                        ACE   23
      REWIND JAN                                                        ACE   24
   40 CALL ALPST                                                        ACE   25
   45 IF (KR(7) - 1) 80,80,75                                           ACE   26
   50 IF(KKJ) 55,60,60                                                  ACE   27
   55 KKJ=-3                                                            ACE   28
      GOTO 65                                                           ACE   29
   60 IF(KR(1)-2) 65,70,70                                              ACE   30
   65 MODE = 2                                                          ACE   31
      JJC = JC                                                          ACE   32
      IIT=IT                                                            ACE   33
      CALL MAT1                                                         ACE   34
      CALL MAT2                                                         ACE   35
      CALL MAT3                                                         ACE   36
      JC = JJC                                                          ACE   37
      IT=IIT                                                            ACE   38
   70 IF(KR(6)) 72,71,71                                                ACE   39
   71 ISPQ=ISP2                                                         ACE   40
   72 MODE = KR(1)                                                      ACE   41
      CALL RERAY(ISPQ,A,0,B,0,0,IG)                                     ACE   42
      CALL PROPS                                                        ACE   43
      KR(7)=MIN0(I,KR(7))                                               ACE   44
      IQ1=7                                                             ACE   45
      IF(KKJ) 75,75,45                                                  ACE   46
   75 CALL OUTPT                                                        ACE   47
C*****PRINCIPAL ITERATIVE LOOP                                          ACE   48
   80 IF (IT5) 10,90,85                                                 ACE   49
   85 IF (MODE) 95,95,90                                                ACE   50
   90 CALL THERM                                                        ACE   51
      IF (IFRZ) 95,95,150                                               ACE   52
   95 MODE = KR(1)                                                      ACE   53
      ELIQ = 0.                                                         ACE   54
      CALL MAT1                                                         ACE   55
      CALL MAT2                                                         ACE   56
      CALL MAT3                                                         ACE   57
      IT5 = IT5 + I                                                     ACE   58
      BI = B(1)                                                         ACE   59
      IF (KR(9)) 105,105,100                                            ACE   60
  100 CALL KINET                                                        ACE   61
  105 MOE = 1                                                           ACE   62
      IF (KR(7) - 1) 125,120,110                                        ACE   63
  110 IQQ = - 2                                                         ACE   64
      WRITE(KOUT,115)(I,I=I,I5)                                         ACE   65
  115 FORMAT(1H1,40X,49HITS TEMP   PRES*MWT  EQUIL ER  MASBAL ER  SCALE ACE   66
     *   /(10(I5,7H MASBAL)))                                           ACE   67
  120 WRITE(KOUT,5)IT5,T,AA,EL,ENL,CMF,(E(I),I=1,I5)                    ACE   68
  125 IF (IT5) 50,75,130                                                ACE   69
  130 IT=IT5                                                            ACE   70
      IF(IT5-67) 140,135,140                                            ACE   71
  135 KR(7) = 9                                                         ACE   72
      IQQ = - 2                                                         ACE   73
  140 IF(IT5-70) 155,155,145                                            ACE   74
  145 NCV = 1                                                           ACE   75
      KR(7)=4                                                           ACE   76
      IG=-2                                                             ACE   77
  150 IT5=-1                                                            ACE   78
      GOTO 50                                                           ACE   79
  155 CALL SWAP(5LA,5LB,A,B)                                            ACE   80
      ICT = 10                                                          ACE   81
      DUM1=0.                                                           ACE   82
      IOI = IOO                                                         ACE   83
  160 DO 170 I=1,I5                                                     ACE   84
      IF (IFC(I) - 1) 170,170,165                                       ACE   85
  165 A(I + 2,I + 2) = 1.E + 10                                         ACE   86
  170 CONTINUE                                                          ACE   87
      IOO = IOI                                                         ACE   88
      CALL RERAY(IN,A(IL,IL) ,0,B(IL) ,1,0,IOO)                         ACE   89
      ICT = ICT - 1                                                     ACE   90
      IF (ICT) 190,175,175                                              ACE   91
  175 IF (IQQ) 190,180,180                                              ACE   92
  180 CALL AFMAT                                                        ACE   93
      GOTO(160,90,145,185),NQ                                           ACE   94
  185 CALL SCALE(MOE)                                                   ACE   95
      CALL CRECT(MDE)                                                   ACE   96
      IF (CMF - 1.E - 12) 190,190,205                                   ACE   97
  190 IF (NCV) 195,200,195                                              ACE   98
                                                                        ACE   99
                                                                        ACE  100
```

```
195 CALL SWAP(A,B,SLA,SLB)
    GOTO 145
200 NCV = 1
    GOTO 90
205 IF (KR(7) - 1) 80,80,75
    END
```

```
ACE  101          SUBROUTINEAFMAT                                                    AFMA   1
ACE  102    C                                                                        AFMA   2
ACE  103          INCLUDE INC1,LIST                                                  AFMA   3
ACE  104    C                                                                        AFMA   4
ACE  105          INCLUDE INC3,LIST                                                  AFMA   5
ACE  106    C                                                                        AFMA   6
ACE  107    C*****IF TRYING TO PUSH THROUGH TMIN OR TMAX -- REINVERT AND DT TO ZERO  AFMA   7
            IF(ITS-NCV-1) 1,1,2                                                      AFMA   8
          1 DTU=1000.                                                                AFMA   9
            DTO=DTU                                                                  AFMA  10
            TTMIN=300.                                                               AFMA  11
            TTMAX=20000.                                                             AFMA  12
          2 CONTINUE                                                                 AFMA  13
            X1=X(1)                                                                  AFMA  14
            IF (T - TMIN) 5,5,10                                                     AFMA  15
          5 IF (X(1)) 70,20,10                                                       AFMA  16
         10 IF (T - TMAX) 20,15,15                                                   AFMA  17
         15 IF (X(1)) 20,20,70                                                       AFMA  18
    C*****IF NEW CONDENSED HAS NEG CORRECTION, DELETE AFTER REINVERT                 AFMA  19
         20 IF(IER) 40,40,25                                                         AFMA  20
         25 IF (VN(IRE)) 30,30,40                                                    AFMA  21
         30 IF(X(IER) + 1.E-30) 35,40,40                                             AFMA  22
         35 IF(IRE-N) 37,37,36                                                       AFMA  23
         36 JC=0                                                                     AFMA  24
         37 CALL SWAP(A,B,SLA,SLB)                                                   AFMA  25
            DO 38 I=1,ISPQ                                                           AFMA  26
            A(I,IER)=0.                                                              AFMA  27
         38 A(IER,I) = 0.                                                            AFMA  28
            A(IER,IER) = 1.E30                                                       AFMA  29
            B(IER)=-0.1                                                              AFMA  30
            IF (OUM1) 135,150,150                                                    AFMA  31
    C*****IF S.E. ERROR AND CORRECTION ON T OF CONFLICTING SIGN,REINVERT             AFMA  32
         40 IF (MODE - 1) 120,45,125                                                 AFMA  33
         45 IF (X(1) + B1) 70,50,50                                                  AFMA  34
    C*****ON S.E. IF DELTA LN T .GT. .9 REINVERT NO DT IF EL AND ENL ARE SMAAFMA  35
         50 IF (ABS(X(1)) - 0.9) 125,125,55                                          AFMA  36
         55 IF (ENL - 0.02) 60,65,65                                                 AFMA  37
         60 IF (EL - 100.) 125,65,65                                                 AFMA  38
         65 MODE = 0                                                                 AFMA  39
    C*****REINVERT                                                                   AFMA  40
         70 CALL SWAP(A,B,SLA,SLB)                                                   AFMA  41
    C*****IF CONVERGED EXCEPT FOR T ON H OR S OPTIONS  --  NON CONVERGENT            AFMA  42
            IF (MODE - 1) 115,80,75                                                  AFMA  43
         75 IF (EL * 100. * ENL - 1.E - 4) 160,160,115                               AFMA  44
    C*****ON S.E. OPTION RESULTIN IN CONFLICTING ERROR/CORRECTION OR T PUSH AFMA  45
    C*****IF OTHER BALANCES RELATIVELY GOOD, SET T TO TMIN/TMAX AS PER ERRORAFMA  46
    C*****AND GO TO THERM (IF T ALREADY THERE - NONCONVERGE) ELSE DT TO ZEROAFMA  47
         80 IF (ABS(B1) - 100. * (EL + ENL)) 115,85,85                               AFMA  48
         85 TTMIN=AMAX1(TTMIN-DTO,300.)                                              AFMA  49
            TTMAX=AMIN1(TTMAX+DTU,20000.)                                            AFMA  50
```

```
      IF(X1*B1) 87,115,111                                              AFMA  51
   87 IF(B1) 90,90,100                                                  AFMA  52
   90 IF(T-TM1N) 156,156,95                                             AFMA  53
   95 T=AMAX1(TM1N,T-OTO)                                               AFMA  54
      TTMAX=T                                                           AFMA  55
      OTU=OTO/2.                                                        AFMA  56
      GOTO 155                                                          AFMA  57
  100 IF(T-TMAX) 105,156,156                                            AFMA  58
  105 T=AM1N1(TMAX,T+OTU)                                               AFMA  59
      TTM1N=T                                                           AFMA  60
      OTO=OTU/2.                                                        AFMA  61
      IF (ABS(T - TF(JC)) - .001) 110,155,155                           AFMA  62
  110 IFC(JC) = 1                                                       AFMA  63
      VN(JC) = 1.E - 3 / WTM(JC) * WTG                                  AFMA  64
      Y(JC) = 0.                                                        AFMA  65
      GOTO 155                                                          AFMA  66
  111 IF(T-TTM1N) 156,156,112                                           AFMA  67
  112 IF(T-TTMAX) 115,156,156                                           AFMA  68
  115 X(1) = 0.                                                         AFMA  69
      MODE = 0                                                          AFMA  70
      TM1N=TTM1N                                                        AFMA  71
      TMAX=TTMAX                                                        AFMA  72
      1N = 1N - 1                                                       AFMA  73
      1L = 2                                                            AFMA  74
      GOTO 150                                                          AFMA  75
  120 X(1) = 0.                                                         AFMA  76
  125 IF (X(2) + 1.) 130,165,165                                        AFMA  77
  130 CALL SWAP(A,B,SLA,SLB)                                            AFMA  78
  135 X(2)=WTG                                                          AFMA  79
      IF (KR(6)) 140,145,145                                            AFMA  80
  140 X(2) = X(2) + WTL                                                 AFMA  81
  145 X(2)=0.                                                           AFMA  82
      DUM1=-1.                                                          AFMA  83
      A(2,2) = 1.E25                                                    AFMA  84
  150 NQ = 1                                                            AFMA  85
      GOTO 170                                                          AFMA  86
  155 NQ = 2                                                            AFMA  87
      GOTO 170                                                          AFMA  88
  156 JC=0                                                              AFMA  89
      WRITE(KOUT,157)                                                   AFMA  90
  157 FORMAT(//56H  SOLUTION TERMINATED WHEN TEMPERATURE LIMIT ENCOUNTERAFMA  91
     1ED//)                                                             AFMA  92
  160 NQ = 3                                                            AFMA  93
      GOTO 170                                                          AFMA  94
  165 NQ = 4                                                            AFMA  95
  170 RETURN                                                            AFMA  96
      END                                                               AFMA  97
                                                                        AFMA  98
```

```
      SUBROUTINE ALPST                                                  ALPS   1
      COMMON/ACE1/GAMEX,REFM,PCM,ACMSQ,SQMAX,SXP                        ALPS   2
C                                                                       ALPS   3
      INCLUDE INC1,LIST                                                 ALPS   4
C                                                                       ALPS   5
      INCLUDE INC2,LIST                                                 ALPS   6
C                                                                       ALPS   7
    5 FORMAT(2A4,E12.5,2A4,E12.5,2A4,E12.5,2A4,E12.5)                   ALPS   8
   10 FORMAT(29H  UPDATE OF DIFFUSION FACTORS/10X,7HSPECIES5X16HDIFFUSIONALPS   9
     1N FACTOR)                                                         ALPS  10
   15 FORMAT(11X2A4,6XF10.3,2A2)                                        ALPS  11
   20 FORMAT(11X2A4,6XF10.5,2A2)                                        ALPS  12
   25 FORMAT(13,3X,F6.5,F6.4)                                           ALPS  13
   30 FORMAT(8E10.4)                                                    ALPS  14
      DATA REFO,FFAO/4HREFM,4HFFA /                                     ALPS  15
      DATA I5,I6,I7/2H  ,2H*N,2HEW/                                     ALPS  16
      TFMAX = 20000.                                                    ALPS  17
      IF (KR(3) - 7) 35,40,40                                           ALPS  18
   35 IF(NFF) 125,125,55                                                ALPS  19
   40 INF = NFF                                                         ALPS  20
      READ(KIN,25) NFF                                                  ALPS  21
      NFF = NFF + INF                                                   ALPS  22
      INF = INF + 1                                                     ALPS  23
      READ(KIN,5)(NF1A(I),NF1B(I),FF1N(I),I=INF,NFF)                    ALPS  24
      KR(3) = 9 - KR(3)                                                 ALPS  25
      IF (NF1A(INF) - NF1B(INF)) 55,45,55                               ALPS  26
   45 TFMAX = FF1N(INF)                                                 ALPS  27
      GOTO 65                                                           ALPS  28
   55 INF = 1                                                           ALPS  29
      IF (NF1A(1) - NF1B(1)) 65,60,65                                   ALPS  30
   60 TFMAX = FF1N(1)                                                   ALPS  31
   65 JL=0                                                              ALPS  32
      DO 64 I=1,NFF                                                     ALPS  33
      IF(REFO-NF1A(I)) 62,61,62                                         ALPS  34
   61 REFM=FF1N(I)                                                      ALPS  35
      JL=JL+1                                                           ALPS  36
      GO TO 64                                                          ALPS  37
   62 IF(FFAO-NF1A(I)) 64,63,64                                         ALPS  38
   63 FFA=FF1N(I)                                                       ALPS  39
      JL=JL+1                                                           ALPS  40
   64 CONTINUE                                                          ALPS  41
      IF(JL) 71,71,66                                                   ALPS  42
   66 DO 69 J=1,N                                                       ALPS  43
      FF(J)=1.E+10                                                      ALPS  44
      IF(WTM(J)-.01) 69,69,56                                           ALPS  45
   56 IF(IFC(J)) 67,68,67                                               ALPS  46
   67 IF(IABS(IFC(J))-3) 69,68,69                                       ALPS  47
   68 FF(J)=(WTM(J)/REFM) **(FFA*GAMEX)                                 ALPS  48
   69 CONTINUE                                                          ALPS  49
      WRITE(KOUT,72) REFM,FFA                                           ALPS  50
```

```
      IF(NFF-JL) 125,125,71                                             ALPS  51
   71 J=1                                                               ALPS  52
      WRITE(KOUT,10)                                                    ALPS  53
   72 FORMAT(/5X54HALL GASEOUS DIFUSSION FACTORS RECALCULATED AS (MOL,WTALPS  54
     1/F7.3,3H)**F6.3//)                                               ALPS  55
      NP=N+1                                                            ALPS  56
      DO 120 IK=1,NP                                                    ALPS  57
      I = 1                                                             ALPS  58
      I1 = 15                                                           ALPS  59
      I2 = 15                                                           ALPS  60
      I3 = 15                                                           ALPS  61
      I4 = 15                                                           ALPS  62
      IF(IK-N) 74,74,85                                                 ALPS  63
   74 IF(IFC(J)) 70,85,70                                               ALPS  64
   70 IF (IABS(IFC(J)) - 3) 75,85,75                                    ALPS  65
   75 IF (TFMAX - 20000.) 80,85,85                                      ALPS  66
   80 TF(J) = TFMAX                                                     ALPS  67
      I = 0                                                             ALPS  68
      GOTO 105                                                          ALPS  69
   85 IF (NFIA(I) - FAMOA(J)) 115,90,115                                ALPS  70
   90 IF (NFIB(I) - FAMOB(J)) 115,95,115                                ALPS  71
   95 IF (FFIN(I) - 100.) 110,100,100                                   ALPS  72
  100 TF(J) = AMIN1(FFIN(I) ,TFMAX)                                     ALPS  73
  105 WRITE(KOUT,15)FAMOA(J),FAMOB(J),TF(J),I1,I2                       ALPS  74
      I1 = 16                                                           ALPS  75
      I2 = 17                                                           ALPS  76
      GOTO 115                                                          ALPS  77
  110 FF(J) = FFIN(I)                                                   ALPS  78
      WRITE(KOUT,20)NFIA(I),NFIB(I),FFIN(I),I3,I4                       ALPS  79
      FF(J) = FF(J) ** GAMEX                                            ALPS  80
      I3 = 16                                                           ALPS  81
      I4 = 17                                                           ALPS  82
  115 I = I + 1                                                         ALPS  83
      IF (I - NFF) 85,85,120                                            ALPS  84
  120  J=J+1                                                            ALPS  85
  125 NFF=0                                                             ALPS  86
      WS=1.0                                                            ALPS  87
  130 IF (KR(6)) 150,135,135                                            ALPS  88
  135 W(1) = 0.                                                         ALPS  89
      IF (KR(4)) 145,145,140                                            ALPS  90
  140 IF (KR(4) - 3) 155,145,155                                        ALPS  91
  145 W(I) = 1.0                                                        ALPS  92
      GOTO 155                                                          ALPS  93
  150 WS = W(1) + W(2) + W(3)                                           ALPS  94
  155 NOATO = NOAT                                                      ALPS  95
      NOAT = 0                                                          ALPS  96
      DUM1 = 0.                                                         ALPS  97
      DO 200 K=1,15                                                     ALPS  98
      ALPH = (W(1) * TK(K,1) + W(2) * TK(K,2) + W(3) * TK(K,3)) / WS    ALPS  99
      IF (ALPH) 160,160,200                                             ALPS 100
  160 IF(KAT(K)-99) 165,161,165                                         ALPS 101
  161 IF(KR(6)) 200,195,195                                             ALPS 102
  165 IF (KR(6)) 195,170,175                                            ALPS 103
  170 IF(TK(K,1)) 171,171,200                                           ALPS 104
  171 IF(KR(8)) 195,195,172                                             ALPS 105
  172 IF(TK(K,3)) 195,195,200                                           ALPS 106
  175 IF (NOATO) 190,190,180                                            ALPS 107
  180 DO 185 KK=1,NOATO                                                 ALPS 108
      IF (IOAT(KK) - K) 185,195,185                                     ALPS 109
  185 CONTINUE                                                          ALPS 110
  190 CONTINUE                                                          ALPS 111
      GOTO 200                                                          ALPS 112
  195 NOAT = NOAT + 1                                                   ALPS 113
      DUM1 = DUM1 - ALPH                                                ALPS 114
      IOAT(NOAT) = K                                                    ALPS 115
  200 CONTINUE                                                          ALPS 116
      WS = WS * (1. + DUM1)                                             ALPS 117
      DO 205 K=1,15                                                     ALPS 118
      GAMF(K)=0.                                                        ALPS 119
  205 ALP(K) = (W(1) * TQ(K,1) + W(2) * TQ(K,2) + W(3) * TQ(K,3)) / WS  ALPS 120
      TEST = 1.0                                                        ALPS 121
      IF (KR(6)) 280,215,210                                            ALPS 122
  210 STOP2222                                                          ALPS 123
C*****SURFACE MASS BALANCE PACKAGE GOES HERE                            ALPS 124
  215 IF (KR(4) - 2) 250,220,250                                        ALPS 125
  220 IF(NCV+KR(3)) 225,225,291                                         ALPS 126
  225 PMU2 = 0.                                                         ALPS 127
      KR(4) = 1                                                         ALPS 128
      DO 231 K=1,15                                                     ALPS 129
      IF(WTM(K)-1.0) 231,229,229                                        ALPS 130
  229 VA = VN(K) / FF(K)                                                ALPS 131
      ZKE(K) = VA                                                       ALPS 132
  230 PMU2 = PMU2 + VA * WTM(K)                                         ALPS 133
  231 CONTINUE                                                          ALPS 134
      J = ISP                                                           ALPS 135
      DO 240 IK=ISP,N                                                   ALPS 136
      IF(WTM(J)-1.0) 240,234,234                                        ALPS 137
  234 VA = VN(J) / FF(J)                                                ALPS 138
      PMU2 = PMU2 + VA * WTM(J)                                         ALPS 139
      DO 235 K=1,15                                                     ALPS 140
  235 ZKE(K) = ZKE(K) + VA * VNU(J,K)                                   ALPS 141
  240 J=J+1                                                             ALPS 142
      DO 245 K=1,15                                                     ALPS 143
  245 ZKE(K) = ZKE(K) / PMU2                                            ALPS 144
  250 DO 270 I=1,15                                                     ALPS 145
      K=-IK(I)                                                          ALPS 146
      IF(KAT(I)-99) 255,260,255                                         ALPS 147
  255 IF(W(1)) 265,265,270                                              ALPS 148
  260 ALP(K) = 0.                                                       ALPS 149
      GOTO 270                                                          ALPS 150
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      ALP(K) = ALP(K) + ZKE(K)                                          ALPS 151
  270 CONTINUE                                                          ALPS 152
  275 TEST=1.+W(2)+W(3)                                                 ALPS 153
  280 DO 285 K=1,15                                                     ALPS 154
  285 TEST = TEST - ALP(K) * WTH(K)                                     ALPS 155
      IF (ABS(TEST) - .001) 300,300,290                                 ALPS 156
  290 WRITE(KOUT,295) W                                                 ALPS 157
      STOP                                                              ALPS 158
  291 WRITE(KOUT,296)                                                   ALPS 159
      STOP                                                              ALPS 160
  295 FORMAT(//// 5X39HSICK MASS BALANCE INITIATION. CHECK . . /        ALPS 161
     1 10X73H1. REARRANGEMENT OF ELEMENTS BETWEEN EDGE AND WALL SOLUTIONALPS 162
     2S (KR(2).GT.0) /10X28H2. COMPONENT MASS FRACTION ( 3E12.4,11H) NOTALPS 163
     3 EQUAL/14X71HTO ZERO FOR UNDEFINED COMPONENT (ALL ZERO GRAM-ATOMICALPS 164
     4-WEIGHTS PER GRAM) )                                              ALPS 165
  296 FORMAT(////5X79HNO VALID EDGE COMPOSITION AVAILABLE BECAUSE LAST SALPS 166
     1OLUTION WAS NON CONVERGENT OR/11X73HNEW FIRST GUESSES HAVE BEEN INALPS 167
     2TRODUCED IN INPUT SUBROUTINE (KR(3)=1 TO 8) )                     ALPS 168
  300 IF (KR(3)) 305,305,370                                            ALPS 169
  305 IF (NOATO) 370,370,310                                            ALPS 170
C     REINITIALIZE SPECIES                                              ALPS 171
  310 PIN = P / 10.                                                     ALPS 172
      PLOG = ALOG(PIN)                                                  ALPS 173
      J = 1                                                             ALPS 174
  315 DO 365 IK=1,N                                                     ALPS 175
      IF (IFC(J) + 1) 320,365,330                                       ALPS 176
  320 IFC(J) = IFC(J) + 3                                               ALPS 177
      IF (J - 15) 340,340,325                                           ALPS 178
  325 YC = J.                                                           ALPS 179
      GOTO 345                                                          ALPS 180
  330 IF (IFC(J) - 1) 365,365,335                                       ALPS 181
  335 IFC(J) = IFC(J) - 3                                               ALPS 182
  340 YC = PLOG                                                         ALPS 183
  345 IF (IFC(J)) 355,360,350                                           ALPS 184
  350 IFC(J) = - 1                                                      ALPS 185
  355 VN(J) = 0.                                                        ALPS 186
      Y(J) = YC                                                         ALPS 187
      GOTO 365                                                          ALPS 188
  360 VN(J) = PIN                                                       ALPS 189
      Y(J) = PLOG                                                       ALPS 190
  365 J=J+1                                                             ALPS 191
  370 IF (NOAT) 425,425,375                                             ALPS 192
  375 J = 1                                                             ALPS 193
  380 DO 405 IK=1,N                                                     ALPS 194
      IF (NOAT - 1) 400,385,385                                         ALPS 195
  385 DO 395 L=1,NOAT                                                   ALPS 196
      K = IOAT(L)                                                       ALPS 197
      LAMT = LAM1(J) / 2 * * (K - 1)                                    ALPS 198
      LAMT = LAMT - (LAMT / 2) * 2                                      ALPS 199
      IF (LAMT) 390,395,390                                             ALPS 200
  390 VN(J) = 0.                                                        ALPS 201
      IFC(J) = IFC(J) - 3                                               ALPS 202
      GOTO 405                                                          ALPS 203
  395 CONTINUE                                                          ALPS 204
  400 CONTINUE                                                          ALPS 205
  405 J=J+1                                                             ALPS 206
      IF (NOAT - 1) 420,410,410                                         ALPS 207
  410 DO 415 L=1,NOAT                                                   ALPS 208
      K = IOAT(L)                                                       ALPS 209
      J = - IR(K)                                                       ALPS 210
  415 IFC(J) = IFC(J) + 6                                               ALPS 211
  420 CONTINUE                                                          ALPS 212
  425 RETURN                                                            ALPS 213
      END                                                               ALPS 214
                                                                        ALPS 215
```

```
      SUBROUTINE BELCM                                                  BELC   1
C                                                                       BELC   2
      INCLUDE INC1,LIST                                                 BELC   3
C                                                                       BELC   4
      INCLUDE INC2,LIST                                                 BELC   5
C                                                                       BELC   6
   15 IF (J - IS) 20,20,35                                              BELC   7
   20 JM = J - I                                                        BELC   8
      WRITE(KOUT,25)JM,IS,(FAMOA(I),FAMOB(I),I=I,JM)                    BELC   9
      WRITE(KOUT,30)(FAMOA(I),FAMOB(I),I=ISP,N)                         BELC  10
      STOP                                                              BELC  11
   25 FORMAT(////15H ONLY FOLLOWINGI3,23H BASE SPECIES FOUND FORI3,      BELC  12
     I9H ELEMENTS/(2X20A4))                                             BELC  13
   30 FORMAT(/30H OTHER SPECIES CONSIDERED WERE/(2X20A4))               BELC  14
   35 DO 45 L=2,IS                                                      BELC  15
      JM = ISP - L                                                      BELC  16
      IMJ = IM(JM + 1)                                                  BELC  17
      IF (JM - I) 50,40,40                                              BELC  18
   40 DO 45 K=I,JM                                                      BELC  19
      UGM = TAU(IMJ,K)                                                  BELC  20
      DO 45 I=1,IS                                                      BELC  21
   45 UM(I,K) = UM(I,K) - UGM * UM(I,JM + I)                            BELC  22
   50 CONTINUE                                                          BELC  23
      DO 70 I=I,IS                                                      BELC  24
   55 IMI = IM(I)                                                       BELC  25
      IF (IMI - I) 60,70,60                                             BELC  26
   60 DO 65 K=1,IS                                                      BELC  27
      V = UM(K,IMI)                                                     BELC  28
      UM(K,IMI) = UM(K,I)                                               BELC  29
   65 UM(K,I) = V                                                       BELC  30
      IM(I) = IM(IMI)                                                   BELC  31
      IM(IMI) = IMI                                                     BELC  32
      GOTO 55                                                           BELC  33
   70 CONTINUE                                                          BELC  34
C-----ELEMENT -- BASE GAS CORRESPONDENCE                                BELC  35
C     INITIALIZE ROW AND COLUMN SUMS                                    BELC  36
      IG = IS                                                           BELC  37
      DO 75 I=I,IS                                                      BELC  38
      IR(I) = - I                                                       BELC  39
   75 IC(I) = - I                                                       BELC  40
C     EVALUATE INITIAL SUMS                                             BELC  41
      LAMO = 1                                                          BELC  42
      DO 90 I=I,IS                                                      BELC  43
      DO 85 J=I,IS                                                      BELC  44
      LAMT = LAMI(J) / LAMO                                             BELC  45
      LIM(I,J) = LAMT - (LAMT / 2) * 2                                  BELC  46
      IF (LIM(I,J)) 80,85,80                                            BELC  47
   80 IC(J) = IC(J) + I                                                 BELC  48
      IW(I) = IR(I) + I                                                 BELC  49
   85 CONTINUE                                                          BELC  50
      90 LAMO = LAMO * LAMO                                             BELC  51
C     CHECK FOR ZEROS                                                   BELC  52
      95 IZ = 0                                                         BELC  53
     100 DO 185 I=I,IS                                                  BELC  54
         IF (IC(I) - IZ) 140,105,140                                    BELC  55
     105 DO 110 J=I,IS                                                  BELC  56
         IF (LIM(J,I)) 115,110,115                                      BELC  57
     110 CONTINUE                                                       BELC  58
     115 IC(I) = - J                                                    BELC  59
         IR(J) = - I                                                    BELC  60
         LIM(J,I) = 0                                                   BELC  61
         DO 135 K=I,IS                                                  BELC  62
         IF (LIM(J,K)) 120,125,120                                      BELC  63
     120 IC(K) = IC(K) - 1                                              BELC  64
         LIM(J,K) = 0                                                   BELC  65
     125 IF (LIM(K,I)) 130,135,130                                      BELC  66
     130 LIM(K,I) = 0                                                   BELC  67
         IR(K) = IR(K) - I                                              BELC  68
     135 CONTINUE                                                       BELC  69
         GOTO 190                                                       BELC  70
     140 IF (IR(I) - IZ) 185,145,185                                    BELC  71
     145 DO 155 J=I,IS                                                  BELC  72
         IF (LIM(I,J)) 150,155,150                                      BELC  73
     150 IC(J) = - I                                                    BELC  74
         IR(I) = - J                                                    BELC  75
         LIM(I,J) = 0                                                   BELC  76
         GOTO 160                                                       BELC  77
     155 CONTINUE                                                       BELC  78
     160 DO 180 K=I,IS                                                  BELC  79
         IF (LIM(K,J)) 165,170,165                                      BELC  80
     165 IR(K) = IR(K) - I                                              BELC  81
         LIM(K,J) = 0                                                   BELC  82
     170 IF (LIM(I,K)) 175,180,175                                      BELC  83
     175 LIM(I,K) = 0                                                   BELC  84
         IC(K) = IC(K) - 1                                              BELC  85
     180 CONTINUE                                                       BELC  86
         GOTO 190                                                       BELC  87
     185 CONTINUE                                                       BELC  88
         IZ = IZ + 1                                                    BELC  89
         GOTO 100                                                       BELC  90
     190 IG = IG - 1                                                    BELC  91
         J = IS + I                                                     BELC  92
         IF (IG) 195,195,95                                             BELC  93
     195 DO 200 I=1,IS                                                  BELC  94
         K = - IR(I)                                                    BELC  95
         FAMA(I) = FAMOA(K)                                             BELC  96
     200 FAMB(I) = FAMOB(K)                                             BELC  97
         WRITE(KOUT,205)(ATA(I),ATB(I),ATC(I),I=I,IS)                   BELC  98
         WRITE(KOUT,210)(FAMA(I),FAMB(I),I=1,IS)                        BELC  99
     205 FORMAT(/5X,8HELEMENTS,7X,15A4/(20X,15A4))                      BELC 100
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```
 210 FORMAT(/5X,12HBASE SPECIES,3X,5(2A4,4X)/(20X,5(2A4,4X)))
     DO 215 L=1,3
     DO 215 I=I,IS
     TQ(I,L) = 0.
     DO 215 K=1,IS
 215 TQ(I,L) = TQ(I,L) + UM(I,K) * TK(K,L)
 220 RETURN
     END
```

```
BELC 101          SUBROUTINECRECT(MOE)                                    CREC   1
BELC 102          DIMENSION OY(I)                                         CREC   2
BELC 103     C                                                            CREC   3
BELC 104          INCLUDE INC1,LIST                                       CREC   4
BELC 105     C                                                            CREC   5
BELC 106          INCLUDE INC3,LIST                                       CREC   6
BELC 107     C                                                            CREC   7
BELC 108          EQUIVALENCE(A(I),OY(I))                                 CREC   8
BELC 109          M1 = I                                                  CREC   9
                  M = IB(1)                                               CREC  10
                  WTL = 0.                                                CREC  11
                  WTG = 0.                                                CREC  12
                  DUM2 = 0.                                               CREC  13
                  I = I                                                   CREC  14
                  LIM=KR(8)+N                                             CREC  15
                  DO 115 IK=1,LIM                                         CREC  16
                  OYI = CMF * OY(IK)                                      CREC  17
                  IF (OYI) 10,5,10                                        CREC  18
                5 IF(IFC(I)) 115,55,105                                   CREC  19
               10 IF (IFC(I)) 75,15,100                                   CREC  20
               15 IF (IP(I)) 20,50,20                                     CREC  21
               20 IF (M - IK) 25,30,25                                    CREC  22
               25 IF (MOE) 50,50,35                                       CREC  23
               30 M1 = M1 + I                                             CREC  24
                  M = IB(MI)                                              CREC  25
               35 VN(I) = VN(I) * (1. + OYI)                              CREC  26
                  IF(VN(I)) 50,50,45                                      CREC  27
               45 Y(I) = ALOG(VN(I))                                      CREC  28
                  GOTO 53                                                 CREC  29
               50 Y(I) = Y(I) + OYI                                       CREC  30
                  VN(I) = EXP(Y(I))                                       CREC  31
               55 VA = WYM(I) * VN(I)                                     CREC  32
                  WTG = WTG + VA                                          CREC  33
                  DUM2 = DUM2 + VA / FF(I)                                CREC  34
                  IF (IK - IS) 60,60,65                                   CREC  35
               60 PNUS(I) = VN(I)                                         CREC  36
                  IF(KR(6)) 115,63,72                                     CREC  37
               63 SLAM(I)=VN(I)/FF(I)                                     CREC  38
                  GOTO 115                                                CREC  39
               65 DO 70 K=1,IS                                            CREC  40
                  VA = VNU(I,K) * VN(I)                                   CREC  41
                  IF(KR(6)) 70,68,70                                      CREC  42
               68 SLAM(K)=SLAM(K)+VA/FF(I)                                CREC  43
               70 PNUS(K)=PNUS(K)+VA                                      CREC  44
                  IF(KR(6)) 115,115,72                                    CREC  45
               72 DO 73 K=I,IS                                            CREC  46
               73 SLAM(K)=SLAM(K)+VN(I)*VLAM(I,K)                         CREC  47
                C    NON-PRESENT BASE CORRECTIONS AND TESTS               CREC  48
               75 Y(I) = Y(I) + OYI                                       CREC  49
                  IF (Y(I)) 115,80,80                                     CREC  50
```

```
 80 IF (IFC(I) + 1) 115,85,85
 85 IF (KR(6)) 95,90,90
 90 IF (T - TF(I) + .001) 115,95,95
 95 Y(I) = 0.
    IFC(I) = + 1
    GOTO 115
100 VN(I) = VN(I) + DYI
    IF (VN(I)) 110,110,105
105 WTL = WTL + VN(I) * WTM(I)
    GOTO 115
110 VN(I) = 0.
    IFC(I) = - 1
115 I=I+1
    IF(KR(6)) 121,116,121
116 FFF=WTG/OUM2
    DO 120 I=1,IS
120 SLAM(I) = SLAM(I) * FFF
121 RETURN
    END
```

```
CREC  51        SUBROUTINE IMELM                                                IMEL   1
CREC  52  C                                                                     IMEL   2
CREC  53        INCLUDE INC1,LIST                                               IMEL   3
CREC  54  C                                                                     IMEL   4
CREC  55        INCLUDE INC2,LIST                                               IMEL   5
CREC  56  C                                                                     IMEL   6
CREC  57        DIMENSION ATAS(10),ATBS(10),ATCS(10)                            IMEL   7
CREC  58        COMMON/CARKIN/ KRK(10),ROUGH,NCC                                IMEL   8
CREC  59        DATA AG,BG,CG/4H MOT,4H ORY,4H ICE/                             IMEL   9
CREC  60        DATA AG,BG,CG/4H GRA,4HPHIT,4HE   /                             IMEL  10
CREC  61      5 FORMAT (13)                                                     IMEL  11
CREC  62     10 FORMAT(I3,3A4,4F10.5)                                           IMEL  12
CREC  63     15 FORMAT(54HORELATIVE ELEMENTAL COMPOSITIONS, ATOMIC WTS/UNIT MASS IMEL  13
CREC  64       1/6X6HMAT.NO.3X7HELEMENT4X9HATOMIC WTS2IMEDGE GAS      SURFACE/(7XIMEL  14
CREC  65       23,3X3A4,F10.5,2F13.7))                                          IMEL  15
CREC  66        IF (NCC-1) 90,20,90                                             IMEL  16
CREC  67     20 READ(KIN,5)IS                                                   IMEL  17
CREC  68        IF (IS-10) 25,25,60                                             IMEL  18
CREC  69     25 IF (IS) 251,250,251                                             IMEL  19
CREC  70    250 IS=ISS                                                          IMEL  20
            IF (KAT(IS)-46) 254,253,254                                         IMEL  21
    253 TK(ICAR,1)=TK(ICAR,1)+TK(IS,1)                                          IMEL  22
        TK(IOX,1)=TK(IOX,1)+2.0*TK(IS,1)                                        IMEL  23
        IS=IS-1                                                                 IMEL  24
        GO TO 254                                                               IMEL  25
    251 READ(KIN,10)(KAT(J),ATA(J),ATB(J),ATC(J),WAT(J),TK(J,1),TK(J,2),TKIMEL  26
       1(J,3),J=1,IS)                                                           IMEL  27
        DO 93 I=1,IS                                                            IMEL  28
        IF (KAT(I)-6) 95,94,95                                                  IMEL  29
     94 ICAR=I                                                                  IMEL  30
        GO TO 93                                                                IMEL  31
     95 IF (KAT(I)-8) 93,96,93                                                  IMEL  32
     96 IOX=I                                                                   IMEL  33
     93 CONTINUE                                                                IMEL  34
        IS=IS+1                                                                 IMEL  35
        ISS=IS                                                                  IMEL  36
        KAT(IS)=106                                                             IMEL  37
        ATA(IS)=AG                                                              IMEL  38
        ATB(IS)=BG                                                              IMEL  39
        ATC(IS)=CG                                                              IMEL  40
        WAT(IS)=12.011                                                          IMEL  41
        TK(IS,1)=0.0                                                            IMEL  42
        TK(IS,2)=0.0                                                            IMEL  43
        TK(IS,3)=TK(ICAR,3)                                                     IMEL  44
        TK(ICAR,3)=1.0E-19                                                      IMEL  45
        DO 91 I=1,IS                                                            IMEL  46
        ATAS(I)=ATA(I)                                                          IMEL  47
        ATBS(I)=ATB(I)                                                          IMEL  48
     91 ATCS(I)=ATC(I)                                                          IMEL  49
        GO TO 30                                                                IMEL  50
```

```
90 IS=IS+1
   ISS=IS
   TK(ICAR,1)=TK(ICAR,1)-VN(1)/AA
   TK(IOX,1)=TK(IOX,1)-2.0*VN(1)/AA
   KAT(IS)=44
   ATAS(IS)=AD
   ATBS(IS)=BD
   ATCS(IS)=CD
   WAT(IS)=44.011
   TK(IS,1)=VN(1)/AA
   TK(IS,2)=0.0
   TK(IS,3)=1.0E-19
254 DO 92 I=1,IS
   ATA(I)=ATAS(I)
   ATB(I)=ATBS(I)
92 ATC(I)=ATCS(I)
30 DO 57 K=1,3
   VA = 0.
   DO 50 J=1,IS
   IF (KAT(J) - 99) 35,45,35
35 IF (TK(J,K)) 40,50,45
40 VA = VA - TK(J,K)
   TK(J,K) = - TK(J,K) / WAT(J)
   GOTO 50
45 VA = VA + TK(J,K) * WAT(J)
50 CONTINUE
   IF(VA) 53,57,53
53 DO 55 J=1,IS
55 TK(J,K) = TK(J,K) / VA
57 CONTINUE
   WRITE(KOUT,15)(KAT(J),ATA(J),ATB(J),ATC(J),WAT(J),TK(J,1),
  1TK(J,3),J=1,IS)
   ISP = IS + 1
   IF (KR(3)) 65,65,60
60 IF (KR(3) - 9) 85,65,85
65 CONTINUE
   DO 70 L=1,3
   DO 70 I=1,15
   TQ(I,L) = 0.
   DO 70 K=1,15
70 TQ(I,L) = TQ(I,L) + UM(I,K) * TK(K,L)
75 FORMAT(/////40X,31HPROGRAM LIMITED TO 15 ELEMENTS   )
85 RETURN
80 WRITE(KOUT,75)
   STOP
   END
```

```
      SUBROUTINE INPUT
      REAL NFIAD(50),NFIBD(50),FFIND(50)
      COMMON/ACE1/GAMEX,REFM,PCH,ACHSQ,SQMAK,SXP
C
      INCLUDE INC1,LIST
C
      INCLUDE INC2,LIST
C
C
      INCLUDE DATX
C
      COMMON/CARKIN/ KRK(10),ROUCM,NCC
      DATA (NFIAD(I),NFIBD(I),FFIND(I),I=1,14)/
     14HC    ,4H    ,0.68950,4HCH4 ,4H    ,0.95030,4HCN  ,4H    ,1.03330,
     24HCO   ,4H    ,1.01720,4HCO2 ,4H    ,1.24950,4HH   ,4H    ,0.19396,
     34HCHN  ,4H    ,1.14730,4HH2  ,4H    ,0.28302,4HH2O ,4H    ,0.77040,
     44HN    ,4H    ,0.75530,4HN2  ,4H    ,1.02750,4HO   ,4H    ,0.70630,
     54HHO   ,4H    ,0.74210,4HO2  ,4H    ,0.95530/
    5 FORMAT (I3)
   10 FORMAT (6F9.6,6XF6.0,I.)
   15 FORMAT(1X6E12.5,F10.4,.2/1X6E12.5,F10.4,I2,F7.4)
   20 FORMAT(2A4,E12.4,2A4,E12.4,2A4,E12.4,2A4,E12.4)
   25 FORMAT( 7(F3.0,I3),A2,9A4)
      DATA CHAR,BLANK/4HCHAR,4H    /
      J = ISP
      IF (I1) 30,30,35
   30 CONTINUE
      NJAN=0
      REFM=23.4
      FFA=.431
      NFF = 0
      JC=KR(3) - (KR(3) / 2) * 2
      VINT = P * 1.E - 6
      YINT = ALOG(VINT)
      JAT(8) = 0
      N = 0
      II = ISP
      J = 1
      IFL = - 1
      IOC = 1
   35 IF (KR(3) - 5) 40,50,50
   40 IF (KRK(3)) 42,41,42
   41 NJAN=NJAN+1
      DO 43 I=1,7
      ALPT(I)=ALPTD(I,NJAN)
      JAT(I)=JATD(I,NJAN)
   43 SORCE(I)=SORCD(I,NJAN)
      SORCE(8)=SORCD(8,NJAN)
      AMOA=AMOAD(NJAN)
      AMOB=AMOBD(NJAN)
```

```
      IF (NJAN-1) 44,61,44
   61 DO 71 I=1,14
      NFIA(I)=NFIAO(I)
      NFIB(I)=NFIBO(I)
   71 FFIN(I)=FFIND(I)
      NFF=14
      INF=1
      IF (NCC-1) 44,44,62
   62 ALPT(1)=1.0
      JAT(1)=44
      ALPT(2)=0.0
      JAT(2)=0
      GO TO 44
   42 READ(KIN,25)(ALPT(K),JAT(K),K=1,7),SORCE,AMOA,AMOB
   44 IF (KR(3)-3) 55,45,45
   45 WRITE(   JAN) ALPT,JAT,SORCE,AMOA,AMOB
      GOTO 55
   50 READ (   JAN) ALPT,JAT,SORCE,AMOA,AMOB
      IF (NJAN) 55,550,55
  550 IF (JAT(1)) 55,55,551
  551 ALPT(1)=1.0
      JAT(1)=44
      ALPT(2)=0.0
      JAT(2)=0
      NJAN=1
   55 IF (ALPT(1)) 60,375,60
   60 IF (JAT(1)) 65,65,85
   65 INF = NFF + 1
      K=ABS(ALPT(1))
      NFF = K + NFF
      IF (KR(3) - 5) 70,80,80
   70 READ(KIN,20)(NFIA(I),NFIB(I),FFIN(I),I=INF,NFF)
      IF (KR(3) - 3) 35,75,75
   75 WRITE(   JAN) (NFIA(I) ,NFIB(I) ,FFIN(I) ,I = INF,NFF)
      GOTO 35
   80 READ(   JAN) (NFIA(I) ,NFIB(I) ,FFIN(I) ,I = INF,NFF)
      GOTO 35
   85 DO 90 K=1,15
   90 C(K) = 0.
      DO 110 I=1,7
      IF (JAT(I)) 95,110,95
   95 DO 100 K=1,15
      IF (JAT(I) - KAT(K)) 100,105,100
  100 CONTINUE
      KK = II
      GOTO 285
  105 C(K) = ALPT(I)
  110 CONTINUE
  115 WT = 0.
      IF (JC) 125,120,125
  120 WRITE(KOUT,25)(ALPT(K),JAT(K),K=1,7),SORCE,AMOA,AMOB
  125 L = 1
      LAMKK = 0
      DO 140 I=1,15
      IF (C(I)) 130,135,130
  130 LAMKK = LAMKK + L
  135 L = L + L
      ALPT(I) = C(I)
  140 WT = WT + C(I) * WAT(I)
      IF (J - IS) 145,145,215
  145 JM = J - 1
      IF (JM) 175,175,150
  150 DO 170 L=1,JM
      IML = IM(L)
      UGM = C(IML)
      UM(L,J) = 0.
      IF (UGM) 155,170,155
  155 DO 160 I=1,L
  160 UM(I,J) = UM(I,J) - UM(I,L) * UGM
      DO 165 I=IML,15
  165 C(I) = C(I) - TAU(I,L) * UGM
  170 UM(J,L) = 0.
  175 DO 180 I=1,15
      IF (ABS(C(I)) - .001) 180,180,185
  180 TAU(I,J) = 0.
      GOTO 215
  185 IM(J) = I
      UM(J,J) = 1.
      DO 190 L=1,J
  190 UM(L,J) = UM(L,J) / C(I)
      DO 195 L=I,15
  195 TAU(L,J) = C(L) / C(I)
  205 YC = YINT
      DO 210 L=1,15
  210 C1J(J,L) = ALPT(L)
      KK = J
      KKK = J
      J = J + 1
      GOTO 285
  215 CONTINUE
  250 IF (J - 15) 255,255,270
  255 DO 260 I=1,JM
  260 VNU(II,I) = - UM(I,J)
      DO 265 I=J,15
  265 VNU(II,I) = 0.
      GOTO 280
  270 DO 275 L=1,15
      VNU(II,L) = 0.
      DO 275 I=1,15
  275 VNU(II,L) = VNU(II,L) + C(I) * UM(L,I)
```

```
280 KK = II                                                                    INPU0151
    KKK = II                                                                   INPU0152
    II = II + I                                                                INPU0153
    YC = 0.                                                                    INPU0154
285 IF (KR(3) - 5) 290,300,300                                                 INPU0155
290 IF (KRK(3)) 292,291,292                                                    INPU0156
291 DO 293 K=1,2                                                               INPU0157
    RA(K)=RAD(K,NJAN)                                                          INPU0158
    RB(KK,K)=RBD(K,NJAN)                                                       INPU0159
    RC(KK,K)=RCD(K,NJAN)                                                       INPU0160
    RD(KK,K)=RDD(K,NJAN)                                                       INPU0161
    RE(KK,K)=RED(K,NJAN)                                                       INPU0162
    RF(KK,K)=RFD(K,NJAN)                                                       INPU0163
    TU(KK,K)=TUD(K,NJAN)                                                       INPU0164
293 KPHA(K)=KPHAO(K,NJAN)                                                      INPU0165
    GO TO 294                                                                  INPU0166
292 READ(KIN,10)(RA(K),RB(KK,K),RC(KK,K),RD(KK,K),RE(KK,K),RF(KK,K),TU        INPU0167
   1(KK,K),KPHA(K),K=1,2)                                                      INPU0168
294 IF (KR(3)-3) 305,295,295                                                   INPU0169
295 WRITE(  JAN) (RA(K) ,RB(KK,K) ,RC(KK,K) ,RD(KK,K) ,RE(KK,K) ,RF(KK        INPU0170
   1,K) ,TU(KK,K) ,KPHA(K) ,K = 1,2)                                           INPU0171
    GOTO 305                                                                   INPU0172
300 READ(  JAN) (RA(K) ,RB(KK,K) ,RC(KK,K) ,RD(KK,K) ,RE(KK,K) ,RF(KK,        INPU0173
   1K) ,TU(KK,K) ,KPHA(K) ,K = 1,2)                                            INPU0174
305 IF (KK - II) 310,35,310                                                    INPU0175
310 FF(KK) = 20000.                                                            INPU0176
    IF (KPHA(1) - KPHA(2)) 315,330,320                                         INPU0177
315 IF (KPHA(1) + KPHA(2) - 5) 320,335,320                                     INPU0178
320 WRITE(KOUT,325)AMOA,AMOB                                                   INPU0179
    STOP                                                                       INPU0180
325 FORMAT (////25H BAD PHASE NUMBERING FOR 2A4)                               INPU0181
330 IF(KPHA(1)-1) 320,345,340                                                  INPU0182
335 TU(KK,1) = - TU(KK,1)                                                      INPU0183
340 FF(KK) = 1.E + 10                                                          INPU0184
    IFC(KKK) = - 1                                                             INPU0185
    VN(KK) = 0.                                                                INPU0186
    Y(KK) = AMAX1(YC,0.)                                                       INPU0187
    GOTO 355                                                                   INPU0188
345 FF(KK)=(WT/REFM)**FFA                                                      INPU0189
    IF(WT-.1) 346,346,350                                                      INPU0190
346 FF(KK)=1.E+10                                                              INPU0191
350 IFC(KKK) = 0                                                               INPU0192
    VN(KK) = VINT                                                              INPU0193
    Y(KK) = YINT                                                               INPU0194
355 IF (JC)  365,360,365                                                       INPU0195
360 WRITE(KOUT,15)(RA(K),RB(KK,K),RC(KK,K),RD(KK,K),RE(KK,K),RF(KK,K),        INPU0196
   1TU(KK,K),KPHA(K),K=1,2),FF(KK)                                             INPU0197
365 FF(KK)=FF(KK)**GAMEX                                                       INPU0198
    IF (IFC(KK)) 3651,3650,3651                                                INPU0199
3651 FF(KK)=1.0E+10                                                            INPU0200

3650 FAMOA(KK)=AMOA                                                            INPU0201
    FAMOB(KK) = AMOB                                                           INPU0202
    LAMI(KK) = LAMKK                                                           INPU0203
    WTM(KK) = WT                                                               INPU0204
    RB(KK,1) = RB(KK,1) + RA(1)                                                INPU0205
    RB(KK,2) = RB(KK,2) + RA(2)                                                INPU0206
    N = N + 1                                                                  INPU0207
    IF (N-179) 368,368,366                                                     INPU0208
366 NEX=N-179                                                                  INPU0209
    WRITE(KOUT,367)NEX                                                         INPU0210
367 FORMAT(////11H THERE ARE I2,15H EXCESS SPECIES)                            INPU0211
    STOP                                                                       INPU0212
368 CONTINUE                                                                   INPU0213
    IF(KK-15) 35,370,35                                                        INPU0214
370 CONTINUE                                                                   INPU0215
375 VN(N,1) =0.                                                                INPU0216
    TF(N,1)=0.                                                                 INPU0217
    IFC(N,1)=-1                                                                INPU0218
    WTM(N,1)=-1.                                                               INPU0219
    FAMOA(N,1)=CHAR                                                            INPU0220
    FAMOB(N,1)=BLANK                                                           INPU0221
390 RETURN                                                                     INPU0222
    END                                                                        INPU0223
```

```
      SUBROUTINE KINET                                                  KINE   1
      DIMENSION PPA(50),PSI(10,50),FKK(10,50),PRMU(10,50),FFX(50)       KINE   2
C                                                                       KINE   3
      INCLUDE INCL,LIST                                                 KINE   4
C                                                                       KINE   5
      COMMON /DIFFER/ IB(11),DKPT(50),PKP(50),PKR(50),RAT(50),DUM(50),  KINE   6
     D                LL(50),MA(50)                                    KINE   7
C                                                                       KINE   8
      COMMON/CARKIN/ KRK(10),ROUCM,NCC                                  KINE   9
      DATA HHCL,HHF/4HCL ,4HF  /,4HCLM ,4HFM  /                         KINE  10
    5 FORMAT(1313)                                                      KINE  11
      IF (KR(9)-4) 10,3330,255                                          KINE  12
  255 IF(KR(9)-5) 334,334,331                                           KINE  13
  331 KR(9)=4                                                           KINE  14
      DO 332 M=1,MT                                                     KINE  15
  332 AC(46,M)=FKF(M)                                                   KINE  16
      IF (KRK(5)-2) 404,405,405                                         KINE  17
  404 DO 400 M=1,MT                                                     KINE  18
      DO 400 J=1,IS                                                     KINE  19
      PSI(J,M)=0.0                                                      KINE  20
  400 FKK(J,M)=0.0                                                      KINE  21
      IF (KRK(8)-4) 407,416,416                                         KINE  22
  416 DO 408 I=1,3                                                      KINE  23
      DO 408 J=1,4                                                      KINE  24
  408 PSI(J,1)=1.0                                                      KINE  25
      PSI(2,3)=0.0                                                      KINE  26
      IF (FAMOA(6)-HHCL) 410,409,410                                    KINE  27
  410 IF (FAMOA(6)-HHF) 333,409,333                                     KINE  28
  409 FKK(6,3)=3.0                                                      KINE  29
      FKK(6,2)=3.0                                                      KINE  30
      GO TO 333                                                         KINE  31
  407 IF (KRK(8)-3) 411,333,411                                         KINE  32
  411 PSI(1,1)=1.0                                                      KINE  33
      PSI(2,1)=1.0                                                      KINE  34
      GO TO 333                                                         KINE  35
  405 DO 406 I=1,MT                                                     KINE  36
      READ(KIN,415)(PSI(J,1),J=1,IS)                                    KINE  37
  406 READ(KIN,415)(FKK(J,1),J=1,IS)                                    KINE  38
  415 FORMAT(8F10.6)                                                    KINE  39
  333 WRITE(KOUT,3331)                                                  KINE  40
 3331 FORMAT(/3X,7HSPECIES,/4A,10HINHIBITING,/5X7HFACTORS,/5X,7HPSI/FKK,KINE  41
     1/)                                                                KINE  42
      DO 3332 J=1,IS                                                    KINE  43
 3332 WRITE(KOUT,3333) FAMOA(J),FAMOB(J),(PSI(J,I),FKK(J,I),I=1,MT)     KINE  44
 3333 FORMAT(5X2A4,2X,10(F5.2,1H/,F5.2)/(15X,10(F5.2,1H/,F5.2)))        KINE  45
 3330 DO 403 M=1,MT                                                     KINE  46
      PPA(M)=1.0                                                        KINE  47
      FFA(M)=1.0                                                        KINE  48
      DO 402 J=1,IS                                                     KINE  49
      PPA(M)=PPA(M)*PSI(J,M)**VN(J)                                     KINE  50
  402 FFX(M)=FFX(M)*FKK(J,M)**VN(J)                                     KINE  51
  403 FKF(M)=AC(46,M)/(PPX(M)*FFX(M))                                   KINE  52
      GO TO 10                                                          KINE  53
  334 KR(9)=3                                                           KINE  54
      DO 335 M=1,MT                                                     KINE  55
      PPX(M)=1.                                                         KINE  56
      IF (M.GE.3) GO TO 336                                             KINE  57
      GO TO 335                                                         KINE  58
  336 PPX(M)=P                                                          KINE  59
  335 CONTINUE                                                          KINE  60
   10 HT = 1.9869 * T                                                   KINE  61
      DO 40 M=1,MT                                                      KINE  62
      SUMD = 0.                                                         KINE  63
      SUMK = 0.                                                         KINE  64
      SUMR = 0.                                                         KINE  65
      SUMP = 0.                                                         KINE  66
      DO 15 I=1,IS                                                      KINE  67
      IF(IABS(IFC(I))-1) 14,14,11                                       KINE  68
   11 IF(PMU(I,M)) 12,14,12                                             KINE  69
   12 VK1=0.                                                            KINE  70
      VK2=0.                                                            KINE  71
      GO TO 35                                                          KINE  72
   14 CONTINUE                                                          KINE  73
      PRMU(I,M) = PMU(I,M) - RMU(I,M)                                   KINE  74
      SUMK = SUMK + PRMU(I,M) * VLNK(I)                                 KINE  75
      SUMR = SUMR + RMU(I,M) * Y(I)                                     KINE  76
      SUMP = SUMP + PMU(I,M) * Y(I)                                     KINE  77
   15 SUMD = SUMD + PRMU(I,M) * H(I)                                    KINE  78
C     EQUILIBRIUM CONSTANTS FOR KINETIC REACTIONS IN TERMS OF BASE SPECIKINE  79
C          LOG KP=S                                                     KINE  80
C     DERIVATIVES OF LOGS OF ABOVE KP=S WITH RESPECT TO LOG T           KINE  81
      DKPT(M) = SUMD / RT                                               KINE  82
C     RIGHT HAND SIDE (OR REVERSE PART) OF DRIVING POTENTIAL            KINE  83
      PKP(M) = EXP(SUMP - SUMK)                                         KINE  84
C     LEFT HAND SIDE (OR FORWARD PART) OF DRIVING POTENTIAL             KINE  85
      PKR(M) = EXP(SUMR)                                                KINE  86
      VK1 = PKR(M) - PKP(M)                                             KINE  87
      IF (VK1) 25,20,25                                                 KINE  88
   20 VK1 = 1.E - 9 * PKR(M)                                            KINE  89
   25 CONTINUE                                                          KINE  90
      VK2=AA*FKF(M)*1.**EAK(M)*EXP(-EAK(M)/RT)                          KINE  91
C     PM TIMES FORWARD RATE OF REACION I  (PM=AA)                       KINE  92
   35 PMR(M) = VK2 * VK1                                                KINE  93
      PKP(M)=PKP(M)*VK2                                                 KINE  94
      PKR(M)=PKR(M)*VK2                                                 KINE  95
      RAT(M)=AMAX1(PKP(M),PKR(M))                                       KINE  96
      IF(KK(7)-1) 40,40,36                                              KINE  97
   36 IF(M-1) 37,37,39                                                  KINE  98
   37 WRITE(KOUT,38)                                                    KINE  99
   38 FORMAT(2X,1HM,7X,3HLKP,6X,8HOLKP/OLT,6X,4HPMRR,8X,4HPMRP,9X,3HPMR,9X,3HRAT) KINE 100
```

```
   39 WRITE(KOUT,41) M,SUMK,DKPT(M),PKR(M),PKP(M),PMR(M),RAT(M)
   40 MA(M) = M
   41 FORMAT(13,2A,6E12.5)
   45 FORMAT(1X26HA(I,J),B(I),I=1,8,J=I,8 IN)
   50 FORMAT(1X12E10.3)
   55 FORMAT(1X27HA(I,J),B(I),I=I,8,J=I,8 OUT)
      KR7=KR(7)
      KR(7)=0
      IF (KR(7) - 1) 80,80,65
   65 CONTINUE
      WRITE(KOUT,50)PRMU
      WRITE(KOUT,215)
      WRITE(KOUT,50)(EB(I),I=I,IS)
   70 WRITE(KOUT,45)
      DO 75 I=1,ISP2
   75 WRITE(KOUT,50)(A(I,J),J=I,ISP2),B(I)
   80 CONTINUE
C*****ORDER REACTIONS
   85 IF (MT - 1) 105,105,90
   90 K = 0
      DO 100 M=2,MT
      IF (RAT(M) - RAT(M - 1)) 100,100,95
   95 K = MA(M)
      MA(M) = MA(M - 1)
      MA(M - 1) = K
      DUM1 = RAT(M)
      RAT(M) = RAT(M - 1)
      RAT(M - 1) = DUM1
  100 CONTINUE
      IF (K) 105,105,85
C*****START SECOND MAJOR LOOP ON REACTIONS
  105 DO 200 MM=1,MT
      M = MA(MM)
C*****IS IT A CONTROLLING REACTION
      LL(MM) = 0
      DO 125 L=1,IS
      IF (PRMU(L,M)) 110,125,110
  110 DO 115 K=1,MM
      IF (L - LL(K)) 115,125,115
  115 CONTINUE
      IF (RAT(MM) - EB(L)) 125,125,120
C* * * YES,IT IS FOR MASS BALANCE L
  120 LL(MM) = L
      GOTO 130
  125 CONTINUE
C* * *NO, IT IS NOT, ADD INTO ALL MASS BALANCES
      I1 = 1
      I2 = IS
      GOTO 170
C*****REARRANGE ACCORDING TO CONTROLLING REACTION
  130 DUM1 = PRMU(L,M)
      PRMU(L,M) = 0.
      DO 165 I=I,IS
      IF (PRMU(I,M)) 135,165,135
  135 DUM2 = PRMU(I,M) / DUM1
      MP = MM + 1
      IF (MT - MP) 155,140,140
  140 DO 150 K=MP,MT
      MI = MA(K)
      PRMU(I,MI) = PRMU(I,MI) - DUM2 * PRMU(L,MI)
      IF (ABS(PRMU(I,MI)) - .001) 145,150,150
  145 PRMU(I,MI) = 0.
  150 CONTINUE
  155 DO 160 K=1,ISPQ
  160 A(I + 2,K) = A(I + 2,K) - DUM2 * A(L + 2,K)
      B(I + 2) = B(I + 2) - DUM2 * B(L + 2)
      E(I)=E(I)-DUM2*E(L)
      DUM2 = ABS(DUM2)
      EB(1) = AMAX1(EB(1) ,DUM2 * EB(L))
  165 CONTINUE
      PRMU(L,M) = DUM1
C*****ADD CONTROLLING REACTION INTO ITS MASS BALANCE
      I1 = L
      I2 = L
  170 DO 175 J=1,IS
      SUMD = RMU(J,M) * PKR(M) - PMU(J,M) * PKP(M)
      SUMD=SUMD-PMR(M)*(PSI(J,M)*VN(J)*FFA(M)*PPA(M)*FKK(J,M)*VN(J))/
     1(PPA(M)*FFA(M))
      DO 175 I=I1,I2
  175 A(I + 2,J + 2) = A(I + 2,J + 2) - SUMD * PRMU(I,M)
      SUMD=-PKP(M)*DKPT(M)-(EAK(M)/RT*EXK(M))*PMR(M)
      DO 180 I=I1,I2
      DUM1 = PMR(M) * PRMU(I,M)
      A(I+2,2)=A(I+2,2)-DUM1
      A(I + 2,1) = A(I + 2,1) + SUMD * PRMU(I,M)
      E(I)=E(I)+DUM1
      B(I + 2) = B(I + 2) + DUM1
  180 EB(1) = AMAX1(EB(I) ,ABS(PRMU(I,M) * RAT(MM)))
      IF (KR(7) - 1) 200,200,185
  185 WRITE(KOUT,215)
      WRITE(KOUT,50)(EB(I),I=I,IS)
  190 WRITE(KOUT,55)
      DO 195 I=1,ISP2
      WRITE(KOUT,50)(A(I,J),J=I,ISP2),B(I)
  195 CONTINUE
      WRITE(KOUT,5)M,I1,I2,L,LL,MM,MA
      WRITE(KOUT,50)PRMU
  200 CONTINUE
      DO 205 MM=I,MT
      L=LL(MM)
```

```
      IF(L) 201,206,201
  201 M=MA(MM)
      AR=1.
      EXEL=(PKK(M)+1.E-36)/(PKP(M)+1.E-36)
      IF(ABS(EXEL-1.)-.1) 204,204,202
  202 ELK=ALOG(EXEL)
      AR=EXEL/(EXEL-1.)-1./ELK
  204 DO 205 J=1,15
  205 A(L+2,J+2)=A(L+2,J+2)+E(L)*(PMU(J,M)*(1.-AR)+AR*RMU(J,M))
      A(L+2,1)=A(L+2,1)-E(L)*DKPT(M)*(1.-AR)
  206 CONTINUE
      ENL = 0.
      DO 210 I=3,1SP2
  210 ENL = AMAX1(ABS(E(I-2)) / EB(I-2) ,ENL)
  215 FORMAT(1X12HEB(M),M=1,MT)
      KR(7)=KR7
      IF(ENL-1.E-5) 216,216,225
  216 IF(EL-1.E-4) 220,225,225
  220 IT=ITS
      ITS=-1
  225 RETURN
      END
```

```
KINE 201      SUBROUTINE KININ                                                  KINI   1
KINE 202      DIMENSION KRA(10,33),WRA(3,33),ZA(33),PRA(33),TFA(8),TSA(15)      KINI   2
KINE 203      INCLUDE INCI.LIST                                                 KINI   3
KINE 204      COMMON/CARKIN/ KRK(10),ROUCM,NCC                                  KINI   4
KINE 205      COMMON/CONCRD/ Z,GAMER,WR(3)                                      KINI   5
KINE 206      DATA (TFA(I),I=1, 8)/500.,1000.,1500.,2000.,2500.,3000.,3500.,    KINI   6
             14000./                                                            KINI   7
KINE 208      DATA (TSA(I),I=1,15)/1200.,1400.,1600.,1800.,2000.,2200.,2400.,   KINI   8
             12600.,2800.,3000.,3200.,3400.,3600.,3800.,4000./                  KINI   9
KINE 210      DATA KTF,KTS/8,15/                                                KINI  10
KINE 211  202 NCC=NCC+1                                                         KINI  11
KINE 212      IF (NCC-1) 2,1,2                                                  KINI  12
KINE 213    1 READ(KIN,701) KRK,Z,PR,ZE,PC,ROUCM,GAMER,TILE                     KINI  13
KINE 214  701 FORMAT(1011,6F10.5,2A4,A2)                                        KINI  14
KINE 215      IF (KRK(1)-8) 204,203,204                                         KINI  15
KINE 216  203 KR(1)=8                                                           KINI  16
KINE 217      GO TO 49                                                          KINI  17
KINE 218  204 IF (KRK(5)-2) 4,3,4                                               KINI  18
KINE 219    3 KTF=0                                                           KINI  19
KINE 220    6 KTF=KTF+1                                                       KINI  20
              READ(KIN,702) TFA(KTF)                                            KINI  21
KINE 221  702 FORMAT(F10.5)                                                     KINI  22
KINE 222      IF (TFA(KTF)) 6,5,6                                               KINI  23
KINE 223    5 KTF=KTF-1                                                       KINI  24
            4 IF(KRK(6)-2) 8,7,8                                              KINI  25
            7 KTS=0                                                           KINI  26
           10 KTS=KTS+1                                                       KINI  27
              READ(KIN,702) TSA(KTS)                                            KINI  28
              IF (TSA(KTS)) 10,9,10                                             KINI  29
            9 KTS=KTS-1                                                       KINI  30
            8 KR(7)=KRK(10)                                                   KINI  31
              KR(8)=KRK(9)-1                                                    KINI  32
              KR(6)=0                                                           KINI  33
              IF (KRK(9)) 12,11,12                                              KINI  34
           11 KR(10)=0                                                        KINI  35
              GO TO 13                                                          KINI  36
           12 KR(10)=1                                                        KINI  37
           13 IF (KRK(3)) 15,14,15                                            KINI  38
           14 KRA(3,1)=1                                                      KINI  39
              GO TO 163                                                         KINI  40
           15 KRA(3,1)=KRK(3)                                                 KINI  41
          163 KRKS=1                                                          KINI  42
              KRKSS=0                                                           KINI  43
              IF (KRK(3)-9) 161,160,161                                         KINI  44
          160 KRK(3)=0                                                        KINI  45
              KRA(3,1)=1                                                        KINI  46
              KRKSS=9                                                           KINI  47
              GO TO 16                                                          KINI  48
          161 IF (KRK(3)-3) 16,162,164                                        KINI  49
          162 KRKS=5                                                          KINI  50
```

```
      GO TO 16
  164 KRKS=6
   16 KRA(1,I)=KRK(2)
      KRA(2,1)=1
      KRA(4,I)=0
      KRA(9,1)=0
      KTC=7*KTF+KTS
      DO 17 I=1,KTC
      KRA(6,I)=KR(6)
      KRA(7,I)=KR(7)
      KRA(8,1)=KR(8)
      KRA(10,I)=KR(10)
      WRA(1,I)=1.0
      WRA(2,I)=0.0
      WRA(3,I)=0.0
   17 CONTINUE
      ZA(I)=Z
      PRA(1)=PR
      IF (KRK(1)) 19,18,19
   18 KRA(5,1)=0
      IF (KRK(8)-4) 21,20,21
   20 KRA(1,2)=KRK(2)
      KRA(2,2)=1
      KRA(3,2)=KRKS
      KRA(4,2)=0
      KRA(5,2)=0
      KRA(9,2)=0
      ZA(2)=Z
      PRA(2)=PR
      NCT=2
      GO TO 36
   21 NCT=1
      GO TO 36
   19 IF (KRK(I)-2) 22,22,23
   22 KRA(5,I)=0
      KRA(1,2)=4
      KRA(2,2)=0
      KRA(3,2)=0
      KRA(4,2)=0
      KRA(5,2)=0
      KRA(9,2)=0
      ZA(2)=0.0
      PRA(2)=0.0
      IF (KRK(1)-2) 27,26,27
   26 KRA(5,2)=3
   27 IF (KRK(8)-4) 25,24,25
   24 KRA(1,3)=0
      KRA(2,3)=1
      KRA(3,3)=KRKS
      KRA(4,3)=0
      KRA(5,3)=0
      KRA(9,3)=0
      ZA(3)=0.0
      PRA(3)=0.0
      NCT=3
      GO TO 36
   25 NCT=2
      GO TO 36
   23 IF (KRK(I)-3) 29,28,29
   28 KRA(5,I)=2
      KRA(1,2)=3
      KRA(2,2)=0
      KRA(3,2)=0
      KRA(4,2)=0
      KRA(5,2)=1
      KRA(9,2)=0
      ZA(2)=0.0
      PRA(2)=ZE
      IF (KRK(8)-4) 31,30,31
   30 KRA(1,3)=0
      KRA(2,3)=1
      KRA(3,3)=KRKS
      KRA(4,3)=0
      KRA(5,3)=0
      KRA(9,3)=0
      ZA(3)=0.0
      PRA(3)=0.0
      NCT=3
      GO TO 36
   31 NCT=2
      GO TO 36
   29 KRA(5,1)=2
      KRA(1,2)=3
      KRA(2,2)=0
      KRA(3,2)=0
      KRA(4,2)=0
      KRA(5,2)=1
      KRA(9,2)=0
      ZA(2)=0.0
      PRA(2)=ZE
      KRA(1,3)=4
      KRA(2,3)=0
      KRA(3,3)=0
      KRA(4,3)=0
      KRA(5,3)=0
      KRA(9,3)=0
      ZA(3)=0.0
      PRA(3)=0.0
      IF (KRK(I)-5) 33,32,33
   32 KRA(5,3)=3
```

```
 33 IF (KRK(8)-4) 35,34,35                                          KINI 151
 34 KRA(1,4)=0                                                      KINI 152
    KRA(2,4)=1                                                      KINI 153
    KRA(3,4)=KRKS                                                   KINI 154
    KRA(4,4)=0                                                      KINI 155
    KRA(5,4)=0                                                      KINI 156
    KRA(9,4)=0                                                      KINI 157
    ZA(4)=0.0                                                       KINI 158
    PRA(4)=0.0                                                      KINI 159
    NCT=4                                                           KINI 160
    GO TO 36                                                        KINI 161
 35 NCT=3                                                           KINI 162
 36 DO 360 I=1,NCT                                                  KINI 163
360 KRA(10,I)=0                                                     KINI 164
    IF (KRK(5)  38,37,38                                            KINI 165
 38 NCT1=NCT+1                                                      KINI 166
    NCT2=NCT+KTF                                                    KINI 167
    DO 39 I=NCT1,NCT2                                               KINI 168
    KRA(1,I)=0                                                      KINI 169
    KRA(2,I)=0                                                      KINI 170
    KRA(3,I)=0                                                      KINI 171
    KRA(4,I)=0                                                      KINI 172
    KRA(5,I)=0                                                      KINI 173
    KRA(9,I)=0                                                      KINI 174
    ZA(I)=-TFA(I-NCT)                                               KINI 175
    PRA(I)=0.0                                                      KINI 176
 39 CONTINUE                                                        KINI 177
    KRA(3,NCT1)=KRKSS                                               KINI 178
    NCT3=NCT2+1                                                     KINI 179
    NCT4=NCT2+KTS                                                   KINI 180
    GO TO 40                                                        KINI 181
 37 NCT3=NCT+1                                                      KINI 182
    NCT4=NCT+KTS                                                    KINI 183
 40 IF (KRK(6)) 45,46,45                                            KINI 184
 45 NCT5=NCT3+1                                                     KINI 185
    DO 41 I=NCT3,NCT5                                               KINI 186
    KRA(1,I)=0                                                      KINI 187
    KRA(2,I)=0                                                      KINI 188
    KRA(3,I)=0                                                      KINI 189
    KRA(4,I)=3                                                      KINI 190
    KRA(5,I)=0                                                      KINI 191
    KRA(9,I)=0                                                      KINI 192
    ZA(I)=500.0                                                     KINI 193
    PRA(I)=0.0                                                      KINI 194
    WRA(3,I)=1.0E-19                                                KINI 195
 41 CONTINUE                                                        KINI 196
    IF (KRK(5)) 411,410,411                                         KINI 197
410 KRA(3,NCT3)=KRKSS                                               KINI 198
411 KRA(4,NCT5)=2                                                   KINI 199
    ZA(NCT5)=1000.0                                                 KINI 200
    NCT3=NCT3+2                                                     KINI 201
    NCT4=NCT4+2                                                     KINI 202
    DO 42 I=NCT3,NCT4                                               KINI 203
    KRA(1,I)=5                                                      KINI 204
    KRA(2,I)=0                                                      KINI 205
    KRA(3,I)=0                                                      KINI 206
    KRA(4,I)=2                                                      KINI 207
    KRA(5,I)=0                                                      KINI 208
    ZA(I)=TSA(I-NCT3+1)                                             KINI 209
    PRA(I)=0.0                                                      KINI 210
    IF (KRK(8I-1) 421,421,422                                       KINI 211
421 KRA(9,I)=0                                                      KINI 212
    GO TO 42                                                        KINI 213
422 KRA(9,I)=4                                                      KINI 214
 42 CONTINUE                                                        KINI 215
    IF (KRK(8I-1) 43,43,44                                          KINI 216
 44 KRA(9,NCT3)=6                                                   KINI 217
 43 NCT3=NCT4+1                                                     KINI 218
 46 CONTINUE                                                        KINI 219
    IF (PC) 53,2,53                                                 KINI 220
 53 DO 54 I=1,NCT3                                                  KINI 221
    K=NCT3+2-I                                                      KINI 222
    DO 55 J=1,10                                                    KINI 223
 55 KRA(J,K)=KRA(J,K-1)                                             KINI 224
    ZA(K)=ZA(K-1)                                                   KINI 225
    PRA(K)=PRA(K-1)                                                 KINI 226
    WRA(1,K)=WRA(1,K-1)                                             KINI 227
    WRA(2,K)=WRA(2,K-1)                                             KINI 228
 54 WRA(3,K)=WRA(3,K-1)                                             KINI 229
    DO 56 I=1,10                                                    KINI 230
 56 KRA(I,1)=KRA(I,2)                                               KINI 231
    KRA(1,2)=2                                                      KINI 232
    KRA(2,2)=0                                                      KINI 233
    KRA(3,2)=0                                                      KINI 234
    ZA(2)=0.0                                                       KINI 235
    KRA(5,2)=0                                                      KINI 236
    ZA(1)=Z                                                         KINI 237
    PRA(1)=PC                                                       KINI 238
    NCT3=NCT3+1                                                     KINI 239
  2 IF (NCC-NCT3) 200,201,201                                       KINI 240
201 NCC=NCC                                                         KINI 241
    GO TO 202                                                       KINI 242
200 DO 47 I=1,10                                                    KINI 243
    KR(I)=KRA(I,NCC)                                                KINI 244
 47 CONTINUE                                                        KINI 245
    Z=ZA(NCC)                                                       KINI 246
    PR=PRA(NCC)                                                     KINI 247
    WR(1)=WRA(1,NCC)                                                KINI 248
    WR(2)=WRA(2,NCC)                                                KINI 249
    WR(3)=WRA(3,NCC)                                                KINI 250
```

```
      IF (KR(4)) 49,49,48                                                KINI 251
48    DO 50 I=ISP,N                                                      KINI 252
      IF ((IFC(I)/3)*3-IFC(I)) 51,50,51                                  KINI 253
51    NS=I-1                                                             KINI 254
      GO TO 52                                                           KINI 255
50    CONTINUE                                                           KINI 256
      GO TO 49                                                           KINI 257
52    VN(NS+I)=VN(N+I)                                                   KINI 258
      TF(NS+I)=TF(N+I)                                                   KINI 259
      IFC(NS+I)=IFL(N+I)                                                 KINI 260
      WTM(NS+I)=WTM(N+I)                                                 KINI 261
      FAMOA(NS+I)=FAMOA(N+I)                                             KINI 262
      FAMOB(NS+I)=FAMOB(N+I)                                             KINI 263
      N=NS                                                               KINI 264
49    RETURN                                                             KINI 265
      END                                                                KINI 266
```

```
      SUBROUTINEMATI                                                     MATI   1
C                                                                        MATI   2
      INCLUDE INC1.LIST                                                  MATI   3
C                                                                        MATI   4
      INCLUDE INC3.LIST                                                  MATI   5
C                                                                        MATI   6
      WSS=WS                                                             MATI   7
      DO 11 I=1,IS                                                       MATI   8
   11 IBC(I) = IFC(I)                                                    MATI   9
      IF(KR(6)) 4,3,2                                                    MATI  10
    2 WSS=AMIN1(W(1),0.) + AMIN1(W(2),0.) + AMIN1(W(3),0.)               MATI  11
      WS=W(1) + W(2) + W(3)                                              MATI  12
      GO TO 6                                                            MATI  13
    3 CONTINUE                                                           MATI  14
    6 IF(ITS) 7,4,4                                                      MATI  15
    7 DO 9 I=1,IS                                                        MATI  16
      IF(IBC(I)-1) 9,8,9                                                 MATI  17
    8 IBC(I)=-1                                                          MATI  18
    9 CONTINUE                                                           MATI  19
    4 RV=WSS-WIL/WIG                                                     MATI  20
      IF (KR(7) - 1) 30,5,10                                             MATI  21
    5 IF (ITS) 30,20,30                                                  MATI  22
   10 WRITE(KOUT,15)FFF,WTL,WTG,AA,RV,ALP,PNUS,SLAM                      MATI  23
   15 FORMAT(32H FFF,WTL,WTG,AA,RV/ALP/PNUS/SLAM/IXSE12,5/(IXI0E12,5))   MATI  24
      KR(7) = KR(7) - 1                                                  MATI  25
      IF (KR(7) - 1) 30,20,30                                            MATI  26
   20 WRITE(KOUT,25)(I,I=1,IS)                                           MATI  27
   25 FORMAT(1HI,40X,49HITS TEMP   PRES*MW7  EQUIL ER  MASBAL ER  SCALE MATI  28
     *   /(I0(IS,7H MASBAL)))                                            MATI  29
C     INITIALIZE                                                         MATI  30
   30 EL = 0.                                                            MATI  31
      CPG = 0.                                                           MATI  32
      EP = P                                                             MATI  33
      CPE = 0.                                                           MATI  34
      JC = 0                                                             MATI  35
      JCS=0                                                              MATI  36
      ISPO = IS + 2                                                      MATI  37
      B(1) = 0.                                                          MATI  38
      B(2) = 0.                                                          MATI  39
      A(1,1) = 0.                                                        MATI  40
      A(1,2) = 0.                                                        MATI  41
      A(2,1) = 0.                                                        MATI  42
      A(2,2) = 0.                                                        MATI  43
C-----INITIALIZE CONTRIBUTION OF MOST SIGNIFICANT SPECIES IN EACH MASS BMATI  44
      DO 35 I=1,IS                                                       MATI  45
      EB(I) = 0.                                                         MATI  46
   35 E(I) = AA * ALP(I)                                                 MATI  47
      ISP2 = ISPO                                                        MATI  48
C - - - MAIN BASE SPECIES LOOP                                           MATI  49
   40 DO 240 IK=1,IS                                                     MATI  50
```

```
      I=2-IR(IK)                                                        MAT1  51
      IF(KAT(IK)-99) 45,41,45                                           MAT1  52
   41 PNUS(I-2)=0.                                                      MAT1  53
C     ZERO MATRIX                                                       MAT1  54
   45 DO 50 K=1,IS                                                      MAT1  55
   50 A(K,I) = 0.                                                       MAT1  56
      IF (I-IS) 70,55,70                                                MAT1  57
C     NORMALIZE ON PRESSURE ON FIRST PASS                               MAT1  58
   55 VM(I - 2) = VM(I - 2) / SUMN                                      MAT1  59
      EBL(I - 2) = 0.                                                   MAT1  60
      IF(IBC(I-2)) 70,60,65                                             MAT1  61
   60 Y(I - 2) = Y(I - 2) - SUML                                        MAT1  62
      GOTO 70                                                           MAT1  63
   65 VM(I - 2) = VN(I - 2) / SUMC                                      MAT1  64
C     INITIALIZE SOME MORE                                              MAT1  65
   70 B(I) = 0.                                                         MAT1  66
      A(I,I) = 0.                                                       MAT1  67
      IP(I - 2) = 0.                                                    MAT1  68
C     SET FLAG INDICATING SIGNIFICANCE OF SPECIES IN MASS               MAT1  69
C     BALANCE(S) AND INCREMENT COUNT ON SIGNIFICANT SPECIES             MAT1  70
   75 IF (VM(I - 2) - EBL(I - 2)) 85,85,80                              MAT1  71
   80 IP(I - 2) = - 1                                                   MAT1  72
C     TREAT BASE SPECIES CONTAINING BUT NOT REPRESENTING NON-PRESENT    MAT1  73
C     ELEMENTS IN SAME MANNER AS NON-PRESENT CONDENSED SPECIES          MAT1  74
   85 IF(IBC(I-2)+1) 290,90,90                                          MAT1  75
   90 IF(IBC(I-2)) 140,170,95                                           MAT1  76
   95 A(I,I) = 1.                                                       MAT1  77
      VA = VM(I - 2)                                                    MAT1  78
      IF(1-ABS(IBC(I-2)-31-1) 96,240,100                                MAT1  79
   96 A(2,I)=1.0                                                        MAT1  80
      GO TO 240                                                         MAT1  81
  100 IF (EB(I - 2) - ABS(VA)) 105,110,110                              MAT1  82
  105 EB(I - 2) = ABS(VA)                                               MAT1  83
      IB(I - 2) = I - 2                                                 MAT1  84
  110 E(I - 2) = E(I - 2) - VA                                          MAT1  85
      IF (KR(6)) 115,120,120                                            MAT1  86
  115 IF (MODE - 1) 240,130,240                                         MAT1  87
  120 DO 125 K=1,IS                                                     MAT1  88
  125 A(K+2,I)=-W7M(I-2) * (PNUS(K)/WTG+GAMF(K))                        MAT1  89
      A(I,I) = A(I,I) + 1.                                              MAT1  90
  130 TMIN = AMAX1(TMIN,TF(I - 2))                                      MAT1  91
      IF (7 - TF(I - 2) + .001) 135,135,140                             MAT1  92
  135 A(I,I) = 1.0E + 10                                                MAT1  93
      E(I - 2) = - VN(I - 2) * 1.001E + 10                              MAT1  94
      MODE = 0                                                          MAT1  95
  140 IF(MODE-1) 141,145,141                                            MAT1  96
  141 IF(KR(8)) 240,240,145                                             MAT1  97
  145 IF (7F(I - 2) + .001 - T) 290,150,150                             MAT1  98
  150 IF (JC) 165,165,155                                               MAT1  99
  155 IF(Y(I-2)-BJC) 290,290,165                                        MAT1 100
  165 BJC=Y(I-2)                                                        MAT1 101
      JCS=JC                                                            MAT1 102
      IMAX = TF(I - 2)                                                  MAT1 103
      JC = I - 2                                                        MAT1 104
      IF(JC-IBC(I-2)                                                    MAT1 105
      IF(KR(8)) 169,169,240                                             MAT1 106
  169 A(I+JCS+2)=0.                                                     MAT1 107
      A(I+I)=-1.0                                                       MAT1 108
      B(I)=BJC                                                          MAT1 109
      GOTO 290                                                          MAT1 110
C-----GAS PHASE                                                         MAT1 111
  170 VA = VM(I - 2)                                                    MAT1 112
      CPG = CPG + VA * CP(I - 2)                                        MAT1 113
      A(1,I) = VA                                                       MAT1 114
      A(2,I) = VA                                                       MAT1 115
      EP = EP - VA                                                      MAT1 116
      IF(KAT(IK)-99) 175,235,175                                        MAT1 117
  175 IF (KR(6)) 235,210,180                                            MAT1 118
  180 DO 185 K=1,IS                                                     MAT1 119
  185 A(K+2,I) = (GAMK(I-2,K) + GAMM(K) * H(I-2)) * VA                  MAT1 120
      A(I,I) = A(I,I) + VA * RV                                         MAT1 121
  190 DUM2 = WTM(I - 2) / WTG * WTL / WTG * VA                          MAT1 122
      DO 205 K=1,IS                                                     MAT1 123
      IF (EB(K) - ABS(A(K + 2,I))) 195,200,200                          MAT1 124
  195 EB(K) = ABS(A(K + 2,I))                                           MAT1 125
      IB(K) = I - 2                                                     MAT1 126
  200 E(K) = E(K) - A(K + 2,I)                                          MAT1 127
  205 A(K + 2,I) = A(K + 2,I) + DUM2 * PNUS(K)                          MAT1 128
      GOTO 240                                                          MAT1 129
  210 DUM1 = WTM(I - 2) / WTG * VA                                      MAT1 130
      DUM2 = WTL / WTG * DUM1                                           MAT1 131
      IF (KR(4)) 215,215,220                                            MAT1 132
  215 DUM1 = 0.                                                         MAT1 133
      VA = (RV + 1.) * VA                                               MAT1 134
      GOTO 225                                                          MAT1 135
  220 DUM1 = DUM1 * (1. - FFF / FF(I - 2))                              MAT1 136
      VA = (RV + FFF / FF(I - 2)) * VA                                  MAT1 137
  225 DO 230 K=1,IS                                                     MAT1 138
  230 A(K + 2,I) = DUM1 * SLAM(K) + DUM2 * PNUS(K)                      MAT1 139
      A(I,I) = A(I,I) + VA                                              MAT1 140
  235 EB(I - 2) = ABS(VA)                                               MAT1 141
      IB(I - 2) = I - 2                                                 MAT1 142
      E(I - 2) = E(I - 2) - VA                                          MAT1 143
  240 IF (MODE - 2) 285,260,245                                         MAT1 144
  245 IF(IBC(I-2)) 290,255,250                                          MAT1 145
  250 HOS = SB(I - 2)                                                   MAT1 146
      GOTO 270                                                          MAT1 147
  255 HOS = SB(I - 2) - 1.9869 * Y(I - 2) - 1.9869                      MAT1 148
      GOTO 275                                                          MAT1 149
  260 HOS = H(I - 2)                                                    MAT1 150
```

```
265 IF(IBC(I-2)) 290,275,270
270 A(I,I) = HOS
    GOTO 280
275 A(I,I) = HOS + VN(I - 2)
280 A(I,2) = A(I,2) - HOS * VN(I - 2)
285 CPF = CPF + CP(I - 2) * VN(I - 2)
290 CONTINUE
    DO 295 I=1,IS
    BE(I)=E(I)
295 BY(I)=Y(I)
    RETURN
    END
```

```
MATI 151          SUBROUTINEMAT2                                    MAT2   1
MATI 152    C                                                       MAT2   2
MATI 153          INCLUDE INC1,LIST                                 MAT2   3
MATI 154    C                                                       MAT2   4
MATI 155          INCLUDE INC3,LIST                                 MAT2   5
MATI 156    C                                                       MAT2   6
MATI 157          ISPQ = IS + 2                                     MAT2   7
MATI 158          ISP2 = ISPQ                                       MAT2   8
MATI 159          IER = 0                                           MAT2   9
MATI 160          IRE = 0                                           MAT2  10
MATI 161          EER = 0.                                          MAT2  11
MATI 162    C - - - MAIN NON-BASE SPECIES LOOP                      MAT2  12
MATI 163          IF(JC)4,4,3                                       MAT2  13
                3 BJC=Y(JC)                                         MAT2  14
                4 LIM=N+KR(8)                                       MAT2  15
                  IF(LIM-ISP) 350,5,5                               MAT2  16
                5 J=ISP                                             MAT2  17
                  DO 345 IK=ISP,LIM                                 MAT2  18
                  IF(IK-N) 10,10,8                                  MAT2  19
                8 E(J)=1.E-10                                       MAT2  20
                  IF(IFC(J)) 55,345,85                              MAT2  21
               10 IF(IFC(J)+1) 345,15,15                            MAT2  22
               15 IF (ITS) 35,20,35                                 MAT2  23
               20 VN(J) = VN(J) / SUMN                              MAT2  24
                  IF (IFC(J)) 35,30,25                              MAT2  25
               25 VN(J) = VN(J) / SUMC                              MAT2  26
                  GOTO 35                                           MAT2  27
               30 Y(J) = Y(J) - SUML                                MAT2  28
               35 E(J) = VLNK(J) - Y(J)                             MAT2  29
                  DO 50 I=1,IS                                      MAT2  30
                  IF (IBC(I)) 45,45,40                              MAT2  31
               40 FNU(I) = 0.                                       MAT2  32
                  GOTO 50                                           MAT2  33
               45 FNU(I) = VNU(J,I)                                 MAT2  34
                  E(J) = E(J) + FNU(I) * BY(I)                      MAT2  35
               50 CONTINUE                                          MAT2  36
                  EAB = ABS(E(J))                                   MAT2  37
                  IF (IFC(J)) 55,215,85                             MAT2  38
C*****CONDENSED SPECIES                                             MAT2  39
               55 EAB = E(J)                                        MAT2  40
                  IF(KR(6)) 65,60,60                                MAT2  41
               60 IF(T-TF(J)+.001) 61,65,65                         MAT2  42
               61 EAB=0.                                            MAT2  43
                  IF(KR(8)) 170,170,180                             MAT2  44
               65 IF (E(J) - EER) 170,170,70                        MAT2  45
               70 EER = E(J)                                        MAT2  46
                  IF (IER) 75,75,80                                 MAT2  47
               75 ISPQ = ISPQ + 1                                   MAT2  48
                  IER = ISPQ                                        MAT2  49
               80 IE = IER                                          MAT2  50
```

```
      IRE = IK                                                          MAT2  51
      GOTO 90                                                           MAT2  52
   85 ISPQ = ISPQ + 1                                                   MAT2  53
      IE = ISPQ                                                         MAT2  54
   90 WTR = 0.                                                          MAT2  55
      IF (KR(6)) 100,95,95                                              MAT2  56
   95 TMIN = AMAX1(TF(J) ,TMIN)                                         MAT2  57
      WTR = WTM(J) / WTG                                                MAT2  58
  100 DO 105 I=1,ISPQ                                                   MAT2  59
      A(I,IE) = 0.                                                      MAT2  60
  105 A(IE,I) = 0.                                                      MAT2  61
      DO 145 K=1,IS                                                     MAT2  62
      DUM1 = VNU(J,K)                                                   MAT2  63
      IF(IBC(K)-1) 125,125,145                                          MAT2  64
  125 VA = DUM1 * VN(J)                                                 MAT2  65
  130 A(K+2,IE) = DUM1-WTR *(PNUS(K) +GAMF(K)*WTG)                      MAT2  66
  135 BE(K) = BE(K) - VA                                                MAT2  67
      IF (ABS(VA) - EB(K)) 145,145,140                                  MAT2  68
  140 EB(K) = ABS(VA)                                                   MAT2  69
      IB(K) = IK                                                        MAT2  70
  145 CONTINUE                                                          MAT2  71
      K = IE - ISP2                                                     MAT2  72
      IF(IK-N) 148,148,146                                              MAT2  73
  146 JJ(K)=JC                                                          MAT2  74
      B(IE)=Y(JC)                                                       MAT2  75
      IF(JC-IS) 151,151,147                                             MAT2  76
  147 A(IE,1)=TC(JC)                                                    MAT2  77
      B(IE)=E(JC)                                                       MAT2  78
  151 EAB=-B(IE)                                                        MAT2  79
      IF(IFCJC) 335,335,152                                             MAT2  80
  152 EAB=ABS(EAB)                                                      MAT2  81
      GO TO 335                                                         MAT2  82
  148 JJ(K)=J                                                           MAT2  83
      A(IE,1) = TC(J)                                                   MAT2  84
      B(IE) = E(J)                                                      MAT2  85
      IF(T+.001-TF(J)) 150,149,149                                      MAT2  86
  149 IF(KR(8)) 165,165,175                                             MAT2  87
  150 IF (MODE - 1) 155,160,155                                         MAT2  88
  155 IF(KR(6)) 165,160,160                                             MAT2  89
  160 A(IE,IE) = 1.E + 10                                               MAT2  90
      B(IE) = - VN(J) * 1.001E + 10                                     MAT2  91
      MODE = 0                                                          MAT2  92
  165 IF (MODE - 2) 170,200,205                                         MAT2  93
  170 IF (MODE - 1) 335,175,335                                         MAT2  94
  175 IF(T-TF(J)-.001) 180,180,191                                      MAT2  95
  180 IF (JC) 190,190,185                                               MAT2  96
  185 IF(E(J)-BJC) 345,345,190                                          MAT2  97
  190 BJC=E(J)                                                          MAT2  98
      JC=IK                                                             MAT2  99
      IFCJC=IFC(JC)                                                     MAT2 100
      TMAX=TF(J)                                                        MAT2 101
      IF(KR(8)) 192,192,191                                             MAT2 102
  191 IF(MODE-2) 345,200,205                                            MAT2 103
  192 B(1)=BJC                                                          MAT2 104
      DO 195 K=1,IS                                                     MAT2 105
  195 A(1,K + 2) = - FNU(K)                                             MAT2 106
      A(1,1) = TC(J)                                                    MAT2 107
      GOTO 345                                                          MAT2 108
  200 MOS = M(J)                                                        MAT2 109
      GOTO 210                                                          MAT2 110
  205 MOS = SB(J)                                                       MAT2 111
  210 A(1,IE) = MOS                                                     MAT2 112
      A(1,2) = A(1,2) - VN(J) * MOS                                     MAT2 113
      CPF = CPF + CP(J) * VN(J)                                         MAT2 114
      GOTO 335                                                          MAT2 115
C*****GAS PHASE SPECIES                                                 MAT2 116
  215 IP(J) = 0                                                         MAT2 117
      IF (VN(J)) 220,335,220                                            MAT2 118
  220 IQ = 0                                                            MAT2 119
      CPG = CPG + VN(J) * CP(J)                                         MAT2 120
      IF (KR(6)) 245,225,230                                            MAT2 121
  225 FFJ = FFF / FF(J)                                                 MAT2 122
  230 DUM1 = WTM(J) / WTG * VM(J)                                       MAT2 123
      DUM2 = DUM1 / WTG * WTL                                           MAT2 124
      IF(KR(6)) 234,234,245                                             MAT2 125
  234 IF(KR(4)) 235,235,240                                             MAT2 126
  235 DUM1 = 0.                                                         MAT2 127
      FFJ = 1.0                                                         MAT2 128
      GOTO 245                                                          MAT2 129
  240 DUM1 = DUM1 * (1. - FFJ)                                          MAT2 130
  245 DO 300 K1=1,IS                                                    MAT2 131
      I=2-IR(K1)                                                        MAT2 132
      VA = VNU(J,1 - 2) * VN(J)                                         MAT2 133
      IF(KAT(K1)-99) 247,265,247                                        MAT2 134
  247 IF(KR(6)) 265,260,250                                             MAT2 135
  250 VA = VA * RV * VN(J) * (VLAM(J,I - 2) + GAMM(I - 2) * M(J))       MAT2 136
      BE(I - 2) = BE(I - 2) - VA                                        MAT2 137
      ABSVA = ABS(VA)                                                   MAT2 138
      VA = VA * PNUS(I - 2) * DUM2                                      MAT2 139
      GOTO 270                                                          MAT2 140
  260 VB = VA * FFJ                                                     MAT2 141
      VA = RV * VA + VB                                                 MAT2 142
      BE(I - 2) = BE(I - 2) - VA                                        MAT2 143
      ABSVA = ABS(VA)                                                   MAT2 144
      VA = VA + SLAM(I - 2) * DUM1 * DUM2 * PNUS(I - 2)                 MAT2 145
      GOTO 270                                                          MAT2 146
  265 BE(I - 2) = BE(I - 2) - VA                                        MAT2 147
      ABSVA = ABS(VA)                                                   MAT2 148
  270 IF (ABSVA - EBL(I - 2)) 280,280,275                               MAT2 149
  275 IQ = 1                                                            MAT2 150
```

```
      IF (ABSVA - EB(I - 2)) 290,290,285
280   IF (ABS(VA) - EBL(I - 2)) 300,300,290
285   EB(I - 2) = ABSVA
      IB(I - 2) = IK
290   DO 295 K=3,ISP2
295   A(I,K) = A(I,K) + VA * FNU(K - 2)
      B(I) = B(I) - VA * E(J)
      A(1,1) = A(I,I) - VA * TC(J)
      A(2,I) = A(2,I) + VN(J) * FNU(I - 2)
300   CONTINUE
      IF (IQ) 335,335,305
305   EP = EP - VN(J)
      IP(J) = - I
      B(2) = B(2) - VN(J) * E(J)
      A(2,1) = A(2,I) - VN(J) * TC(J)
      IF (MODE - 2) 330,310,315
310   HOS = B(J) * VN(J)
      GOTO 320
315   HOS = VN(J) * (SB(J) - 1.9869 * Y(J) - 1.9869)
320   DO 325 I=3,ISP2
325   A(I,I) = HOS * FNU(I - 2) + A(I,I)
      A(1,2) = A(I,2) - HOS
      A(I,I) = A(I,1) - HOS * TC(J)
      B(I) = B(I) - HOS * E(J)
330   CPF = CPF + VN(J) * CP(J)
335   IF (EL - EAB) 340,345,345
340   EL = EAB
345   J=J+1
350   CONTINUE
      RETURN
      END
```

```
MAT2 151      SUBROUTINEMAT3                                          MAT3   1
MAT2 152      DIMENSION L(10),AR(10)                                  MAT3   2
MAT2 153                                                              MAT3   3
MAT2 154      INCLUDE INC1,LIST                                       MAT3   4
MAT2 155                                                              MAT3   5
MAT2 156      INCLUDE INC3,LIST                                       MAT3   6
MAT2 157                                                              MAT3   7
MAT2 158      ISP3 = IS + 3                                           MAT3   8
MAT2 159      IF (MODE - 2) 50,5,25                                   MAT3   9
MAT2 160      CPA = CPF * T                                           MAT3  10
MAT2 161      SHMLT = HMELT * VN(MELT)                                MAT3  11
MAT2 162      EHS = AA * HIP + A(1,2)                                 MAT3  12
MAT2 163      IF(KKJ-I) 15,10,15                                      MAT3  13
MAT2 164      DUM1 = SVA / AA * T * T                                 MAT3  14
MAT2 165      EHS = AA * SVC - DUM1 + A(1,2)                          MAT3  15
MAT2 166      HIP = - A(I,2) / AA                                     MAT3  16
MAT2 167      A(I,2) = - AA * SVC - DUM1                              MAT3  17
MAT2 168      CPA = (CPF + 2. * DUM1 / T) * T                         MAT3  18
MAT2 169      DUM2 = SVB / AA * T                                     MAT3  19
MAT2 170      P=P-EP                                                  MAT3  20
MAT2 171      EP=0.                                                   MAT3  21
MAT2 172      IF(ABS(EHS/AA)-10.) 13,13,15                            MAT3  22
MAT2 173      EP=-P+SVD-DUM2                                          MAT3  23
MAT2 174      A(2,1) = A(2,1) + DUM2                                  MAT3  24
MAT2 175      A(2,2) = - DUM2                                         MAT3  25
MAT2 176      CONTINUE                                                MAT3  26
MAT2 177      GOTO 30                                                 MAT3  27
MAT2 178      CPA = CPF                                               MAT3  28
MAT2 179      SHMLT = SMELT * VN(MELT)                                MAT3  29
MAT2 180      EHS = AA * SIP + A(1,2) - 1.9869 * (P - EP)             MAT3  30
MAT2 181      A(I,2) = - AA * SIP                                     MAT3  31
MAT2 182      B(I) = B(I) + EHS                                       MAT3  32
              A(1,I) = A(1,1) + CPA                                   MAT3  33
              IF (SHMLT) 50,50,35                                     MAT3  34
              IF (EHS) 50,50,40                                       MAT3  35
              EHS = EHS - SHMLT                                       MAT3  36
              B(I) = B(I) - SHMLT                                     MAT3  37
              IF (EHS) 45,50,50                                       MAT3  38
              FLIO = 1. + EHS / SHMLT                                 MAT3  39
              MODE = 0                                                MAT3  40
              A(I,1)=1.E+10                                           MAT3  41
              TMIN = 500.                                             MAT3  42
              TMAX = 5000.                                            MAT3  43
              ENL=ABS(EP)/P*100.                                      MAT3  44
              DO 75 I=3,ISP2                                          MAT3  45
              L(I - 2) = I - 2                                        MAT3  46
              E(I - 2) = BE(I - 2)                                    MAT3  47
              EBL(I-2)=EB(I-2)*1.E-7                                  MAT3  48
              A(I,2) = - AA * ALP(I - 2)                              MAT3  49
              IF (IFC(I - 2) - 1) 60,60,55                            MAT3  50
```

```
   55 NFM = NFM + 1                                                     MAT3  51
      GOTO 75                                                           MAT3  52
   60 IF (KR(6)) 70,70,65                                               MAT3  53
   65 A(1,1) = A(1,1) + GAMM(1 - 2) * T * CPG                           MAT3  54
      E(1-2) = E(1-2) + WTL*GAMF(1-2)                                   MAT3  55
   70 ER = E(1 - 2)                                                     MAT3  56
      ABER = ABS(ER) / (EB(1 - 2) + 1.E - 20)                           MAT3  57
      ENL = AMAX1(ABER,ENL)                                             MAT3  58
      B(1) = B(1) + ER                                                  MAT3  59
   75 CONTINUE                                                          MAT3  60
      IF (ISP2 - ISPQ) 80,255,255                                       MAT3  61
   80 IV = 0                                                            MAT3  62
      JZ = 0                                                            MAT3  63
C     ADD CONDENSED NONBASE SPECIES TO ARRAY                           MAT3  64
   85 DO 90 IE=ISP3,ISPQ                                               MAT3  65
      J = IE - ISP2                                                     MAT3  66
      J = JJ(J)                                                         MAT3  67
      IF(J-IS) 86,86,88                                                 MAT3  68
   86 DO 87 K=1,IS                                                      MAT3  69
   87 A(IE,K+2)=0.                                                      MAT3  70
      A(IE,J+2)=-1.0                                                    MAT3  71
      GO TO 90                                                          MAT3  72
   88 DO 89 K=1,IS                                                      MAT3  73
   89 A(IE,K+2)=-VNU(J,K)                                               MAT3  74
   90 CONTINUE                                                          MAT3  75
      IF (IV) 95,95,215                                                 MAT3  76
C     CHECK FOR SINGULAR CONDENSED SET                                 MAT3  77
   95 DO 140 IE=ISP3,ISPQ                                              MAT3  78
      IV = IV + 1                                                       MAT3  79
      IF (IV - 1) 120,120,100                                           MAT3  80
C     REDUCE NEW ROW BY PREVIOUS ROWS                                  MAT3  81
  100 DO 115 J=2,IV                                                     MAT3  82
      K = L(J - 1)                                                      MAT3  83
      DIV = - A(IE,K + 2)                                               MAT3  84
      IF (DIV) 105,115,105                                              MAT3  85
  105 A(IE,K + 2) = 0.                                                  MAT3  86
      JM = J + ISP                                                      MAT3  87
      DO 110 M=3,ISP2                                                   MAT3  88
  110 A(IE,M) = A(IE,M) + DIV * A(JM,M)                                 MAT3  89
  115 CONTINUE                                                          MAT3  90
C     SEEK VALID NON-ZERO ELEMENT                                      MAT3  91
  120 DO 130 J=IV,IS                                                    MAT3  92
      M = L(J)                                                          MAT3  93
      IF (ABS(A(IE,M + 2)) - .01) 130,130,125                           MAT3  94
  125 IF (IFC(M)) 135,135,130                                           MAT3  95
  130 CONTINUE                                                          MAT3  96
C     SINGULAR CONDENSED SET                                           MAT3  97
      GOTO 145                                                          MAT3  98
  135 L(J) = L(IV)                                                      MAT3  99
      L(IV) = M                                                         MAT3 100
      DIV = A(IE,M + 2)                                                 MAT3 101
      A(IE,M + 2) = 1.                                                  MAT3 102
C     NORMALIZE NEW ROW                                                MAT3 103
      DO 140 J=3,ISP2                                                   MAT3 104
  140 A(IE,J) = A(IE,J) / DIV                                           MAT3 105
C     COMPLETES MAJOR LOOP=NON SINGULAR                                MAT3 106
      GOTO 85                                                           MAT3 107
C     EXTRACT COEFFICIENTS ON SINGULAR SET-NONBASE                     MAT3 108
  145 DO 150 J=2,IV                                                     MAT3 109
      K = L(J - 1)                                                      MAT3 110
  150 AR(J - 1) = A(IE,K + 2)                                           MAT3 111
      AR(IV) = 1.                                                       MAT3 112
C     EXTRACT COEFFICIENTS ON SINGULAR SET - BASE                      MAT3 113
      DO 165 K=1,IS                                                     MAT3 114
      IF (IFC(K)) 165,165,155                                           MAT3 115
  155 IF (ABS(A(IE,K + 2)) - .01) 165,165,160                           MAT3 116
  160 IV = IV + 1                                                       MAT3 117
      AR(IV) = - A(IE,K + 2)                                            MAT3 118
      JJ(IV) = K                                                        MAT3 119
  165 CONTINUE                                                          MAT3 120
C     ISOLATE NEW CONDENSED CANDIDATE                                  MAT3 121
      DO 175 J=1,IV                                                     MAT3 122
      K = JJ(J)                                                         MAT3 123
      IF (VN(K)) 170,170,175                                            MAT3 124
  170 JZ = J                                                            MAT3 125
      KZ = K                                                            MAT3 126
      GOTO 185                                                          MAT3 127
  175 CONTINUE                                                          MAT3 128
  180 STOP                                                              MAT3 129
C     ###  MUST GO TO ALLOW ENTRY OF NEW CANDIDATE                     MAT3 130
  185 TEST = - 1.0E10                                                   MAT3 131
      JX = 0                                                            MAT3 132
      DO 200 J=1,IV                                                     MAT3 133
      IF(ABS(AR(J))-.01) 200,200,186                                    MAT3 134
  186 DUM1=AR(JZ)/AR(J)                                                 MAT3 135
      IF(DUM1) 190,200,200                                              MAT3 136
  190 K = JJ(J)                                                         MAT3 137
      DUM1 = DUM1 * VN(K)                                               MAT3 138
      IF (DUM1 - TEST) 200,200,195                                      MAT3 139
  195 TEST = DUM1                                                       MAT3 140
      JX = J                                                            MAT3 141
      KX = K                                                            MAT3 142
  200 CONTINUE                                                          MAT3 143
      TEST = VN(KA) / AR(JX)                                            MAT3 144
C      DOES NEW CANDIDATE ENTER                                        MAT3 145
      IF (E(KZ) - E(KX)) 85,85,205                                      MAT3 146
C     YES                                                              MAT3 147
  205 DO 210 J=1,IV                                                     MAT3 148
      K = JJ(J)                                                         MAT3 149
  210 VN(K) = VN(K) - TEST * AR(J)                                      MAT3 150
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      KR(7) = KR(7) + 1                                                 MAT3 151
      VN(KX) = 1.                                                       MAT3 152
      KZ = KX                                                           MAT3 153
      JZ = JX                                                           MAT3 154
      GOTO 85                                                           MAT3 155
C     ELIMINATE TERMS CORRESPONDING TO PRESENT BASE CONDENSED           MAT3 156
  215 DO 230 K=1,IS                                                     MAT3 157
      IF (IFC(K)) 230,230,220                                           MAT3 158
  220 DO 225 IE=ISP3,ISPQ                                               MAT3 159
  225 A(IE,K + 2) = 0.                                                  MAT3 160
  230 CONTINUE                                                          MAT3 161
      IF (JZ) 250,250,235                                               MAT3 162
C     FIX MATRIX TO YIELD SMALL NEG CORRECTION ON ELIMINATED SPECIES    MAT3 163
  235 IF (KX - 1) 245,245,240                                           MAT3 164
  240 KZ = JZ + IS                                                      MAT3 165
  245 A(KZ + 2,KZ + 2) = 1.E + 15                                       MAT3 166
      B(KZ + 2) = - 1.E + 10                                            MAT3 167
  250 CONTINUE                                                          MAT3 168
  255 B(2) = EP + B(2)                                                  MAT3 169
      IF (MODE - 1) 290,270,260                                         MAT3 170
  260 IF (ABS(EMS / A(1,1)) - .0001) 290,290,300                        MAT3 171
  265 IF (ABS(B(1)) - 1.E - 4) 290,290,300                              MAT3 172
  270 IF (IFCJC) 275,265,285                                            MAT3 173
  275 IF (JC - IME) 280,285,280                                         MAT3 174
  280 GOTO 265                                                          MAT3 175
  285 MODE = 0                                                          MAT3 176
      TMIN=TTMIN                                                        MAT3 177
      TMAX=TTMAX                                                        MAT3 178
      GOTO 265                                                          MAT3 179
  290 IF (EL - 1.E - 4) 295,295,300                                     MAT3 180
  295 IF (ENL - 1.E - 5) 315,315,300                                    MAT3 181
  300 IN = ISPQ                                                         MAT3 182
      IL = 1                                                            MAT3 183
      IF (MODE) 305,305,310                                             MAT3 184
  305 IN = ISPQ - 1                                                     MAT3 185
      IL = 2                                                            MAT3 186
      X(1) = 0.                                                         MAT3 187
  310 RETURN                                                            MAT3 188
  315 IF(KR(9)) 320,320,310                                             MAT3 189
  320 ITS=-2                                                            MAT3 190
      GOTO 310                                                          MAT3 191
      END                                                               MAT3 192
                                                                        MAT3 193
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      SUBROUTINEOUTPT                                                   OUTP0001
      DIMENSION IU(25)                                                  OUTP0002
C                                                                       OUTP0003
      INCLUDE INC1,LIST                                                 OUTP0004
C                                                                       OUTP0005
      COMMON/ACE1/GAMEA,REFM,PCM,ACMSQ,SOMAK,SXP                        OUTP0006
C                                                                       OUTP0007
      INCLUDE INC3,LIST                                                 OUTP0008
C                                                                       OUTP0009
      COMMON/CARK1N/ KRK(10),ROUCM,NCC                                  OUTP0010
    5 FORMAT(/15H SOLUTION TIMES,/10X,13HITERATIONS = ,I4,23X,7HTIME = ,OUTP0011
     1F8.3,1X,4HSEC.)                                                   OUTP0012
    6 FORMAT(/42H CLOSED SYSTEM EQUILIBRIUM SOLUTION OUTPUT,//29H   MASSOUTP0013
     1 CONDENSED/MASS GAS = ,E12.5)                                     OUTP0014
    7 FORMAT(3X,7HTEMP = ,F10.4,1X,6HDEG R.,2X,1H=,1X,F10.4,1X,5HDEG K.,OUTP0015
     15X7HPRESS = F13.5,4H ATM)                                         OUTP0016
    8 FORMAT(/34A40HGAS                CONDENSED       COMPOSITE/3X,18HENTHAOUTP0017
     1LPY - BTU/LBM,5X,3(5X,E12.5)/3X,23HENTROPY - BTU/LBM DEG R,3(5X,E1OUTP0018
     22.5)/3X,17HDENSITY - LBM/FT3,2(11XE12.5,11X)/3X,16HMOLECULAR WEIGHTOUTP0019
     35X,3(5X,F12.4)/)                                                  OUTP0020
    9 FORMAT(/2X71HCHEMICAL STATE  (MOLE FR. = MOLECULES / TOTAL GAS PHAOUTP0021
     1SE MOLECULES).....)                                               OUTP0022
   10 FORMAT(2X27HABOVE ARE STATIC PROPERTIES,15X,12HM-KINETIC = ,E12.5,OUTP0023
     11X,7HBTU/LBM/3X,7HVEL. = ,E12.4,1X,6HFT/SEC,3X,7HFLUX = ,E12.5,1X,OUTP0024
     210HLBM/FT2SEC,3X,7HMACH = ,F9.5)                                  OUTP0025
   11 FORMAT(3X,7HVEL2 = ,E12.4,1X,6HFT/SEC,5X,8HMACH2 = ,F9.5,3X,9HTHETOUTP0026
     1A 2 =,F10.6,1X,3HDEG)                                             OUTP0027
   12 FORMAT(2X,60HABOVE ARE STATIC CONDITIONS DOWNSTREAM OF THE SHOCK FOUTP0028
     1OR .../3X,6HVEL1 =,E9.3,1X,6HFT/SEC,2X,11HH1-STATIC =,E9.3,1X,16HOUTP0029
     2BTU/LBM  H-TOT =,E9.3,1X, 7HBTU/LBM/3X,5HP1 = ,F12.5,1X,13HATM   ROUTP0030
     3HO1 = ,E12.5,1X,17HLBM/FT3  THETA 1 =,F10.6,1X,3HDEG)             OUTP0031
   13 FORMAT(/2X71HSTATIC CHEMICAL STATE (MOLE FR.=MOLECULES/TOTAL GAS POUTP0032
     1HASE MOLECULES)...)                                               OUTP0033
   14 FORMAT(2X,76HABOVE ARE ISENTROPIC STAGNATION CONDITIONS DOWNSTREAMOUTP0034
     1 OF THE SHOCK FOR . . .)                                          OUTP0035
   15 FORMAT(3X,6HVEL1 =,E9.3,1X,19HFT/SEC  H1-STATIC =,E9.3,1X,16HBTU/LOUTP0036
     1BM  H-TOT =,E9.3,1X,7HBTU/LBM/3X,5HP1 = ,F12.5,1X,3HATM,3X,7HRHO1 OUTP0037
     2= ,E12.5,1X,20HLBM/FT3   THETA 1 = ,F10.6,1X,3HDEG)               OUTP0038
   16 FORMAT(/2X77HISEN. STAG. CHEMICAL STATE (MOLE FR.=MOLECULES / TOTAOUTP0039
     1L GAS PHASE MOLECULES)..)                                         OUTP0040
   17 FORMAT(//9X,13HITERATIONS = ,I4,23X,7HTIME = ,F8.3,1X,3HSEC)      OUTP0041
   18 FORMAT(26H  RHO V WALL/RHOE UE CM = ,E12.5,3X,9HBPRIME = ,E12.5)  OUTP0042
  191 FORMAT(/46H  SURFACE IS LAYER-ORIENTED PYROLYTIC GRAPHITE)         OUTP0043
  192 FORMAT(/45H  SURFACE IS EDGE-ORIENTED PYROLYTIC GRAPHITE)         OUTP0044
  193 FORMAT(/24H  SURFACE IS BULK GRAPHITE)                            OUTP0045
  194 FORMAT(36H  MASS TRANSFER COEFFICIENT ROUCM = ,E12.5)             OUTP0046
  195 FORMAT(/46H OPEN SYSTEM CHEMICAL KINETICS SOLUTION OUTPUT)        OUTP0047
   20 FORMAT(/39H  STATE ADJACENT TO THE SURFACE . . . ./3X,7HTEMP = ,  OUTP0048
     1F10.4,1X,7HDEG R = ,F11.4,1X17HDEG K     PRESS = ,F13.5,1X3HATM)  OUTP0049
   21 FORMAT(/2X,40HPUNCHED CARD OUTPUT (80 COLUMNS) . . . .)           OUTP0050
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   22 FORMAT(/2X,3HMCHEMICAL STATE ADJACENT TO THE SURFACE/3X,54H(MOLE FOUTP0051
     1R FOR GASES = MOLECULES / TOTAL GAS MOLECULES )/3X,50H(MOLE FR FOROUTP0052
     2 CONDENSED = BPRIME CONDENSED ). . . .)                          OUTP0053
   23 FORMAT(8X2A4,2HISF8.5,1IH LIQUID ANDF8.5,6H SOLID)               OUTP0054
   24 FORMAT(/54H  NET FORWARD RATE OF KINETICALLY CONTROLLED REACTIONS/OUTP0055
     1 70H   (MOLES OF REACTION / UNIT SURFACE AREA / TIME / RHOE UE CM)OUTP0056
     2. . . . /(14,1H=E12.5,13,1H=E12.5,13,1H=E12.5,13,1H=E12.5,13,1H=E1OUTP0057
     32.5))                                                            OUTP0058
   25 FORMAT( /87H  SPECIES   MOL.FRAC.    O=LN=KP/O=LN=T   LOG-PP      LOOUTP0059
     1G-KP      FLAG    ERROR          CP   /(1X2A4,4E13.5,15,2E13.5))  OUTP0060
      ASQRT(Q)=SIGN(SQRT(ABS(Q)),Q)                                    OUTP0061
      TAN(Q) = SIN(Q) / COS(Q)                                         OUTP0062
      MEPS = 0.01                                                      OUTP0063
C     FIND VKIN AS FIRST NONZERO FKF(M)                                OUTP0064
      VKIN=ROUCM                                                       OUTP0065
  703 CONTINUE                                                         OUTP0066
   35 WM = AA / P                                                      OUTP0067
      CALL ETIMEF(TIME)                                                OUTP0068
      WRITE(KOUT,5) IT,TIME                                            OUTP0069
      SHIP = HIP                                                       OUTP0070
      SSIP = SIP                                                       OUTP0071
      KR8=KR(8)                                                        OUTP0072
      IF(JC*(N+1-INE)) 41,41,42                                        OUTP0073
   41 JC=N+1                                                           OUTP0074
      KRH=0                                                            OUTP0075
   42 HG=0.                                                            OUTP0076
      HL = 0.                                                          OUTP0077
      SG=0.                                                            OUTP0078
      SL=0.                                                            OUTP0079
      SPL=0.                                                           OUTP0080
      HIP = 0.                                                         OUTP0081
      WTLS=WTL                                                         OUTP0082
      SIP = 0.                                                         OUTP0083
      PMU2 = 0.                                                        OUTP0084
      HTIL = 0.                                                        OUTP0085
      BPRM=W(3)                                                        OUTP0086
      TT=T+1.8                                                         OUTP0087
   70 DO 9S J=I,N                                                      OUTP0088
      HTIL = HTIL + VN(J) / FF(J) * H(J)                               OUTP0089
      PMU2 = PMU2 + VN(J) / FF(J) * WTM(J)                             OUTP0090
      VA = VN(J) * H(J)                                                OUTP0091
      IF (IFC(J)) 80,7S,80                                             OUTP0092
   7S HG = HG + VA                                                     OUTP0093
      SG=SG+VN(J)*(SB(J)-1.9869*Y(J))                                  OUTP0094
      GOTO 95                                                          OUTP0095
   80 HL = HL + VA                                                     OUTP0096
      SL=SL+VN(J)*SB(J)                                                OUTP0097
      SPL=SPL+VN(J)                                                    OUTP0098
   9S CONTINUE                                                         OUTP0099
      RV=W(2)+W(3)-WTLS/WTG                                            OUTP0100
      IF(KR(5)) 104,104,101                                            OUTP0101
  101 WTLS=WTLS+VN(N+1)                                                OUTP0102
      BPRM=BPRM+VN(N+1)/WTG                                            OUTP0103
  104 HTIL=HTIL/PMU2                                                   OUTP0104
      IF(SPL) 107,106,107                                              OUTP0105
  106 WTLS=0.                                                          OUTP0106
      WTL=1.E-30                                                       OUTP0107
      SPL=1.0                                                          OUTP0108
  107 WTR=WTLS/WTG                                                     OUTP0109
      HL= HL+VN(MELT)*FLIQ*HMELT                                       OUTP0110
      SL= SL+VN(MELT)*FLIQ*SMELT                                       OUTP0111
      HIP=(HL+HG)/AA                                                   OUTP0112
      SIP=(SL+SG)/AA                                                   OUTP0113
      KR1=KR(1)+IFRZ+KR8                                               OUTP0114
      FAF=GAMEX                                                        OUTP0115
      IF (KR(4)) 160,150,155                                           OUTP0116
  150 HTIL = HG / AA                                                   OUTP0117
      FAF = 0.                                                         OUTP0118
  155 WSO=AMAX1(WS-W(3)+BPRM,1.E-30)                                   OUTP0119
      HIP=(HG+(HL-WTR*HG)/WSO)/AA                                      OUTP0120
      SIP=0.                                                           OUTP0121
  160 RHO=P*WM/(T*1.3146)                                              OUTP0122
      RHOG=WTG/(T*1.3146)                                              OUTP0123
      HG=HG/WTG*1.8                                                    OUTP0124
      HL=HL/WTL*1.8                                                    OUTP0125
      SL=SL/WTL                                                        OUTP0126
      SG=SG/WTG                                                        OUTP0127
      HBP=HIP*1.8                                                      OUTP0128
      WMG=WTG/P                                                        OUTP0129
      WML=WTL/SPL                                                      OUTP0130
      IF(KR(6)) 181,182,182                                            OUTP0131
  181 WRITE(KOUT,6) WTR                                                OUTP0132
      WRITE(KOUT,7) TT,T,P                                             OUTP0133
      GO TO 183                                                        OUTP0134
  182 WRITE(KOUT,19S)                                                  OUTP0135
      IF (KRK(4)-1) 1821,1820,1821                                     OUTP0136
 1820 WRITE(KOUT,191)                                                  OUTP0137
      GO TO 1824                                                       OUTP0138
 1821 IF (KRK(4)-2) 1823,1822,1823                                     OUTP0139
 1822 WRITE(KOUT,192)                                                  OUTP0140
      GO TO 1824                                                       OUTP0141
 1823 WRITE(KOUT,193)                                                  OUTP0142
 1824 WRITE(KOUT,194) ROUCM                                            OUTP0143
      WRITE(KOUT,18) RV,BPRM                                           OUTP0144
      WRITE(KOUT,20) TT,T,P                                            OUTP0145
  183 WRITE(KOUT,8) HG,HL,HBP,SG,SL,SIP,RHOG,RHO,WMG,WML,WM            OUTP0146
  210 IF(KKJ) 220,245,245                                              OUTP0147
  220 VELSO = ( (SV1 * SIN(SA1)) * * 2. + ( (SR1 / RHO) * SV1 * COS(SA1)OUTP0148
     1) * * 2.) / 45054.                                               OUTP0149
      SA2 = (ATAN(RHO / SR1 * TAN(SA1))) * 57.29577                    OUTP0150
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      SO1=SA1*57.29577                                                  OUTP0151
      SM1 = SM1*1.8                                                     OUTP0152
      SQMAK = (VELSQ / GAM * WM / (1.9869 * T))                         OUTP0153
      VMACH=ASQRT(SQMAK)                                                OUTP0154
      VEL=ASQRT(VELSQ*45054.)                                           OUTP0155
      FLUX=VEL*RHO                                                      OUTP0156
      WRITE(KOUT,11) VEL,VMACH,SA2                                      OUTP0157
      HBH=HCH*1.8                                                       OUTP0158
      WRITE(KOUT,12) SV1,SM1,HBH,SP1,SR1,SO1                            OUTP0159
      SM1 = SM1 / 1.8                                                   OUTP0160
      GOTO 260                                                          OUTP0161
  245 IF(KR(5)-1) 246,255,250                                           OUTP0162
  246 IF(KR(5)) 247,260,260                                             OUTP0163
  247 WRITE(KOUT,14)                                                    OUTP0164
      HBH=HCH*1.8                                                       OUTP0165
      SO1=SA1*57.29577                                                  OUTP0166
      SB1=SH1*1.8                                                       OUTP0167
      WRITE(KOUT,15) SV1,SB1,HBH,SP1,SR1,SO1                            OUTP0168
      GO TO 260                                                         OUTP0169
  250 HCH = H1P                                                         OUTP0170
      SCH = S1P                                                         OUTP0171
      PCH=P                                                             OUTP0172
      GO TO 260                                                         OUTP0173
  255 VELSQ = (HCH - H1P) * 2.                                          OUTP0174
      SQMAK=VELSQ/GAM*WM/(1.9869*T)                                     OUTP0175
      VMACH=ASQRT(SQMAK)                                                OUTP0176
      VEL=ASQRT(VELSQ*45054.)                                           OUTP0177
      FLUX=VEL*RHO                                                      OUTP0178
      HKIN = (HCH-H1P)*1.8                                              OUTP0179
      WRITE(KOUT,10) HKIN,VEL,FLUX,VMACH                                OUTP0180
      IF(KKX(1)-5) 260,2601,260                                         OUTP0181
 2601 PUNCH 2602, VEL, P, HG , PR(1)                                    OUTP0182
 2602 FORMAT(13X,3E11.5,22X,F11.2)                                      OUTP0183
  260 CONTINUE                                                          OUTP0184
      IF (KR(10)) 165,180,165                                           OUTP0185
  165 IF (NCV + 1TS) 166,180,180                                        OUTP0186
  166 WRITE(KOUT,21)                                                    OUTP0187
      W(2)=ROUCH                                                        OUTP0188
      IF(KKX(1)-3)1681,1682,180                                         OUTP0189
C***** SCRIMP OUTPUT FORMATS                                           OUTP0190
 1682 KSC=0                                                             OUTP0191
      IF(BPRM)1684,1684,1683                                            OUTP0192
 1683 KSC=KR1                                                           OUTP0193
 1684 WRITE (KOUT,1685) TILE (2),W(2),BPRM,T,FAF,HTIL,H1P,KSC,FAMOA(JC),OUTP0194
     1 FAMOB(JC),P,TILE                                                 OUTP0195
 1685 FORMAT(2A1H(4XA4,2F8.5,F9.4,F5.3,2F9.3,12,2AA4,A2,F4.2,2A4,A2,1H))OUTP0196
      PUNCH 1686,        TILE (2),W(2),BPRM,T,FAF,HTIL,H1P,KSC,FAMOA(JC),OUTP0197
     1 FAMOB(JC),P,TILE                                                 OUTP0198
 1686 FORMAT(     4XA4,2F8.5,F9.4,F5.3,2F9.3,12,2AA4,A2,F4.2,2A4,A2,1H))OUTP0199
      GO TO 180                                                         OUTP0200
 1681 CONTINUE                                                          OUTP0201
      IF(KKA(1)) 170,170,168                                            OUTP0202
  168 CONTINUE                                                          OUTP0203
C*****THE SQUEE CALLS AND FORMAT 167 YIELD A COMPRESSED OUTPUT TO BE    OUTP0204
C*****READ AS (E6.4,E8.5,2E6.4,F4.2,E7.5,E6.4,2E8.5,.....)             OUTP0205
      CALL SQUEE (P,10(1),4)                                            OUTP0206
      CALL SQUEE (W(2),10(4),4)                                         OUTP0207
      CALL SQUEE (BPRM,10(7),5)                                         OUTP0208
      CALL SQUEE (VKIN,10(10),4)                                        OUTP0209
      10(13) = FAF*100.                                                 OUTP0210
      CALL SQUEE (T,10(14),5)                                           OUTP0211
      CALL SQUEE(ABS(WTR),10(17),4)                                     OUTP0212
      CALL SQUEE (HTIL,10(20),5)                                        OUTP0213
      H1PP=HG/1.8                                                       OUTP0214
      CALL SQUEE(H1PP,10(23),5)                                         OUTP0215
      KR1=KR1+1                                                         OUTP0216
      WRITE(KOUT,1675) 10,FAMOA(JC),FAMOB(JC),KR1,TILE                  OUTP0217
      PUNCH 167,  10,FAMOA(JC), FAMOB(JC), KR1,TILE                     OUTP0218
      KR1=KR1-1                                                         OUTP0219
      W(2)=0.                                                           OUTP0220
  167 FORMAT (14,A1,11,14,A1,11,16,A1,11,14,A1,11,                      OUTP0221
     1       14,15,A1,11,14,A1,11,16,A1,11,16,A1,11,A4,A2,11,3X,2A4,A2) OUTP0222
 1675 FORMAT(3H  (14,A1,11,14,A1,11,16,A1,11,14,A1,11,14,15,A1,11,      OUTP0223
     1   14,A1,11,16,A1,11,16,A1,11,A4,A2,11,4X,2A4,A2,1H))             OUTP0224
      IF (KKX(1) - 1) 170,180,170                                       OUTP0225
  170 H1PP=HG/1.8                                                       OUTP0226
      WRITE(KOUT,175)P,W(2),BPRM,T,FAF,HTIL,H1PP,KR1,FAMOA(JC),FAMOB(JC)OUTP0227
     1      ,WTR                                                        OUTP0228
      PUNCH 176,      P,W(2),BPRM,T,FAF,HTIL,H1PP,KR1,FAMOA(JC),FAMOB(JC)OUTP0229
     1     ,WTR                                                        OUTP0230
      W(2)=0.                                                           OUTP0231
  175 FORMAT(3H  (F8.4,2F8.5,F9.4,F5.3,2F9.3,12,2X,2A4,E10.3,3H  ))     OUTP0232
  176 FORMAT (   F8.4,2F8.5,F9.4,F5.3,2F9.3,12,2A,2A4,E10.3)           OUTP0233
  180 IF(1TS) 271,135,135                                               OUTP0234
  271 IF(MI*KR(9)) 284,284,278                                          OUTP0235
  278 DO 279 L=1,MI                                                     OUTP0236
  279 PMR(L)=PMR(L)/AA                                                  OUTP0237
      WRITE(KOUT,24)(L,PMR(L),L=1,MI)                                   OUTP0238
  284 IF(KR(6)) 273,272,272                                             OUTP0239
  272 WRITE(KOUT,22)                                                    OUTP0240
      GO TO 105                                                         OUTP0241
  273 IF(KR(5)) 276,274,274                                             OUTP0242
  274 IF(KKJ) 277,275,275                                               OUTP0243
  275 WRITE(KOUT,9)                                                     OUTP0244
      GO TO 105                                                         OUTP0245
  276 WRITE(KOUT,16)                                                    OUTP0246
      GO TO 105                                                         OUTP0247
  277 WRITE(KOUT,13)                                                    OUTP0248
  105 DO 110 I=1,N                                                      OUTP0249
      IF(IFC(I)-1) 110,108,110                                          OUTP0250
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  108 IF(KR(6))  110,109,109                                                    OUTP0251
  109 VN(I)=VN(I)/WM*WTM(I)                                                     OUTP0252
  110 VN(I) = VN(I) / P                                                         OUTP0253
      IF(NCV) 113,113,120                                                       OUTP0254
  113 IF(KR(7)-1) 114,114,120                                                   OUTP0255
  114 IF(N-60) 115,115,116                                                      OUTP0256
  115 WRITE(KOUT,270)(FAMOA(I),FAMOB(I),VN(I),I=1,N)                            OUTP0257
      GOTO 125                                                                  OUTP0258
  116 WRITE(KOUT,269)(FAMOA(I),FAMOB(I),VN(I),I=1,N)                            OUTP0259
  270 FORMAT(/35X7HSPECIES3X8HMOLE FR,2X)/(5X2A4,E12.5,5X2A4,E12.5,5X2A OUTP0260
     14,E12.5))                                                                 OUTP0261
  269 FORMAT(/5(5X7HSPECIES3X8HMOLE FR,2X)/(5X2A4,E12.5,5X2A4,E12.5,5X2A OUTP0262
     14,E12.5,5X2A4,E12.5,5X2A4,E12.5))                                         OUTP0263
      GO TO 125                                                                 OUTP0264
  120 WRITE (KOUT,25)(FAMOA(I),FAMOB(I),VN(I),TC(I),Y(I),VLNK(I),IFC(I),E OUTP0265
     1(I),CP(I),I=1,N)                                                          OUTP0266
  125 DO 130 I=1,N                                                              OUTP0267
      IF(IFC(I)-1) 130,128,130                                                  OUTP0268
  128 IF(KR(6)) 130,129,129                                                     OUTP0269
  129 VN(I)=VN(I)/WTM(I)*WM                                                     OUTP0270
  130 VN(I) = VN(I) * P                                                         OUTP0271
  135 IF(FL10) 280,280,140                                                      OUTP0272
  140 FSOL=1.-FL10                                                              OUTP0273
      WRITE(KOUT,23) FAMOA(MELT),FAMOB(MELT),FL10,FSOL                          OUTP0274
  280 IF (ITS) 285,315,315                                                      OUTP0275
  285 IF(KR(5)) 290,310,290                                                     OUTP0276
  290 IF(KKJ-KR(5)) 300,295,300                                                 OUTP0277
  295 KKJ = 1                                                                   OUTP0278
      KR(1) = 3                                                                 OUTP0279
      MODE = 3                                                                  OUTP0280
      KR(2)=1                                                                   OUTP0281
      KR(5)=-3                                                                  OUTP0282
      ACHSQ=0.                                                                  OUTP0283
      ITS=0                                                                     OUTP0284
      GAME = GAM / (GAM - 1.)                                                   OUTP0285
C**** FIRST GUESS OF STAGNATION PRESSURE BEHIND SHOCK                           OUTP0286
      P = ( (1. + ( (GAM - 1.) / 2.) * (SQMAK)) ** GAME) * P                    OUTP0287
      CALL ETIME                                                                OUTP0288
  300 SXP=SIP                                                                   OUTP0289
  310 RETURN                                                                    OUTP0290
  315 MIP = SMIP                                                                OUTP0291
      SIP = SSIP                                                                OUTP0292
      RETURN                                                                    OUTP0293
      END                                                                       OUTP0294
```

```
      SUBROUTINE PROPS                                                          PROP   1
      DIMENSION TT(1), RHO(1), CPBAR(1), SC(1), CAPC(1)                         PROP   2
      DIMENSION ZK(10),Z1(10),VK(10),VI(10)                                     PROP   3
      COMMON/ACE1/GAMEX,REFM,PCM,ACHSQ,SQMAK,SXP                                PROP   4
C                                                                               PROP   5
      INCLUDE INC1.LIST                                                         PROP   6
C                                                                               PROP   7
      INCLUDE INC3.LIST                                                         PROP   8
C                                                                               PROP   9
    5 FORMAT(/27H DERIVATIVE PROPERTY OUTPUT,/57H  CP=FROZEN    CP=EQUILPROP  10
     1   DLNM/DLNT   DLNM/DLNP     GAMMA,/5E12.5)                             PROP  11
   10 FORMAT(1H1,15X45HGRAPHITE SURFACE KINETICS (GASKET) SOLUTION   5X      PROP  12
     1 2A4,A2//)                                                              PROP  13
   15 FORMAT (4H1---50H-----FOLLOWING OUTPUT NON-CONVERGENT----------PROP  14
     1- 2A4,A2//)                                                             PROP  15
      ALF=A(2,1)/A(1,1)                                                         PROP  16
      CSP = 1. / (A(1,1) * AA)                                                  PROP  17
      IF (MODE - 3) 40,45,40                                                    PROP  18
   40 CSP = CSP / T                                                             PROP  19
   45 BETA = P * (A(2,2) - A(1,2) / A(1,1) * A(2,1)) - 1.                       PROP  20
      GAMP=1.-ALF                                                               PROP  21
      GAMP=1./(1.+BETA-1.9869/AA*GAMP/CSP*GAMP*P)                               PROP  22
      IF(KR(5)) 46,44,46                                                        PROP  23
   46 GAM=GAMP                                                                  PROP  24
   44 ITS=-1                                                                    PROP  25
      HMW=0.                                                                    PROP  26
      CAPC(1) = 1.                                                              PROP  27
      I1 = 1                                                                    PROP  28
      WM = AA / P                                                               PROP  29
      ISM = IS - 1                                                              PROP  30
      TT(I1) = T * 1.8                                                          PROP  31
      RHO(I1) = AA / (1.3146 * T)                                               PROP  32
      CPBAR(I1) = CPF                                                           PROP  33
      AISTR = 1.13                                                              PROP  34
C     FORM NECESSARY SUMMATIONS                                                 PROP  35
      PMU2 = 0.                                                                 PROP  36
      CPTIL = 0.                                                                PROP  37
      HTIL = 0.                                                                 PROP  38
      HTZ=0.                                                                    PROP  39
      PMUZ=0.                                                                   PROP  40
      PMU1 = 0.                                                                 PROP  41
      TMU3 = 0.                                                                 PROP  42
      CPG=0.                                                                    PROP  43
      CPGPR=0.                                                                  PROP  44
      IER=1                                                                     PROP  45
      IE=0                                                                      PROP  46
      DO 5T K=1,IS                                                              PROP  47
      VK(K)=0.                                                                  PROP  48
      ZK(K)=0.                                                                  PROP  49
      IF(WAT(K)-0.1) 51,52,52                                                   PROP  50
```

```
   51 IE=K
   52 IF(IFC(K)) 53,54,53
   53 IF(KR(6)) 54,57,57
   54 IF(WTM(K)-0.1) 56,56,55
   55 ZK(K)=VN(K)/FF(K)
   56 VK(K)=VN(K)
   57 CONTINUE
      I=1
      DO 62 IK=1,N
      IF(WTM(I)-0.1) 59,78,78
   59 IER=IK
      HE=H(I)
      WTE=WTM(I)
      CPE=CP(I)
      H(I)=0.
      WTM(I)=0.
      CP(I)=0.
      IF(IK-IS) 62,62,60
   60 DO 61 K=1,IS
   61 VK(K)=VK(K)+VN(I)*VNU(I,K)
      GO TO 62
   78 IF(IFC(I)) 62,79,62
   79 PMU1=PMU1+VN(I) * FF(I) ** (1./GAMEX)
   62 I=I+1
      VMU1=PMU1/P
      AMU5=0.
      PMU6=0.
      WOZ=1.385
      W02=1.2 * AISTR/PMU1
      W07 = WOZ/PMU1-W02
      W04 = 0.2e4 * WOZ
      W05 = 0.32 * AISTR/PMU1
      W08 = WO4/PMU1-W05
      I=I
      DO 80 IK=1,N
      IF(IFC(I)) 80,65,64
   64 IF(KR(6)) 65,80,80
   65 IF(WTM(I)-0.1) 80,66,66
   66 VA=VN(I)/FF(I)
      IF(IER) 72,73,67
   67 IF(IK-IS) 68,68,69
   68 CEJ=CIJ(IE,I)
      GO TO 72
   69 CEJ=0.
      DO 70 K=1,IS
   70 CEJ=CEJ+VNU(I,K)*CIJ(IE,K)
   72 H(I)=H(I)-CEJ*HE
      CP(I)=CP(I)-CEJ*CPE
      WTM(I)=WTM(I)-CEJ*WTE
   73 VB=VA*WTM(I)
```

```
PROP   51      PMU2=PMU2+VB                                                    PROP 101
PROP   52      HTZ=HTZ+VA*H(I)                                                 PROP 102
PROP   53      IF(IK-IS) 84,84,81                                              PROP 103
PROP   54   81 DO 77 K=1,IS                                                    PROP 104
PROP   55      VK(K)=VK(K) + VN(I)*VNU(I,K)                                    PROP 105
PROP   56   77 ZK(K) = ZK(K) + VA * VNU(I,K)                                   PROP 106
PROP   57   84 FF1=FF(I)                                                       PROP 107
PROP   58      IF (IFC(I)) 841,840,841                                         PROP 108
PROP   59  840 FF1=FF(I)**(1./GAMEX)                                           PROP 109
PROP   60  841 VA=VN(I)/FF1                                                    PROP 110
PROP   61      VB=VA*WTM(I)                                                    PROP 111
PROP   62      VC=VN(I)*FF1                                                    PROP 112
PROP   63   85 PMU2 = PMU2 + VB                                                PROP 113
PROP   64      TMU3 = TMU3 + VA                                                PROP 114
PROP   65      CPTIL = VA * CP(I) + CPTIL                                      PROP 115
PROP   66      HTIL = HTIL + VA * H(I)                                         PROP 116
PROP   67      CPG=CPG+VN(I) *CP(I)                                            PROP 117
PROP   68      HMW=HMW+VN(I)*H(I)                                              PROP 118
PROP   69      AMU5 = AMU5 + VB / (W02 -VC * W07 )                             PROP 119
PROP   70      PMU6 = PMU6 + VA / (W04 - VC * W08 )                            PROP 120
PROP   71      IF (IFC(I)) 80,800,80                                           PROP 121
PROP   72  800 CPGPR=CPGPR+VN(I)*CP(I)                                         PROP 122
PROP   73   80 I=I+1                                                           PROP 123
PROP   74      VMU5 = AMU5 / AA                                                PROP 124
PROP   75      VMU6 = (PMU6 + CPTIL / 1.9869 - 2.5 * TMU3) / P                 PROP 125
PROP   76      VMU2 = PMU2 / P                                                 PROP 126
PROP   77      VMU3 = TMU3 / PMU2                                              PROP 127
PROP   78      HTZ=HTZ/PMU2*1.8                                                PROP 128
PROP   79      DO 95 K=1,IS                                                    PROP 129
PROP   80      VK(K)=VK(K)/AA*WTM(K)                                           PROP 130
PROP   81   95 ZK(K) = ZK(K)/PMU2*HTM(K)                                       PROP 131
PROP   82      DO 100 I=1,IS                                                   PROP 132
PROP   83      ZI(I)=0.                                                        PROP 133
PROP   84      VI(I)=0.                                                        PROP 134
PROP   85      DO 100 K=1,IS                                                   PROP 135
PROP   86      VI(I) = VI(I) + CIJ(K,I) * VK(K) / WTM(K) * WAT(I)              PROP 136
PROP   87  100 ZI(I) = ZI(I) + CIJ(K,I) * ZK(K) / WTM(K) * WAT(I)              PROP 137
PROP   88      CPG=CPG/AA                                                      PROP 138
PROP   89      CPGPR=CPGPR/AA                                                  PROP 139
PROP   90      HMW=HMW/AA                                                      PROP 140
PROP   91      CPTIL = CPTIL / PMU2                                            PROP 141
PROP   92      HTIL = HTIL / PMU2 * 1.8                                        PROP 142
PROP   93      OMEGA = 1.07 / (T / 106.7) * * 0.159                            PROP 143
PROP   94      OBAR = 4.16E - 8 * T / P * SQRT(T) / OMEGA                      PROP 144
PROP   95      VMU = RMO(11) * OBAR * VMU5 / VMU1                              PROP 145
PROP   96      TCOND = RMO(11) * OBAR / WM * VMU6 / VMU1 * 1.9869              PROP 146
PROP   97      SC(11) = VMU5 / VMU2 / W4                                       PROP 147
PROP   98      PR(11)=CPGPR/VMU6*VMU1*1.9869*WM                                PROP 148
PROP   99      IF(KKJ) 107,107,101                                             PROP 149
PROP  100  101 GAME=GAM-1.0                                                    PROP 150
```

```
      SQMAK=(MCH-MMW)/GAM=1.0065/T*WM                                    PROP 151
      PSP=((1.+GAME/2.*SQMAK)/(1.+GAME/2.*ACHSQ))**(GAM/GAME)            PROP 152
      IF(ABS(PSP-1.0)-1.E-4) 104,104,102                                 PROP 153
  102 IF(KKJ-10) 105,105,103                                             PROP 154
  105 P=P*PSP                                                            PROP 155
      AA=P*WP                                                            PROP 156
      KKJ=KKJ+1                                                          PROP 157
      ITS=IT                                                             PROP 158
      GO TO 125                                                          PROP 159
  103 NCV=1                                                              PROP 160
  104 KKJ=0                                                              PROP 161
  107 IF(NCV) 47,47,106                                                  PROP 162
  106 WRITE(KOUT,15) TILE                                                PROP 163
      GO TO 49                                                           PROP 164
   47 IF(KR(10)/2 .KR(7) .KR(2) .KR(3)) 49,49,48                         PROP 165
   48 WRITE(KOUT,10) TILE                                                PROP 166
   49 WRITE(KOUT,5) CPG, CSP, ALF, BETA, GAMP                            PROP 167
      VMU12 = VMU1 * VMU2                                                PROP 168
      IF (KKX(1)-4) 109,108,109                                          PROP 169
  108 MMW=MMW=1.8                                                        PROP 170
      PUNCH 111, MMW, TT, WM, CSP, ALF, VMU, PR                          PROP 171
  111 FORMAT(6E12.5,F8.4)                                                PROP 172
  109 CONTINUE                                                           PROP 173
      WRITE(KOUT,110)TT,VMU,TCOND,OBAR,PR,SC,VMU1,VMU2,WM,MTIL,CPTIL     PROP 174
     1 ,MTZ                                                              PROP 175
  110 FORMAT(/58H PROPERTY ROUTINE OUTPUT IN  L8-MASS,FT,SEC,BTU-AND DEGPROP 176
     1-R    /67H     TEMP         VISC         COND         OBAR         PR PROP 177
     1          SC/6E12.5/57H      MU1          MU2         MOL.WT       MTILPROP 178
     1        CPTIL7X5HMTIL=/6E12.5)                                      PROP 179
  115 FORMAT(1X10E12.5)                                                  PROP 180
  120 FORMAT(/58H ELEMENTAL K AND Z MASS FRACTIONS BY ATOMIC NUMBER . .  PROP 181
     1. . 9H (GAMEX =F6.3,1H)/1X10(4X13,5X))                             PROP 182
      WRITE(KOUT,120) GAMEX,(KAT(J),J=1,IS)                              PROP 183
      WRITE(KOUT,115)(V1(J),J=1,IS)                                      PROP 184
      WRITE(KOUT,115)(Z1(J),J=1,IS)                                      PROP 185
  125 RETURN                                                             PROP 186
      END                                                                PROP 187
                                                                         PROP 188
```

```
      SUBROUTINE RERAY(N,C,NN,O,NNN,LS,IS)                               RERA   1
C     DIRECT INVERSION PROCEDURE  --  C IS REPLACED BY C**-1             RERA   2
      DIMENSION U(16,1),SU(16),C(16,1),L(16),S(16),LL(16),LLL(16),LS(1)  RERA   3
      KOUT=6                                                             RERA   4
      N1=N+1                                                             RERA   5
      NP=N+NN                                                            RERA   6
      DO 11 I=1,NP                                                       RERA   7
      LLL(I)=I                                                           RERA   8
      IF(LS(I)) 113,113,112                                              RERA   9
  112 L(I)=LS(I)                                                         RERA  10
      GO TO 11                                                           RERA  11
  113 L(I)=I                                                             RERA  12
   11 CONTINUE                                                           RERA  13
      IX=-1                                                              RERA  14
      IF(IS+2) 111,109,111                                               RERA  15
  106 FORMAT(11H  L(I),I=1,13,5X (3013))                                 RERA  16
  107 FORMAT(15H  ((C(I,J),J=1,13,12H),(D(J),J=1,13, 6H),I=1,13,15H)  BEFRERA  17
     1ORE RERAY)                                                         RERA  18
  108 FORMAT(2X  11E10.3/(12X  10E10.3))                                 RERA  19
  109 WRITE(KOUT,107) NP,NNN,N                                           RERA  20
      WRITE(KOUT,106)NP,(L(I),I=1,NP)                                    RERA  21
      IX=0                                                               RERA  22
      DO 110 I=1,N                                                       RERA  23
  110 WRITE(KOUT,108)(C(I,J),J=1,NP),(D(I,J),J=1,NNN)                    RERA  24
  111 IS=-1                                                              RERA  25
C     TRIANGULATE MATRIX                                                 RERA  26
      DO 15 I=1,N                                                        RERA  27
      DO 160 M=1,NP                                                      RERA  28
  160 S(M)=ABS(C(I,M))                                                   RERA  29
      IF(IS) 18,16,16                                                    RERA  30
   18 IS=0                                                               RERA  31
      SD(I)=1.                                                           RERA  32
      GO TO 12                                                           RERA  33
C     REDUCE ROW I BY PRECEEDING ROWS                                    RERA  34
   16 DO 17 J=2,I                                                        RERA  35
      K=L(J-1)                                                           RERA  36
      DIV=-C(I,K)                                                        RERA  37
      IF(DIV) 161,17,161                                                 RERA  38
  161 C(I,K)=0.                                                          RERA  39
      DO162 M=1,NP                                                       RERA  40
      DIVC=DIV*C(J-1,M)                                                  RERA  41
      S(M)=AMAX1(S(M),ABS(DIVC))                                         RERA  42
  162 C(I,M)=C(I,M)+DIVC                                                 RERA  43
      IF(NNN) 17,17,163                                                  RERA  44
  163 DO 164 M=1,NNN                                                     RERA  45
  164 D(I,M)=D(I,M)+DIV*D(J-1,M)                                         RERA  46
   17 CONTINUE                                                           RERA  47
C     SEEK MAXIMUM PIVOT                                                 RERA  48
   12 DIV=0.                                                             RERA  49
      K=L(I)                                                             RERA  50
```

```
      J=I                                                               MERA  51
      DO 13 JJ=I,N                                                      MERA  52
      M=L(JJ)                                                           MERA  53
      IF(ABS (C(I,M))-DIV)13,13,121                                     MERA  54
  121 DIV=ABS (C(I,M))                                                  MERA  55
      K=M                                                               MERA  56
      J=JJ                                                              MERA  57
   13 CONTINUE                                                          MERA  58
      SD(I)=DIV/S(K)                                                    MERA  59
      L(J)=L(I)                                                         MERA  60
      L(I)=K                                                            MERA  61
      IF(SD(I)-1.E-8) 131,131,14                                        MERA  62
C     SINGULAR MATRIX RETURN                                            MERA  63
  131 IS=-1                                                             MERA  64
      WRITE(KOUT,132) I,K                                               MERA  65
      C(I,K)=1.E+30                                                     MERA  66
      S(K)=1.0                                                          MERA  67
      GO TO 12                                                          MERA  68
  132 FORMAT(11HSX213)                                                  MERA  69
   14 DIV=C(I,K)                                                        MERA  70
      C(I,K)=1.0                                                        MERA  71
      K=LLL(J)                                                          MERA  72
      LLL(J)=LLL(I)                                                     MERA  73
      LLL(I)=K                                                          MERA  74
      LL(K)=I                                                           MERA  75
C     NORMALIZE ROW                                                     MERA  76
      IF(NNN) 143,143,141                                               MERA  77
  141 DO 142 J=1,NNN                                                    MERA  78
  142 D(I,J)=D(I,J)/DIV                                                 MERA  79
  143 DO 15 J=1,NP                                                      MERA  80
   15 C(I,J)=C(I,J)/DIV                                                 MERA  81
      IF(IX) 152,150,152                                                MERA  82
  151 FORMAT(24H PIVOT ROW/COL/RES,RATIO S(14,1H/13,1H/E9.2,1H,))       MERA  83
  150 WRITE(KOUT,151) (I,L(I),SD(I),I=1,NP)                             MERA  84
C     DIAGONALIZE MATRIX                                                MERA  85
  152 NM=N-1                                                            MERA  86
      DO 20 I=1,NM                                                      MERA  87
      K=L(I+1)                                                          MERA  88
      DO 20 J=1,I                                                       MERA  89
      DIV=-C(J,K)                                                       MERA  90
      IF(DIV)17,20,19                                                   MERA  91
   19 C(J,K)=0.                                                         MERA  92
      IF(NNN) 191,191,192                                               MERA  93
  192 DO 193 M=1,NNN                                                    MERA  94
  193 D(J,M)=D(J,M)+DIV*D(I+1,M)                                        MERA  95
  191 DO 201 M=1,NP                                                     MERA  96
  201 C(J,M)=C(J,M)+DIV*C(I+1,M)                                        MERA  97
   20 CONTINUE                                                          MERA  98
C     INTERCHANGE COLUMNS                                               MERA  99
      DO 30 II=1,NP                                                     MERA 100
      I=II                                                              MERA 101
   21 J=L(I)                                                            MERA 102
      L(I)=I                                                            MERA 103
      IF(J-I)22,30,22                                                   MERA 104
   22 IF(IS)25,23,25                                                    MERA 105
   23 DO 24 M=1,N                                                       MERA 106
      S(M)=C(M,I)                                                       MERA 107
   24 C(M,I)=C(M,J)                                                     MERA 108
      IS=I                                                              MERA 109
      I=J                                                               MERA 110
      GO TO 21                                                          MERA 111
   25 IF(IS-J)26,28,26                                                  MERA 112
   26 DO 27 M=1,N                                                       MERA 113
   27 C(M,I)=C(M,J)                                                     MERA 114
      I=J                                                               MERA 115
      GO TO 21                                                          MERA 116
   28 DO 29 M=1,N                                                       MERA 117
   29 C(M,I)=S(M)                                                       MERA 118
      IS=0                                                              MERA 119
   30 CONTINUE                                                          MERA 120
C     INTERCHANGE ROWS                                                  MERA 121
      DO 40 II=1,N                                                      MERA 122
      I=II                                                              MERA 123
   31 J=LL(I)                                                           MERA 124
      LL(I)=I                                                           MERA 125
      IF(J-I)32,40,32                                                   MERA 126
   32 IF(IS)35,33,35                                                    MERA 127
   33 DO 34 M=1,NP                                                      MERA 128
      S(M)=C(I,M)                                                       MERA 129
   34 C(I,M)=C(J,M)                                                     MERA 130
      IF(NNN) 343,343,341                                               MERA 131
  341 DO 342 M=1,NNN                                                    MERA 132
      SD(M)=D(I,M)                                                      MERA 133
  342 D(I,M)=D(J,M)                                                     MERA 134
  343 IS=I                                                              MERA 135
      I=J                                                               MERA 136
      GO TO 31                                                          MERA 137
   35 IF(IS-J)36,38,36                                                  MERA 138
   36 DO 37 M=1,NP                                                      MERA 139
   37 C(I,M)=C(J,M)                                                     MERA 140
      IF(NNN) 373,373,371                                               MERA 141
  371 DO 372 M=1,NNN                                                    MERA 142
  372 D(I,M)=D(J,M)                                                     MERA 143
  373 I=J                                                               MERA 144
      GO TO 31                                                          MERA 145
   38 DO 39 M=1,NP                                                      MERA 146
   39 C(I,M)=S(M)                                                       MERA 147
      IF(NNN) 393,393,391                                               MERA 148
  391 DO 392 M=1,NNN                                                    MERA 149
  392 D(I,M)=SD(M)                                                      MERA 150
```

```
393 IS=0                                                                RERA 151
 40 CONTINUE                                                            RERA 152
    IF(1x) 411,409,411                                                  RERA 153
407 FORMAT(1SH  ((C(I,J),J=1,13,12H),(D(J),J=1,13, 6H),I=1,I3,1SH)  AFRERA 154
   1TER RERAY  )                                                        RERA 155
409 WRITE(KOUT,407) NP,NNN,N                                            RERA 156
    DO 410 I=1,N                                                        RERA 157
410 WRITL(KOUT,108)(C(I,J),J=1,NP),(D(I,J),J=1,NNN)                     RERA 158
411 RETURN                                                              RERA 159
    END                                                                 RERA 160
                                                                        RERA 161
```

```
      SUBROUTINESCALE(MOE)                                              SCAL   1
      DIMENSION CMFF(180)                                               SCAL   2
      DIMENSION DY(1),DYA(180,1)                                        SCAL   3
C                                                                       SCAL   4
      INCLUDE INC1.LIST                                                 SCAL   5
C                                                                       SCAL   6
      INCLUDE INC3.LIST                                                 SCAL   7
C                                                                       SCAL   8
      EQUIVALENCE(A(1),DY(1),DYA(1))                                    SCAL   9
      CLIM = AMAX1(1.,W(2) * W(31) * 0.2 * WTG                          SCAL  10
      DWTL = 0.                                                         SCAL  11
      DWTG = 0.                                                         SCAL  12
      DUMP = P * 1.E - 7                                                SCAL  13
      BUMP = P * 1.E - 4                                                SCAL  14
      BULP = ALOG(BUMP)                                                 SCAL  15
   15 CMF = 1.                                                          SCAL  16
   20 K = 0                                                             SCAL  17
      DO 35 J=2,IS                                                      SCAL  18
      IF (IB(J) - IB(J - 1)) 25,30,35                                   SCAL  19
   25 JA = IB(J)                                                        SCAL  20
      IB(J) = IB(J - 1)                                                 SCAL  21
      IB(J - 1) = JA                                                    SCAL  22
      K = 1                                                             SCAL  23
      GOTO 35                                                           SCAL  24
   30 IB(J) = 1000                                                      SCAL  25
   35 CONTINUE                                                          SCAL  26
      IF (K) 40,40,20                                                   SCAL  27
   40 IB(IS + 1) = 1000                                                 SCAL  28
      M = IB(1)                                                         SCAL  29
      M1 = 1                                                            SCAL  30
      L = IS + 2                                                        SCAL  31
      I = 0                                                             SCAL  32
      LL = I                                                            SCAL  33
   45 LIM=N*KR(8)                                                       SCAL  34
      DO 320 IK=1,LIM                                                   SCAL  35
      I = I + 1                                                         SCAL  36
   65 IF (IK - 15) 70,70,85                                             SCAL  37
   70 SLAM(I) = 0.                                                      SCAL  38
      IBC(I)=IFC(I)                                                     SCAL  39
      PNUS(I) = 0.                                                      SCAL  40
      IF (IFC(I) - 1) 75,75,115                                         SCAL  41
   75 DY1 = X(I + 2)                                                    SCAL  42
      IF (IFC(I) + 1) 315,80,80                                         SCAL  43
   80 IF (IFC(I)) 245,135,270                                           SCAL  44
   85 IF (IFC(I) + 1) 115,90,90                                         SCAL  45
   90 IF (IFC(I)) 110,95,125                                            SCAL  46
   95 VA = E(I) - TC(I) * A(I)                                          SCAL  47
      DO 105 J=1,IS                                                     SCAL  48
      IF (IBC(J)) 100,100,105                                           SCAL  49
  100 VA = VA + VNU(I,J) * X(J + 2)                                     SCAL  50
```

```
  105 CONTINUE                                                          SCAL  51
      DY1 = VA                                                          SCAL  52
      GOTO 135                                                          SCAL  53
  110 IF (IK - IKE) 115,120,115                                         SCAL  54
  115 DY1 = 0.                                                          SCAL  55
      GOTO 315                                                          SCAL  56
  120 IFC(1) = 1                                                        SCAL  57
      DY1 = X(IEK)                                                      SCAL  58
      GOTO 270                                                          SCAL  59
  125 L = L + 1                                                         SCAL  60
      IF (L - IEK) 130,125,130                                          SCAL  61
  130 DY1 = X(L)                                                        SCAL  62
      GOTO 270                                                          SCAL  63
  135 DWTG = DWTG + VN(1) * DY1 * WTM(1)                                SCAL  64
      IF (IP(1)) 140,235,140                                            SCAL  65
  140 IF (IK - M) 145,185,145                                           SCAL  66
  145 IF (VN(1) - DUMP) 150,180,180                                     SCAL  67
  150 IF (MOE) 235,235,155                                              SCAL  68
  155 IF (DY1) 160,315,165                                              SCAL  69
  160 IF (VN(1) / BUMP - .9999995 - CMF * DY1) 315,315,170              SCAL  70
  165 IF (BUMP / VN(1) - 1. - CMF * DY1) 175,315,315                    SCAL  71
  170 CMF = (VN(1) / BUMP - .9999995) / DY1                             SCAL  72
      GOTO 315                                                          SCAL  73
  175 CMF = (BUMP / VN(1) - 1.) / DY1                                   SCAL  74
      GOTO 315                                                          SCAL  75
  180 IF (MOE) 215,215,190                                              SCAL  76
  185 M1 = M1 + 1                                                       SCAL  77
      M = IB(M1)                                                        SCAL  78
  190 IF (DY1) 195,315,200                                              SCAL  79
  195 IF (DY1 * CMF + .999) 205,315,315                                 SCAL  80
  200 IF (DY1 * CMF - 9.) 315,315,210                                   SCAL  81
  205 CMF = - .999 / DY1                                                SCAL  82
      GOTO 315                                                          SCAL  83
  210 CMF = 9. / DY1                                                    SCAL  84
      GOTO 315                                                          SCAL  85
  215 IF (DY1 * CMF - 2.303) 220,230,230                                SCAL  86
  220 IF (DY1 * CMF + 6.909) 225,315,315                                SCAL  87
  225 CMF = - 6.909 / DY1                                               SCAL  88
      GOTO 315                                                          SCAL  89
  230 CMF = 2.303 / DY1                                                 SCAL  90
      GOTO 315                                                          SCAL  91
  235 IF (Y(1) - BULP + ABS(DY1) * CMF) 315,240,240                     SCAL  92
  240 CMF = - (Y(1) - BULP) / ABS(DY1)                                  SCAL  93
      GOTO 315                                                          SCAL  94
C     NON-PRESENT BASE                                                  SCAL  95
  245 IF (KR(6)) 255,250,250                                            SCAL  96
  250 IF (T - TF(1) + .001) 315,255,255                                 SCAL  97
  255 IF (Y(1) + CMF * DY1 - 0.1) 315,260,260                           SCAL  98
  260 DUM1 = (.1 - Y(1)) / DY1                                          SCAL  99
      IF (DUM1 - .001) 315,315,265                                      SCAL 100
  265 CMF = DUM1                                                        SCAL 101
      GOTO 315                                                          SCAL 102
  270 DWTL = DWTL + DY1 * WTM(1)                                        SCAL 103
      IF (DY1) 275,315,290                                              SCAL 104
  275 IF (VN(1)) 290,290,280                                            SCAL 105
  280 IF (VN(1) + DY1 * CMF) 285,290,290                                SCAL 106
  285 CMF = - VN(1) / DY1 + 1.00001                                     SCAL 107
  290 IF (KR(6)) 305,295,295                                            SCAL 108
  295 CLIP=ABS(CLIM/WTM(1))                                             SCAL 109
      IF (ABS(CMF * DY1) - CLIP) 315,315,300                            SCAL 110
  300 CMF = CLIP / ABS(DY1)                                             SCAL 111
      GOTO 315                                                          SCAL 112
  305 IF (ABS(CMF * DY1) - P) 315,315,310                               SCAL 113
  310 CMF = P / ABS(DY1)                                                SCAL 114
  315 CMFF(1) = CMF                                                     SCAL 115
  320 DY(IK) = DY1                                                      SCAL 116
      IF(KR(6)) 322,321,321                                             SCAL 117
  321 RVL=AMAX1(.1,RV/2.)                                               SCAL 118
      CMF = AMIN1(CMF,WTG / ABS(ABS(DWTL - DWTG / WTG * WTL) / RVL - DWTSCAL 119
     1G))                                                               SCAL 120
  322 IF(KR(7)-1) 355,355,330                                           SCAL 121
  325 FORMAT (1X2(8X2HVN9X1HY8X2HDY7X5HSCALE7X1HE4X6H1FC IP)/(1XA4,5E    SCAL 122
     110.3,13,12,1X,A4,5E10.3,13,I2))                                   SCAL 123
  330 NQ = 1                                                            SCAL 124
  335 WRITE(KOUT,325)(FAMDA(J),VN(J),Y(J),DYA(J,LL),CMFF(J),E(J),IFC(J),SCAL 125
     1IP(J),J=1,NQ)                                                     SCAL 126
  340 WRITE(KOUT,345)(EB(I),I=1,15)                                     SCAL 127
      WRITE(KOUT,350)(X(I),I=1,15PQ)                                    SCAL 128
      WRITE(KOUT,345)(IB(I),I=1,15)                                     SCAL 129
  345 FORMAT(1015)                                                      SCAL 130
  350 FORMAT(8E12.4)                                                    SCAL 131
  355 CONTINUE                                                          SCAL 132
      IF (X(1)) 370,415,370                                             SCAL 133
  370 A1 = X(1) * CMF                                                   SCAL 134
      ABX = ABS(A(1))                                                   SCAL 135
      IF (ABS(A1) - .5) 380,380,375                                     SCAL 136
  375 CMF = .5 / ABX                                                    SCAL 137
      A1 = CMF * X(1)                                                   SCAL 138
  380 IF (A1) 390,415,385                                               SCAL 139
  385 TM = TMAX                                                         SCAL 140
      X1 = AMIN1(.2,X1)                                                 SCAL 141
      GOTO 395                                                          SCAL 142
  390 TM = TMIN                                                         SCAL 143
      X1 = AMAX1( - 0.2,X1)                                             SCAL 144
  395 DTM = (TM - T) / (TM * X1)                                        SCAL 145
      IF (DTM - 1.) 400,410,410                                         SCAL 146
  400 CMF = DTM * CMF                                                   SCAL 147
  405 T = TM                                                            SCAL 148
      GOTO 415                                                          SCAL 149
  410 T = T / (1. - X1)                                                 SCAL 150
```

```
415 AA = AA * EXP(CMF * X(2))
    RETURN
    END
```

```
SCAL 151      SUBROUTINE SQUEE  (A,I,IDEE)
SCAL 152      DIMENSION I(1)
SCAL 153      DATA LUS,INUS/1H*,1H-/
              I(1)=0
              I(3)=0
              B=ABS(A)*1.00000I
              IF(ABS(A)-1.E-10) 7,7,I
            1 IF(B-1.0) 3,2,2
            2 H=B/10.
              I(3) = I(3)+I
              GO TO 1
            3 IF(H-0.1) 4,5,5
            4 B=B*10.
              I(3) = I(3)-1
              GO TO 3
            5 I(1) = A*10.** (IDEE-I(3))*1.00000I
              IF(I(3)) 6,7,7
            6 I(2) = INUS
              GO TO 8
            7 I(2) = LUS
            8 I(3) = IABS(I(3))
              RETURN
              END
```

```
SQUE   1
SQUE   2
SQUE   3
SQUE   4
SQUE   5
SQUE   6
SQUE   7
SQUE   8
SQUE   9
SQUE  10
SQUE  11
SQUE  12
SQUE  13
SQUE  14
SQUE  15
SQUE  16
SQUE  17
SQUE  18
SQUE  19
SQUE  20
SQUE  21
SQUE  22
SQUE  23
SQUE  24
```

```
      SUBROUTINE SWAP(A,B,SLA,SLB)                                      SWAP   1
      DIMENSION A(16,1),B(1),SLA(16,1),SLB(1)                           SWAP   2
      DO 5 I=1,16                                                       SWAP   3
      B(I)=SLB(I)                                                       SWAP   4
      DO 5 J=1,16                                                       SWAP   5
    5 A(I,J)=SLA(I,J)                                                   SWAP   6
      RETURN                                                            SWAP   7
      END                                                               SWAP   8
                                                                        SWAP   9
```

```
      SUBROUTINE IMERM                                                  THER0001
      DIMENSION BLNK(30),BC(30),FKFD(4,3),EAKD(4,3),EXKO(4,3)           THER0002
      DIMENSION LINE(32),IA(19)                                         THER0003
C                                                                       THER0004
      INCLUDE INC1.LIST                                                 THER0005
C                                                                       THER0006
      INCLUDE INC3.LIST                                                 THER0007
      COMMON/CARKIN/ KRK(10),ROUCM,NCC                                  THER0008
      DATA (FKFD(I,1),I=1,4)/12.5,12.5,0.77,1.0/,(EAKO(I,1),I=1,4)/     THER0009
     14.6E+4,4.6E+4,5.55E+4,0.0/,(EXKD(I,1),I=1,4)/0.0,0.0,0.0,0.0/,    THER0010
     2(FKFD(I,2),I=1,4)/1.36E+4,1.36E+4,3.4E+6,1.0/,(EAKO(I,2),I=1,4)/  THER0011
     36.55E+4,6.55E+4,1.295E+5,0.0/,(EXKD(I,2),I=1,4)/0.0,0.0,0.0,0.0/, THER0012
     4(FKFD(I,3),I=1,4)/1.98E+5,1.98E+5,4.94E+7,1.0/,(EAKO(I,3),I=1,4)/ THER0013
     56.55E+4,6.55E+4,1.295E+5,0.0/,(EXKD(I,3),I=1,4)/0.0,0.0,0.0,0.0/  THER0014
      DATA IX/3H  I,3H  2,3H  3,3H  4,3H  5,3H  6,3H  7,3H  8,3H  9,    THER0015
     *3H   ,3H -1,3H -2,3H -3,3H -4,3H -5,3H -6,3H -7,3H -8,3H -9/      THER0016
      DATA IXY/3H --/                                                   THER0017
    5 MODE = KR(1)                                                      THER0018
      IF (ITS) 20,10,20                                                 THER0019
   10 WTG = 0.                                                          THER0020
      WTL = 0.                                                          THER0021
      IF(KR(8)) 17,17,11                                                THER0022
   11 IF(IFC(N+1)-1) 13,18,13                                           THER0023
   18 IF(T+.001-TF(N+1)) 13,13,14                                       THER0024
   13 IFC(N+1)=-1                                                       THER0025
      VN(N+1)=0.                                                        THER0026
   14 DO 16 K=1,15                                                      THER0027
   16 VNU(N+1,K)=-TQ(K,3)                                               THER0028
      WTL=-VN(N+1)                                                      THER0029
   17 DUM2=0.                                                           THER0030
      SUMN = 0.                                                         THER0031
      DO 15 I=1,15                                                      THER0032
      PNUS(I) = 0.                                                      THER0033
   15 SLAM(I) = 0.                                                      THER0034
   20 MMELT = 0.                                                        THER0035
      FLIQ = 0.                                                         THER0036
      SMELT = 0.                                                        THER0037
      MELT = 1                                                          THER0038
      TMIN=TTMIN                                                        THER0039
      TMAX=TTMAX                                                        THER0040
      TFMAX = 500.                                                      THER0041
      VA = ALOG(T / 3000.)                                              THER0042
      VB = T - 3000.                                                    THER0043
      VC = (T + 3000.) / 2.                                             THER0044
      VD = T * 3000.                                                    THER0045
      VE = VC / (VD * VD)                                               THER0046
      RT = 1.9869 * T                                                   THER0047
      IF (NCV) 35,35,25                                                 THER0048
   25 PIN = P * 10.E - 3                                                THER0049
      WM = 20.                                                          THER0050
```

```
      AA = P * WM                                                       THER0051
      IF (MODE) 35,35,30                                                THER0052
   30 T = 3000.                                                         THER0053
   35 CONTINUE                                                          THER0054
      I = 1                                                             THER0055
   40 DO 215 IK=1,N                                                     THER0056
      J=2                                                               THER0057
      IF (NCV) 55,55,45                                                 THER0058
   45 IF (IFC(I)) 55,50,55                                              THER0059
   50 VN(1) = VN(1) + PIN                                               THER0060
      Y(1) = ALOG(VN(1))                                                THER0061
   55 CONTINUE                                                          THER0062
      IF (IFC(I) + 1) 130,60,60                                         THER0063
   60 IF(IFC(I)) 65,70,95                                               THER0064
   65 IF (MODE - 1) 130,185,130                                         THER0065
   70 IF (ITS) 130,75,130                                               THER0066
   75 SUMN = SUMN + VN(I)                                               THER0067
      OUMI = WTM(I) * VN(I)                                             THER0068
      WTG = WTG + OUM1                                                  THER0069
      OUM2 = OUM2 + OUMI / FF(I)                                        THER0070
      IF (IK - IS) 80,80,85                                             THER0071
   80 PNUS(I) = VN(I)                                                   THER0072
      IF(KR(6)) 130,82,92                                               THER0073
   82 SLAM(I)=VN(I)/FF(I)                                               THER0074
      GOTO 130                                                          THER0075
   85 DO 90 K=1,IS                                                      THER0076
      OUMI = VNU(I,K) * VN(I)                                           THER0077
      IF(KR(6)) 90,87,90                                                THER0078
   87 SLAM(K)=SLAM(K)+OUM1/FF(I)                                        THER0079
   90 PNUS(K)=PNUS(K)+OUM1                                              THER0080
      IF(KR(6)) 130,130,92                                              THER0081
   92 DO 93 K=1,IS                                                      THER0082
   93 SLAM(K)=SLAM(K)+VLAM(I,K)*VN(I)                                   THER0083
   95 IF (IFC(I) - 1) 100,100,130                                       THER0084
  100 IF (ITS) 125,105,125                                              THER0085
  105 IF(KR(6)) 120,110,110                                             THER0086
  110 IF (T - TF(I) + .001) 115,115,120                                 THER0087
  115 IFC(I) = - I                                                      THER0088
      VN(I) = 0.                                                        THER0089
      GOTO 65                                                           THER0090
  120 WTL = WTL + VN(I) * WTM(I)                                        THER0091
  125 IF (MODE - 1) 130,180,130                                         THER0092
  180 TMIN = AMAX1(TMIN,TF(I))                                          THER0093
  185 TFMAX = AMAX1(TF(I) ,TFMAX)                                       THER0094
  130 IF (T - ABS(TU(I,1))) 135,140,140                                 THER0095
  135 J = 1                                                             THER0096
  140 CP(I) = RC(I,J) + T * RD(I,J) + RE(I,J) / (T * T)                 THER0097
      H(I) = RB(I,J) + VB * (RC(I,J) + RD(I,J) * VC + RE(I,J) / VD)     THER0098
      SB(I) = RE(I,J) + RC(I,J) * VA + VB * (RD(I,J) + RE(I,J) * VE)    THER0099
  145 IF (MODE - 2) 190,150,150                                         THER0100
  150 IF (IFC(1) - 1) 190,155,190                                       THER0101
  155 IF (TU(1,1)) 160,190,190                                          THER0102
  160 IF (T + TU(1,1)) 170,165,175                                      THER0103
  165 HMELT = - H(1) - HMELT                                            THER0104
      SMELT = - SB(1) - SMELT                                           THER0105
      MELT = I                                                          THER0106
      IF (J - 2) 190,135,190                                            THER0107
  170 TMAX = AMIN1(TMAX, - TU(I,1))                                     THER0108
      GOTO 190                                                          THER0109
  175 TMIN = AMAX1(TMIN, - TU(1,1))                                     THER0110
  190 TC(I) = - H(I) / RT                                               THER0111
      VLNK(I) = TC(I) + SB(I) / 1.9869                                  THER0112
      IF (IK - IS) 195,195,200                                          THER0113
  195 BLNK(I) = VLNK(I)                                                 THER0114
      IBC(I) = IFC(I)                                                   THER0115
      BC(I) = TC(I)                                                     THER0116
      GOTO 215                                                          THER0117
  200 DO 210 K=1,IS                                                     THER0118
      IF (IBC(K) + 1) 210,205,205                                       THER0119
  205 VLNK(I) = VLNK(I) - VNU(I,K) * BLNK(K)                            THER0120
      TC(I) = TC(I) - VNU(I,K) * BC(K)                                  THER0121
  210 CONTINUE                                                          THER0122
  215 I=I+1                                                             THER0123
      NCV = -IABS(NCV)                                                  THER0124
      IF (MODE - 1) 230,220,230                                         THER0125
  220 IF (TFMAX - T) 225,230,230                                        THER0126
  225 T = TFMAX                                                         THER0127
      IF(T-500.) 226,226,5                                              THER0128
  226 WRITE(KOUT,228)                                                   THER0129
      STOP                                                              THER0130
  228 FORMAT(////40H NO AVAILABLE SURFACE SPECIES. .  .STOP )           THER0131
  230 IF (ITS) 355,235,355                                              THER0132
  235 AA = P * WM                                                       THER0133
      NCV = 0                                                           THER0134
  240 FORMAT(8F10.6)                                                    THER0135
  245 FORMAT (213)                                                      THER0136
  250 FORMAT(3E10.4)                                                    THER0137
      IF(KR(9)-5) 335,255,255                                           THER0138
  255 IF (KRK(8)-4) 257,256,256                                         THER0139
  257 DO 258 I=1,IS                                                     THER0140
      RMU(I,1)=0.0                                                      THER0141
  258 PMU(I,1)=0.0                                                      THER0142
      IF (KRK(8)-2) 261,259,261                                         THER0143
  259 RMU(1,1)=1.0                                                      THER0144
      RMU(3,1)=1.0                                                      THER0145
      PMU(2,1)=2.0                                                      THER0146
      GO TO 263                                                         THER0147
  261 RMU(1,1)=1.0                                                      THER0148
      RMU(2,1)=2.0                                                      THER0149
      PMU(3,1)=1.0                                                      THER0150
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      GO TO 263                                                         THER0151
  256 DO 262 I=1,4                                                      THER0152
      DO 262 J=1,15                                                     THER0153
      RMU(J,1)=0.0                                                      THER0154
  262 PMU(J,I)=0.0                                                      THER0155
      RMU(3,1)=1.0                                                      THER0156
      RMU(5,1)=1.0                                                      THER0157
      PMU(2,1)=1.0                                                      THER0158
      PMU(4,1)=1.0                                                      THER0159
      RMU(1,2)=1.0                                                      THER0160
      RMU(5,2)=1.0                                                      THER0161
      PMU(4,2)=2.0                                                      THER0162
      RMU(2,3)=1.0                                                      THER0163
      RMU(5,3)=2.0                                                      THER0164
      PMU(2,3)=3.0                                                      THER0165
      PMU(3,3)=-2.0                                                     THER0166
      PMU(4,3)=2.0                                                      THER0167
      RMU(3,4)=1.0                                                      THER0168
      RMU(4,4)=1.0                                                      THER0169
      PMU(1,4)=1.0                                                      THER0170
      PMU(2,4)=1.0                                                      THER0171
  263 IF (KRK(7)) 266,264,266                                           THER0172
  266 IF (KRK(7)-2) 267,264,267                                         THER0173
  264 NICK=KRK(4)                                                       THER0174
      IF (KRK(8)-4) 268,269,269                                         THER0175
  268 MT=1                                                              THER0176
      IF (KRK(8)-2) 272,271,272                                         THER0177
  271 FKF(1)=FKFU(2,NICK)/ROUCM                                         THER0178
      EAK(1)=EAKU(2,NICK)                                               THER0179
      EXK(1)=EXKU(2,NICK)                                               THER0180
      GO TO 321                                                         THER0181
  272 FKF(1)=FKFU(3,NICK)/ROUCM                                         THER0182
      EAK(1)=EAKU(3,NICK)                                               THER0183
      EXK(1)=EXKU(3,NICK)                                               THER0184
      GO TO 321                                                         THER0185
  269 MT=4                                                              THER0186
      DO 273 I=1,4                                                      THER0187
      FKF(I)=FKFU(I,NICK)/ROUCM                                         THER0188
      EAK(I)=EAKU(I,NICK)                                               THER0189
  273 EXK(I)=EXKU(I,NICK)                                               THER0190
      GO TO 321                                                         THER0191
  267 IF (KRK(8)-4) 2672,2671,2672                                      THER0192
 2671 MT=4                                                              THER0193
      GO TO 2673                                                        THER0194
 2672 MT=1                                                              THER0195
 2673 DO 260 M=1,MT                                                     THER0196
      READ(KIN,250) FKF(M),EAK(M),EXK(M)                                THER0197
  260 FKF(M)=FKF(M)/ROUCM                                               THER0198
  265 FORMAT (//3X,7HKINETIC)                                           THER0199
  270 FORM  3X,11HREACTION=--,I7,9I10/(11X,10I10))                      THER0200
  275 FORMAT (/3X,8HREACTANT)                                           THER0201
  280 FORMAT (5X,12HCOEFFICIENTS/)                                      THER0202
  285 FORMAT(1X,24A4,2X,40A3)                                           THER0203
  286 FORMAT(11H *REACTION*,4013)                                       THER0204
  287 FORMAT(11X,40A3)                                                  THER0205
  290 FORMAT (/3X,7HPRODUCT)                                            THER0206
  295 FORMAT (/3X,12HPRE-EXPONENT)                                      THER0207
  300 FORMAT(5X,6HFACTOR,4X,1P10E11.3/(15X,1P10E11.3))                  THER0208
  305 FORMAT (/3X,10HACTIVATION)                                        THER0209
  310 FORMAT(5X,6HENERGY,4X,1P10E11.3/(15X,1P10E11.3))                  THER0210
  315 FORMAT(/3X,11HTEMPERATURE)                                        THER0211
  320 FORMAT(5X,8HEXPONENT,2X,1P10E11.3/(15X,1P10E11.3))                THER0212
  321 WRITE(KOUT,275)                                                   THER0213
      WRITE(KOUT,280)                                                   THER0214
      WRITE(KOUT,286) (M,M=1,MT)                                        THER0215
      WRITE(KOUT,287) (IAY,M=1,MT)                                      THER0216
      WRITE(KOUT,285)                                                   THER0217
      DO 325 I=1,15                                                     THER0218
      DO 324 M=1,MT                                                     THER0219
      IY=IFIX(RMU(I,M))                                                 THER0220
      IF (IY.EQ.0) IY=10                                                THER0221
      IF (IY.LT.0) IY=10+IABS(IY)                                       THER0222
  324 LINE(M)=IX(IY)                                                    THER0223
  325 WRITE(KOUT,285) FAMOA(I),FAMOB(I),(LINE(M),M=1,MT)                THER0224
      WRITE(KOUT,290)                                                   THER0225
      WRITE(KOUT,280)                                                   THER0226
      WRITE(KOUT,286) (M,M=1,M1)                                        THER0227
      WRITE(KOUT,287) (IAY,M=1,MT)                                      THER0228
      WRITE(KOUT,285)                                                   THER0229
      DO 330 I=1,15                                                     THER0230
      DO 329 M=1,MT                                                     THER0231
      IY=IFIX(PMU(I,M))                                                 THER0232
      IF (IY.EQ.0) IY=10                                                THER0233
      IF (IY.LT.0) IY=10+IABS(IY)                                       THER0234
  329 LINE(M)=IX(IY)                                                    THER0235
  330 WRITE(KOUT,285) FAMOA(I),FAMOB(I),(LINE(M),M=1,M1)                THER0236
      WRITE(KOUT,265)                                                   THER0237
      WRITE(KOUT,270)(M,M=1,MT)                                         THER0238
      WRITE(KOUT,295)                                                   THER0239
      WRITE(KOUT,300)(FKF(M),M=1,MT)                                    THER0240
      WRITE(KOUT,305)                                                   THER0241
      WRITE(KOUT,310)(EAK(M),M=1,MT)                                    THER0242
      WRITE(KOUT,315)                                                   THER0243
      WRITE(KOUT,320)(EXK(M),M=1,M1)                                    THER0244
  335 SUMN = SUMN / P                                                   THER0245
      SUML = ALOG(SUMN)                                                 THER0246
      FFF = WTG / OUM2                                                  THER0247
      RTG = WTG / SUMN                                                  THER0248
      WIL = WIL / SUMN                                                  THER0249
      DO 340 I=1,15                                                     THER0250
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```
      PNUS(I)=PNUS(I)/SUMN
  340 SLAM(I) = SLAM(I) / SUMN * FFF
      WS=W(2)+W(3)
      SUMC = 1.0
      IF (KRALP + KR(2)) 355,355,345
  345 IF (WTL / WTG - WS) 355,355,350
  350 SUMC = WTL / (WTG * WS)
      WTL = WTL / SUMC
  355 RETURN
      END
```

```
THER0251          SUBROUTINE ZIPIN                                          ZIPI   1
THER0252      C                                                             ZIPI   2
THER0253          INCLUDE INC1.LIST                                         ZIPI   3
THER0254      C                                                             ZIPI   4
THER0255          COMMON/ALE1/GAMEX,KEYN,PGM,ACMSW,SQMAK,SXP                ZIPI   5
THER0256      C                                                             ZIPI   6
THER0257          INCLUDE INC2.LIST                                         ZIPI   7
THER0258          COMMON/CARKIN/ KRK(10),ROUCH,NCC                          ZIPI   8
THER0259          COMMON/CONCHO/ Z,GAMER,WR(3)                              ZIPI   9
THER0260        5 FORMAT(10I1,6F10.5,2A4,A2)                                ZIPI  10
THER0261       10 FORMAT (2I3)                                              ZIPI  11
               15 FORMAT (8F10.5)                                           ZIPI  12
                  CALL ETIME                                                ZIPI  13
                  NFF = 0                                                   ZIPI  14
                  TTMIN=300.                                                ZIPI  15
                  TTMAX=20000.                                              ZIPI  16
                  Z = 0.0                                                   ZIPI  17
                  PR = 0.0                                                  ZIPI  18
                  KKJ=0                                                     ZIPI  19
                  PSV=P                                                     ZIPI  20
                  II=0                                                      ZIPI  21
                  IF (ITS + 1) 20,25,20                                     ZIPI  22
               20 GAMEX=0.0666667                                           ZIPI  23
                  W(1) = 1.0                                                ZIPI  24
                  W(2)=0.                                                   ZIPI  25
                  W(3)=0.                                                   ZIPI  26
                  MT=0                                                      ZIPI  27
                  MX = - 1                                                  ZIPI  28
                  NCV = 0                                                   ZIPI  29
                  NOAT = 0                                                  ZIPI  30
                  WM = 20.                                                  ZIPI  31
                  T=300.                                                    ZIPI  32
                  HIP = 0.                                                  ZIPI  33
                  SIP = 0.                                                  ZIPI  34
                  KR(10) = 0                                                ZIPI  35
               25 ITS = 0                                                   ZIPI  36
                  IDC = 1                                                   ZIPI  37
                  KRALP = 0                                                 ZIPI  38
                  KKJ = 0                                                   ZIPI  39
               30 WS = 1.0                                                  ZIPI  40
              135 KRW=KR(8)                                                 ZIPI  41
                  KR4=KR(4)                                                 ZIPI  42
                  CALL KININ                                                ZIPI  43
                  KKK(1) = KR(8)                                            ZIPI  44
                  WRITE(KOUT,140)FILE,KR                                    ZIPI  45
                  KR(8) = 0                                                 ZIPI  46
              140 FORMAT (1H1,4A3,5HGRAPHITE SURFACE KINETICS (GASKET) 2A4,A2,5X10I1) ZIPI  47
                  KRZZ = 0                                                  ZIPI  48
                  THT = 501.                                                ZIPI  49
                  KR(4) = KR(4) - 1                                         ZIPI  50
```

```
      IF (KR(4)) 150,145,145
145   IF (KR(6)) 155,155,150
150   KR(6) = KR(6) - 1
155   IF (KR(7)) 157,157,156
156   KR(7) = 5 * (KR(7) - 1) + 1
157   IF (ABS(WR(1)) + ABS(WR(2)) + ABS(WR(3))) 165,165,160
160   W(1)=WR(1)
      W(2)=WR(2)
      W(3)=WR(3)
      KRALP = 1
165   CONTINUE
210   IF (KR(1) - 5) 220,215,220
215   KR(1) = 0
      KR(8) = 1
220   MODE = KR(1)
      KRALP=KRALP+IABS(KR8-KR(8))+IABS(KR4-KR(4))
      SVA = 0.
      SVB = 0.
225   IFRZ = 0
      IF (MODE - 8) 235,230,235
230   STOP
235   IF(GAMER) 240,275,240
240   GAMER=SIGN(AMAX1(ABS(GAMER),0.0001),GAMER)
      IF(KR(3)) 250,250,245
245   IF(KR(3)-9) 272,250,272
250   J=1
      DO 270 IK=1,N
      FF(J) = FF(J) **(GAMER/GAMEX)
270   J=J+1
272   GAMEX=GAMER
275   IF (Z) 280,276,280
276   IF(MODE-4) 277,311,430
277   IF(MODE-3) 430,278,430
278   IF(KP(5)) 430,430,279
279   SIP=SXP
      GO TO 430
280   IF (MODE - 1) 285,285,300
285   T = Z
      IF (T) 290,295,295
290   T = - T
      IFRZ = 1
295   CONTINUE
      GOTO 430
300   IF (MODE - 2) 430,415,305
305   IF(MODE-4) 420,310,420
310   T = Z
311   MODE = 2
      KKJ=-1
      KR(5)=MAX0(KR(5),1)
      KR(1) = 2
      READ(KIN,315)KVM,UR,MTR,MSR,RMOR,SA1,PR1
      RMOR=-9999.
      PR1=-9999.
315   FORMAT (I1,F9.4,5F10.4)
      IF (UR) 325,330,320
320   SV1 = UR
      GOTO 330
325   SV1 = VEL
330   IF (MTR) 335,340,335
335   MCM = MTR / 1.8
340   IF (MSR) 345,360,345
345   IF (MSR + 9999.) 350,355,350
350   SM1 = MSR / 1.8
      GOTO 360
355   SM1 = MIP
360   IF (RMOR) 370,375,365
365   SR1 = RMOR
      GOTO 375
370   SR1 = RMO
375   IF (PR1) 385,390,380
380   SP1 = PR1
      GOTO 390
385   SP1 = P
390   GOTO(395,400,405),KVM
395   SV1 = SQRT( (MCM - SM1) * 90103.)
      GOTO 410
400   MCM = SM1 + SV1 / 90108. * SV1
      GOTO 410
405   SM1 = MCM - SV1 / 90108. * SV1
410   SA1 = SA1 / 57.29577
      SVA = (1.3146 * SR1 * SV1 * COS(SA1)) * * 2. / 90108.
      SVB = SVA * 2. / 1.9869
      SVC = (SV1 * COS(SA1)) * * 2. / 90108. + SM1
      SVD = SP1 + SVB / (1.3146 * SR1)
      P = SVD
      GOTO 430
415   MIP = Z
      GOTO 430
420   SIP = Z
      IF (SIP + 9999.) 430,425,430
425   SIP = SCM
      SQMAK=0.
      PSV=PCM
430   IF(PR) 431,440,435
431   KKJ=1
      ACMSQ=PR*PR
      GAME=GAM-1.0
      PR=PSV*((1.+GAME/2.*SQMAK)/(1.+GAME/2.*ACMSQ))**(GAM/GAME)
      KR(5)=1
435   P = PR
```

```
440 AA=P*RM                                                          ZIPI 151
    RETURN                                                           ZIPI 152
    END                                                              ZIPI 153
                                                                     ZIPI 154
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      REAL NFIA(1),NFIB(1),FFIN(1),TAU(30,30)                          INC1   1
      EQUIVALENCE (NFIA(1),A(1)), (NFIB(1),A(51)), (FFIN(1),A(101)),   INC1   2
     *(TAU(1),A(151))                                                  INC1   3
      DIMENSION TF(150),CIJ(150,1)                                     INC1   4
      DIMENSION A(1),VLAM(150,1)                                       INC1   5
C                                                                      INC1   6
      COMMON /SPECIE/ FAMUA(150),FAMUB(150),HB(150,2),HC(150,2),       INC1   7
     A                RD(150,2),RE(150,2),RF(150,2),TU(150,2),VN(150), INC1   8
     A                Y(150),WIM(150),VNU(150,30),FF(150),IFC(150),    INC1   9
     A                IP(150),CP(150),H(150),SB(150),TC(150),VLNK(150), INC1  10
     A                E(150),LAMI(150),GAMK(1,1)                       INC1  11
C                                                                      INC1  12
      COMMON /PARAM1/ KIN,KOUT,JAN,MUL,NAB,IDC,N,KKA(3),KR(10),TILE(3), INC1  13
     *                TTMIN,TTMAX,VISC,PR(1)                           INC1  14
C                                                                      INC1  15
      COMMON /PARAM2/ WM,SCM,RHO,VEL,BI,NFF,FFA,IS,ISP,P,T,SIP,HIP,    INC1  16
     B                EL,ENL,FLIQ,NQ,IFL,ISPQ,KHALP,CPF,IRE,IER,AA,ITS, INC1  17
     B                IN,IL,IT,MODE,HMELT,SMELT,TMAX,TMIN,MELT,SUMN,   INC1  18
     B                SUML,JC,HG,CPG,SVA,SVB,SVC,SVO,SUMC,NXC,SAI,     INC1  19
     B                VMACH,KRZZ,SPI,GAM,TMI,MA,DMCMI,HCM,NCV,THT,     INC1  20
     B                IFRZ,NOAT,SRI,IXG,SVI,KKJ,IXC,NXG,SHI,NOATO,     INC1  21
     B                SA2,FFF,W5,RV,CMF,V4,HOS,DUM1,DUM2,EP,IFCJC,     INC1  22
     B                ISP2,WTG,VMU2,WIL                                INC1  23
C                                                                      INC1  24
      COMMON /ARRAYS/ A(32,32),B(32),W(3),XC(50),XG(50),ZKE(30),       INC1  25
     C                TLO(10),OMCLO(10),WALJP(30),EB(30),ALP(30),      INC1  26
     C                GAMM(30),GAMF(30),TQ(30,3),TK(30,3),WAT(30),     INC1  27
     C                IR(30),IOAT(30),KAT(30),UM(30,30),EBL(30)        INC1  28
      EQUIVALENCE (TU(151),TF(1)), (VNU(1),CIJ(1))                     INC1  29
C                                                                      INC1  30
      COMMON /KINETA/ MT,FKF(50),EAK(50),EXK(50),PMU(30,50),RMU(30,50), INC1  31
     *                PMR(50)                                          INC1  32
C                                                                      INC1  33
      EQUIVALENCE (B(1),A(1)), (GAMK(1),VLAM(1))                       INC1  34
      END                                                              INC1  35

      COMMON /DIFFER/ IC(31),ALPT(30),C(30),SORCE(8),RA(2),IM(30),     INC2   1
     D                II,KK,J,VINT,YINT,JAT(10),LIM(30,30),FAMA(30),   INC2   2
     D                FAMB(30),KPHA(2)                                 INC2   3
C                                                                      INC2   4
      DIMENSION ATA(30),ATB(30),ATC(30)                                INC2   5
      EQUIVALENCE (TQ(1),ATA(1)), (TQ(31),ATB(1)), (TQ(61),ATC(1))     INC2   6
      END                                                              INC2   7


      COMMON /DIFFEP/ IB(31),FNU(30),PNUS(30),SLAM(30),BE(30),BY(30),  INC3   1
     D                IBC(30),JJ(30),SLB(32),SLA(32,32)                INC3   2
      END                                                              INC3   3
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C
      DIMENSION ALPTD(7,339),JATD(7,339),SORCD(8,339),AMOAD(339),
     *AMOBD(339),RAD(2,339),RBD(2,339),RCD(2,339),RDD(2,339),RED(2,339),
     *RFD(2,339),TUD(2,339),KPHAD(2,339)
C
      DIMENSION ALPTX(2373),JATX(2373),SORCX(2712),RAX(678),RBX(678),
     *RCX(678),RDX(678),REX(678),RFX(678),TUX(678),KPHAX(678)
C
      EQUIVALENCE  (ALPTX,ALPTD),  (JATX,JATD),  (SORCX,SORCD),
     *             (RAX,RAD),      (RBX,RBD),    (RCX,RCD),
     *             (RDX,RDD),      (REX,RED),    (RFX,RFD),
     *             (TUX,TUD),      (KPHAX,KPHAD)
C
      DATA (ALPTX(I),I=   1,  160)/
     * 1.. 2.. 0.. 0.. 0.. 0.. 0.. 2.. 0.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. ALPT   1
     * 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. ALPT   2
     * 0.. 0.. 0.. 2.. 2.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. ALPT   3
     * 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 2.. ALPT   4
     * 0.. 0.. 0.. 0.. 0.. 0.. 0.. 0.. 0.. 0.. 0.. 0.. 4.. 0.. 0.. 0.. ALPT   5
     * 0.. 0.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 0.. 0.. 0.. 0.. ALPT   6
     * 0.. 0.. 3.. 0.. 0.. 0.. 0.. 0.. 4.. 0.. 0.. 0.. 0.. 0.. 0.. 0.. ALPT   7
     * 1.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. ALPT   8
     * 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. ALPT   9
     * 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. 0.. 0.. 0./ ALPT  10
      DATA (ALPTX(I),I= 161,  304)/
     * 0.. 1.. 2.. 1.. 0.. 0.. 0.. 0.. 1.. 3.. 0.. 0.. 0.. 0.. 0.. 1.. ALPT  11
     * 1.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. ALPT  12
     * 0.. 0.. 0.. 0.. 1.. 3.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. ALPT  13
     * 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 0.. 0.. ALPT  14
     * 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 0.. ALPT  15
     * 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 2.. 0.. 0.. ALPT  16
     * 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. ALPT  17
     * 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 0.. 1.. ALPT  18
     * 1.. 1.. 0.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. 0.. 0.. 1.. 2.. 1./ ALPT  19
      DATA (ALPTX(I),I= 305,  464)/
     * 0.. 0.. 0.. 0.. 1.. 3.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. ALPT  20
     * 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. 0.. 0.. 0.. 0.. ALPT  21
     * 1.. 3.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. ALPT  22
     * 1.. 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. 0.. ALPT  23
     * 0.. 0.. 0.. 1.. 2.. 2.. 0.. 0.. 0.. 1.. 3.. 0.. 0.. 0.. 0.. 0.. ALPT  24
     * 0.. 1.. 3.. 3.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 0.. ALPT  25
     * 1.. 0.. 0.. 0.. 0.. 0.. 2.. 0.. 0.. 0.. 0.. 0.. 2.. 4.. 0.. 0.. ALPT  26
     * 0.. 0.. 0.. 0.. 2.. 6.. 0.. 0.. 0.. 0.. 2.. 2.. 0.. 0.. 0.. 0.. ALPT  27
     * 0.. 0.. 2.. 3.. 0.. 0.. 0.. 0.. 3.. 3.. 0.. 0.. 0.. 0.. 0.. 0.. ALPT  28
     * 3.. 3.. 3.. 0.. 0.. 0.. 0.. 3.. 3.. 6.. 0.. 0.. 0.. 0.. 3.. 6./ ALPT  29
      DATA (ALPTX(I),I= 465,  608)/
     * 3.. 0.. 0.. 0.. 0.. 5.. 9.. 0.. 0.. 0.. 0.. 0..10..14.. 0.. 0.. ALPT  30
     * 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. ALPT  31
     * 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 1.. 0.. ALPT  32
     * 2.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. ALPT  33
     * 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. ALPT  34
     * 0.. 0.. 1.. 2.. 0.. 0.. 0.. 0.. 0.. 1.. 2.. 2.. 0.. 0.. 0.. 0.. ALPT  35
     * 1.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 4.. 0.. 0.. 0.. 0.. 0.. 2.. 2.. ALPT  36
     * 0.. 0.. 0.. 0.. 0.. 3.. 3.. 0.. 0.. 0.. 0.. 0.. 4.. 4.. 0.. 0.. ALPT  37
     * 0.. 0.. 0.. 5.. 5.. 0.. 0.. 0.. 0.. 0.. 6.. 6.. 0.. 0.. 0.. 0./ ALPT  38
      DATA (ALPTX(I),I= 609,  768)/
     * 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 1.. 0.. 0.. 0.. 1.. ALPT  39
     * 1.. 3.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 2.. 1.. ALPT  40
     * 0.. 0.. 0.. 0.. 1.. 3.. 1.. 0.. 0.. 0.. 0.. 1.. 4.. 0.. 0.. 0.. ALPT  41
     * 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. ALPT  42
     * 1.. 2.. 0.. 0.. 0.. 0.. 0.. 1.. 2.. 1.. 0.. 0.. 0.. 0.. 1.. 3.. ALPT  43
     * 0.. 0.. 0.. 0.. 0.. 0.. 1.. 4.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. ALPT  44
     * 0.. 0.. 0.. 1.. 1.. 1.. 2.. 0.. 0.. 0.. 1.. 1.. 1.. 2.. 1.. 0.. ALPT  45
     * 0.. 1.. 1.. 3.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 1.. 0.. 0.. 0.. ALPT  46
     * 1.. 3.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. ALPT  47
     * 1.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. 0./ ALPT  48
      DATA (ALPTX(I),I= 769,  912)/
     * 0.. 0.. 1.. 2.. 1.. 1.. 0.. 0.. 0.. 1.. 2.. 2.. 0.. 0.. 0.. 0.. ALPT  49
     * 1.. 2.. 2.. 0.. 0.. 0.. 0.. 1.. 2.. 1.. 0.. 0.. 0.. 0.. 1.. 3.. ALPT  50
     * 0.. 0.. 0.. 0.. 0.. 1.. 3.. 1.. 0.. 0.. 0.. 0.. 1.. 3.. 3.. 1.. ALPT  51
     * 0.. 0.. 0.. 1.. 3.. 1.. 0.. 0.. 0.. 0.. 1.. 3.. 3.. 1.. 0.. 0.. ALPT  52
     * 0.. 1.. 4.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 2.. ALPT  53
     * 2.. 0.. 0.. 0.. 0.. 0.. 2.. 4.. 0.. 0.. 0.. 0.. 0.. 2.. 4.. 0.. ALPT  54
     * 0.. 0.. 0.. 0.. 2.. 4.. 1.. 0.. 0.. 0.. 0.. 2.. 2.. 0.. 0.. 0.. ALPT  55
     * 0.. 0.. 3.. 2.. 0.. 0.. 0.. 0.. 0.. 4..12.. 1.. 0.. 0.. 0.. 0.. ALPT  56
     * 4.. 2.. 0.. 0.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 1./ ALPT  57
      DATA (ALPTX(I),I= 913, 1072)/
     * 0.. 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 0.. 1.. 1.. 3.. 0.. ALPT  58
     * 0.. 0.. 0.. 1.. 3.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 3.. 1.. 0.. 0.. ALPT  59
     * 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 3.. 1.. 0.. 0.. 0.. 0.. 1.. ALPT  60
     * 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. ALPT  61
     * 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. ALPT  62
     * 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 2.. 1.. 0.. 0.. 0.. 0.. ALPT  63
     * 2.. 2.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. ALPT  64
     * 0.. 0.. 0.. 0.. 0.. 3.. 1.. 1.. 0.. 0.. 0.. 0.. 3.. 1.. 1.. 0.. ALPT  65
     * 0.. 0.. 0.. 3.. 3.. 0.. 0.. 0.. 0.. 4.. 1.. 0.. 0.. 0.. 0.. 0.. ALPT  66
     * 0.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 1./ ALPT  67
      DATA (ALPTX(I),I=1073,1216)/
     * 3.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. ALPT  68
     * 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. ALPT  69
     * 0.. 0.. 4.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. ALPT  70
     * 1.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 2.. 1.. 0.. 0.. 0.. 0.. 2.. 2.. ALPT  71
     * 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. ALPT  72
     * 0.. 0.. 0.. 3.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 3.. 3.. 0.. 0.. 0.. ALPT  73
     * 0.. 3.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. ALPT  74
     * 1.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. ALPT  75
     * 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0./ ALPT  76
      DATA (ALPTX(I),I=1217,1376)/
     * 0.. 0.. 2.. 2.. 2.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. 0.. ALPT  77
     * 2.. 2.. 0.. 0.. 0.. 0.. 0.. 3.. 1.. 0.. 0.. 0.. 0.. 0.. 4.. 2.. ALPT  78
     * 0.. 0.. 0.. 0.. 0.. 4.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. ALPT  79
     * 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. ALPT  80
     * 0.. 2.. 0.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. ALPT  81
     * 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. ALPT  82
     * 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. ALPT  83
     * 0.. 0.. 2.. 3.. 0.. 0.. 0.. 0.. 0.. 0.. 2.. 4.. 0.. 0.. 0.. 0.. ALPT  84
     * 2.. 5.. 0.. 0.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. ALPT  85
     * 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. 0.. 3.. 0.. 0.. 0./ ALPT  86
      DATA (ALPTX(I),I=1377,1520)/
     * 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 2.. 0.. 0.. 0.. 0.. 0.. ALPT  87
     * 0.. 3.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 2.. 2.. 0.. 0.. 0.. 0.. 1.. ALPT  88
     * 2.. 1.. 0.. 0.. 0.. 0.. 1.. 2.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. ALPT  89
     * 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 2.. 6.. 0.. 0.. 0.. ALPT  90
     * 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 0.. ALPT  91
     * 1.. 4.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 2.. ALPT  92
     * 1.. 1.. 0.. 0.. 0.. 0.. 2.. 1.. 4.. 0.. 0.. 0.. 0.. 1.. 3.. 1.. ALPT  93
     * 0.. 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. ALPT  94
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* 0.. 3.. 1.. 2.. 3.. 0.. 0.. 0.. 3.. 2.. 1.. 3.. 0.. 0.. 0.. 3./   ALPT  95
 DATA (ALPTX(I),I=1521,1680)/
* 3.. 3.. 0.. 0.. 0.. 0.. 1.. 1.. 3.. 0.. 0.. 0.. 0.. 0.. 1.. 1.,   ALPT  96
* 0.. 0.. 0.. 1.. 2.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.,   ALPT  97
* 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 0..   ALPT  98
* 1.. 1.. 3.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 1.,   ALPT  99
* 1.. 0.. 0.. 0.. 0.. 3.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.,   ALPT 100
* 0.. 0.. 0.. 4.. 2.. 0.. 0.. 0.. 0.. 4.. 1.. 2.. 0.. 0.. 0.. 0.,   ALPT 101
* 0.. 2.. 2.. 0.. 0.. 0.. 0.. 0.. 2.. 4.. 0.. 0.. 0.. 0.. 0.. 1.,   ALPT 102
* 3.. 0.. 0.. 0.. 0.. 0.. 1.. 4.. 1.. 0.. 0.. 0.. 0.. 1.. 2.. 0..   ALPT 103
* 0.. 0.. 0.. 0.. 1.. 3.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.,   ALPT 104
* 0.. 0.. 2.. 2.. 0.. 0.. 0.. 0.. 0.. 2.. 2.. 0.. 0.. 0.. 0.. 0./   ALPT 105
 DATA (ALPTX(I),I=1681,1824)/
* 1.. 2.. 1.. 0.. 0.. 0.. 0.. 2.. 4.. 4.. 0.. 0.. 0.. 0.. 1.. 1.,   ALPT 106
* 2.. 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.,   ALPT 107
* 0.. 0.. 0.. 2.. 2.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.,   ALPT 108
* 0.. 1.. 2.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. 0.. 1..   ALPT 109
* 3.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 2.. 0..   ALPT 110
* 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.,   ALPT 111
* 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. 0.. 0.. 0.. 0.,   ALPT 112
* 2.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 2.,   ALPT 113
* 0.. 0.. 0.. 0.. 0.. 2.. 4.. 0.. 0.. 0.. 0.. 0.. 2.. 6.. 0.. 0./   ALPT 114
 DATA (ALPTX(I),I=1825,1984)/
* 0.. 0.. 0.. 2.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. 0.. 0..   ALPT 115
* 0.. 2.. 2.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. 1.. 0.. 0.. 0.. 0.. 1.,   ALPT 116
* 1.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 2.. 3.. 1..   ALPT 117
* 0.. 0.. 0.. 0.. 3.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 6.. 0.. 0.. 0..   ALPT 118
* 0.. 0.. 3.. 1.. 1.. 0.. 0.. 0.. 2.. 0.. 0.. 0.. 0.. 0.. 0.. 0.,   ALPT 119
* 2.. 0.. 0.. 0.. 0.. 0.. 0.. 2.. 0.. 0.. 0.. 0.. 0.. 0.. 2.. 0..   ALPT 120
* 0.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 3.. 0.. 0.. 0..   ALPT 121
* 0.. 0.. 0.. 2.. 4.. 1.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 0..   ALPT 122
* 0.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 2.. 0.. 0.. 0.. 0.. 0.. 1.. 0..   ALPT 123
* 0.. 3.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 3.. 3.. 0./   ALPT 124
 DATA (XLPTX(I),I=1985,2128)/
* 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 2.. 2.. 0.. 0.. 0.. 0..   ALPT 125
* 0.. 0.. 1.. 4.. 1.. 0.. 0.. 0.. 0.. 1.. 4.. 1.. 4.. 0.. 0.. 0..   ALPT 126
* 1.. 1.. 4.. 0.. 0.. 0.. 0.. 1.. 2.. 2.. 0.. 0.. 0.. 0.. 1.. 3..   ALPT 127
* 0.. 0.. 0.. 0.. 0.. 1.. 3.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0..   XLPT 128
* 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 2.. 5.. 1.. 0.. 0.. 0..   ALPT 129
* 0.. 3.. 4.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.,   ALPT 130
* 0.. 0.. 0.. 0.. 0.. 0.. 3.. 1.. 0.. 0.. 0.. 0.. 4.. 3.. 0.. 0..   ALPT 131
* 0.. 0.. 0.. 0.. 2.. 4.. 1.. 0.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0..   ALPT 132
* 0.. 0.. 2.. 3.. 0.. 0.. 0.. 0.. 1.. 0.. 0.. 0.. 0.. 0.. 0.. 0./   ALPT 133
 DATA (ALPTX(I),I=2129,2288)/
* 2.. 3.. 0.. 0.. 0.. 0.. 0.. 1.. 4.. 0.. 0.. 0.. 0.. 0.. 1.. 0..   XLPT 134
* 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 2.. 0.. 0.,   ALPT 135
* 0.. 0.. 0.. 3.. 2.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.,   ALPT 136
* 0.. 1.. 1.. 0.. 0.. 0.. 0.. 1.. 1.. 1.. 0.. 0.. 0.. 0.. 2.. 0..   ALPT 137
* 1.. 0.. 0.. 0.. 0.. 0.. 2.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 0.. 0..   ALPT 138
* 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. 0.. 0.. 0.. 1.. 2.. 0.. 0.. 0..   ALPT 139
* 0.. 0.. 1.. 2.. 0.. 0.. 0.. 0.. 0.. 2.. 3.. 1.. 0.. 0.. 0.. 0..   ALPT 140
* 2.. 1.. 4.. 0.. 0.. 0.. 0.. 4.. 2.. 7.. 0.. 0.. 0.. 0.. 6.. 2..   ALPT 141
*18.. 0.. 0.. 0.. 0.. 8.. 2..13.. 0.. 0.. 0.. 0.. 2.. 4.. 4.. 0..   ALPT 142
* 0.. 0.. 0.. 1.. 2.. 3.. 0.. 0.. 0.. 0.. 1.. 3.. 1.. 3.. 0.. 0./   ALPT 143
 DATA (ALPTX(I),I=2269,2373)/
* 0.. 1.. 4.. 2.. 0.. 0.. 0.. 0.. 6..13.. 2.. 0.. 0.. 0.. 0.. 2..   ALPT 144
* 3.. 6.. 0.. 0.. 0.. 0.. 3.. 3.. 3.. 0.. 0.. 0.. 0..10..14.. 0..   ALPT 145
* 0.. 0.. 0.. 0.. 1.. 1.. 0.. 0.. 0.. 0.. 0.. 1.. 1.. 2.. 0.. 0..   ALPT 146
* 0.. 0.. 1.. 3.. 3.. 0.. 0.. 0.. 0.. 5.. 9.. 0.. 0.. 0.. 0.. 0..   ALPT 147
* 1.. 4.. 1.. 0.. 0.. 0.. 0.. 1.. 4.. 1.. 0.. 0.. 0.. 0.. 2.. 5..   ALPT 148
```

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* 2.. 0.. 0.. 0.. 0./                                                ALPT 149
 DATA (JATX (I),I=   1, 160)/
* 6.  8.  0.  0.  0.  0.  0.  0.  1.  0.  0.  0.  0.  0.  0.  1.  8.   JAT   1
* 0.  0.  0.  0.  0.  6.  8.  0.  0.  0.  0.  0.106.  0.  0.  0.  0.   JAT   2
* 0.  0.  0.  6.  1.  0.  0.  0.  0.  0.  0. 17.  1.  0.  0.  0.  0.   JAT   3
* 0.  9.  1.  0.  0.  0.  0.  0.  0.  6.  0.  0.  0.  0.  0.  0.  6.   JAT   4
* 0.  0.  0.  0.  0.  0.  0.  6.  0.  0.  0.  0.  0.  0.  0.  6.  0.   JAT   5
* 0.  0.  0.  0.106.  0.  0.  0.  0.  0.  0.  0.106.  0.  0.  0.  0.   JAT   6
* 0.  0.106.  0.  0.  0.  0.  0.  0.  0.106.  0.  0.  0.  0.  0.  0.   JAT   7
* 13.  0.  0.  0.  0.  0.  0.  0.  6.  13.  0.  0.  0.  0.  0.  13. 17.   JAT   8
* 0.  0.  0.  0.  0.  0. 13. 17.  9.  0.  0.  0.  0.  0. 13. 17.  9.  0.   JAT   9
* 0.  0.  0. 13. 17.  8.  0.  0.  0.  0.  0. 13. 17.  0.  0.  0.  0/   JAT  10
 DATA (JATX (I),I= 161, 304)/
* 0. 13. 17.  9.  0.  0.  0.  0. 13. 17.  0.  0.  0.  0.  0. 13.   JAT  11
* 9.  0.  0.  0.  0.  0. 13.  9.  8.  0.  0.  0.  0. 13.  9.  0.   JAT  12
* 0.  0.  0.  0. 13.  9.  0.  0.  0.  0.  0. 13.  1.  0.  0.  0.   JAT  13
* 0.  0.995.  1.  8.  0.  0.  0.  0. 13.  1.  8.  0.  0.  0.  0.   JAT  14
* 13.  7.  0.  0.  0.  0.  0. 13.  8.  0.  0.  0.  0.  0. 13. 17.   JAT  15
* 0.  0.  0.  0.  0. 13.  0.  0.  0.  0.  0.  0. 13.  8.  0.  0.   JAT  16
* 0.  0.  0.  5.  0.  0.  0.  0.  0.  0.  5. 17.  0.  0.  0.  0.   JAT  17
* 0.  5. 17.  9.  0.  0.  0.  0.  5. 17.  9.  0.  0.  0.  5.  0.   JAT  18
* 17.  8.  0.  0.  0.  0.  5. 17.  0.  0.  0.  0.  0.  5. 17.  9/   JAT  19
 DATA (JATX (I),I= 305, 464)/
* 0.  0.  0.  0.  5. 17.  0.  0.  0.  0.  0.  5.  9.  0.  0.  0.   JAT  20
* 0.  0.  5.  9.  8.  0.  0.  0.  0.  5.  9.  0.  0.  0.  0.  0.   JAT  21
* 5.  9.  0.  0.  0.  0.  0.  5.  1.  0.  0.  0.  0.  5.  1.  0.   JAT  22
* 8.  0.  0.  0.  0.  5.  1.  0.  0.  0.  0.  0.  5.  1.  0.  0.   JAT  23
* 0.  0.  0.  5.  1.  8.  0.  0.  0.  0.  0.  5.  1.  0.  0.  0.   JAT  24
* 0.  5.  1.  8.  0.  0.  0.  0.  5.  7.  0.  0.  0.  0.  5.  1.   JAT  25
* 8.  0.  0.  0.  0.  0.  5.  0.  0.  0.  0.  0.  5. 17.  0.  0.   JAT  26
* 0.  0.  0.  0.  5.  1.  0.  0.  0.  0.  0.  5.  8.  0.  0.  0.   JAT  27
* 0.  0.  5.  8.  0.  0.  0.  0.  0.  5. 17.  8.  0.  0.  0.  0.   JAT  28
* 5.  9.  8.  0.  0.  0.  0.  0.  5.  1.  8.  0.  0.  0.  5.  1/   JAT  29
 DATA (JATX (I),I= 465, 608)/
* 7.  0.  0.  0.  0.  5.  1.  0.  0.  0.  0.  0.  5.  1.  0.  0.   JAT  30
* 0.  0.  0.  4.  0.  0.  0.  0.  0.  0.  0.  6.  4.  0.  0.  0.   JAT  31
* 0.  4. 17.  0.  0.  0.  0.  0.  4. 17.  9.  0.  0.  0.  0.  4.   JAT  32
* 17.  0.  0.  0.  0.  0.  4.  9.  0.  0.  0.  0.  0.  4.  9.  0.   JAT  33
* 0.  0.  0.  0.996.  1.  0.  0.  0.  0.  0.  4.  1.  0.  0.  0.   JAT  34
* 0.  0.  4.  1.  0.  0.  0.  0.  0.  4.  1.  8.  0.  0.  0.  0.   JAT  35
* 4.  8.  0.  0.  0.  0.  0.  4. 17.  0.  0.  0.  0.  4.  8.  0.   JAT  36
* 0.  0.  0.  0.  0.  4.  8.  0.  0.  0.  0.  0.  4.  8.  0.  0.   JAT  37
* 0.  0.  0.  4.  8.  0.  0.  0.  0.  0.  4.  8.  0.  0.  0.  0/   JAT  38
 DATA (JATX (I),I= 609, 760)/
* 0.  6. 17.  0.  0.  0.  0.  0.  6. 17.  9.  8.  0.  0.  0.  0.   JAT  39
* 17.  9.  0.  0.  0.  0.  0.  6. 17.  7.  0.  0.  0.  0.  6. 17.   JAT  40
* 0.  0.  0.  0.  6. 17.  9.  0.  0.  0.  0.  6. 17.  0.  0.  0.   JAT  41
* 0.  0.  6.  9.  0.  0.  0.  0.  0.  0.  6.  9.  7.  0.  0.  0.   JAT  42
* 6.  9.  0.  0.  0.  0.  0.  6.  9.  8.  0.  0.  0.  0.  6.  9.   JAT  43
* 0.  0.  0.  0.  0.  0.  6.  9.  0.  0.  0.  0.  6.  1.  0.  0.   JAT  44
* 0.  0.  0.  6.  1. 17.  9.  0.  0.  0.  0.  6.  1. 17.  9.  0.   JAT  45
* 1.  9.  0.  0.  0.  0.  0.  6.  1.  7.  0.  0.  0.  0.  6.  1.   JAT  46
* 8.  0.  0.  0.  6.  1.  8.  0.  0.  0.  0.  6.  1.  0.  0.  0/   JAT  48
 DATA (JATX (I),I= 769, 912)/
* 0.  0.  6.  1. 17.  9.  0.  0.  0.  6.  1. 17.  0.  0.  0.  0.   JAT  49
* 6.  1.  9.  0.  0.  0.  0.  6.  1.  8.  0.  0.  0.  0.  6.  1.   JAT  50
* 0.  0.  0.  0.  0.  6.  1. 17.  0.  0.  0.  6.  1. 17. 14.   JAT  51
* 0.  0.  0.  6.  1.  9.  0.  0.  0.  0.  6.  1.  9. 14.  0.  0.   JAT  52
* 0.  6.  1.  0.  0.  0.  0.  0.  6.  7.  0.  0.  0.  0.  0.  6.   JAT  53
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     *  9,  0,  0,  0,  0,  0,  6,  9,  0,  0,  0,  0,  0,  6,  1,  0,  0,JAT   54
     *  0,  0,  0,  0,  6,  1,  8,  0,  0,  0,  0,  6,  7,  0,  0,  0,  0,JAT   55
     *  0,  0,  6,  8,  0,  0,  0,  0,  0,  6,  1, 14,  0,  0,  0,  0,  0,JAT   56
     *  6,  7,  0,  0,  0,  0,  0,  9, 17,  0,  0,  0,  0,  0,  0,  0, 17,  9/JAT   57
      DATA (JATX (1),I= 913,1072)/
     *  0,  0,  0,  0,  0, 17,  9,  3,  0,  0,  0,  0,  0, 17,  9,  8,  0,  0,JAT   58
     *  0,  0,  0, 17,  9,  0,  0,  0,  0,  0,  0, 17,  9, 14,  0,  0,  0,  0,JAT   59
     *  0, 17,  1,  8,  0,  0,  0,  0, 17,  1, 14,  0,  0,  0,  0,  0, 17,  0,JAT   60
     *  3,  0,  0,  0,  0,  0, 17,  3,  8,  0,  0,  0,  0,  0,  0, 17,  7,  8,JAT   61
     *  0,  0,  0,  0,  0, 17,  8,  0,  0,  0,  0,  0,  0, 17,  8,  0,  0,  0,JAT   62
     *  0,  0,  0, 17, 14,  0,  0,  0,  0,  0, 17,  1, 14,  0,  0,  0,  0,  0,JAT   63
     * 17,  3,  0,  0,  0,  0,  0,  0, 17,  8,  0,  0,  0,  0,  0,  0, 17, 14,JAT   64
     *  0,  0,  0,  0,  0,  0,  0, 17,  9, 14,  0,  0,  0,  0,  0, 17,  1, 14,JAT   65
     *  0,  0,  0,  0, 17,  3,  0,  0,  0,  0,  0, 17, 14,  0,  0,  0,  0,  0,JAT   66
     *  0,  0,  9,  0,  0,  0,  0,  0,  0,  9,  1,  8,  0,  0,  0,  0,  0,  9/JAT   67
      DATA (JATX (1),I=1073,1216)/
     *  1, 14,  0,  0,  0,  0,  0,  9,  3,  0,  0,  0,  0,  0,  0,  9,  3,  8,JAT   68
     *  0,  0,  0,  0,  0,  9,  7,  0,  0,  0,  0,  0,  0,  9,  7,  8,  0,  0,JAT   69
     *  0,  0,  0,  9, 14,  0,  0,  0,  0,  0,  0,  9,  8,  0,  0,  0,  0,  0,JAT   70
     *  0,  9, 14,  0,  0,  0,  0,  0,  0,  9,  1, 14,  0,  0,  0,  0,  0,  9,JAT   71
     *  3,  0,  0,  0,  0,  0,  9,  8,  0,  0,  0,  0,  0,  9, 14,  0,  0,  0,JAT   72
     *  0,  0,  0,  0,  9,  1, 14,  8,  0,  0,  0,  0,  0,  9,  3,  0,  0,  0,JAT   73
     *  0,  0,  9,  7,  0,  0,  0,  0,  0,  1,  0,  0,  0,  0,  0,  0,  0,  1,JAT   74
     *  3,  0,  0,  0,  0,  0,  1,  3,  8,  0,  0,  0,  0,  1,  7,  0,  0,JAT   75
     *  0,  0,  0,  0,  0,  1,  8,  0,  0,  0,  0,  0,  0,  1, 14,  0,  0,  0/JAT   76
      DATA (JATX (1),I=1217,1376)/
     *  0,  0,  0,  1,  3,  8,  0,  0,  0,  0,  0,  1,  7,  0,  0,  0,  0,  0,JAT   77
     *  0,  1,  8,  0,  0,  0,  0,  0,  0,  1,  7,  0,  0,  0,  0,  0,  1,  7,JAT   78
     *  0,  0,  0,  0,  0,  0,  0,  1, 14,  0,  0,  0,  0,  0,  0,  3,  0,  0,JAT   79
     *  0,  0,  0,  0,  3,  7,  8,  0,  0,  0,  0,  0,  3,  8,  0,  0,  0,  0,JAT   80
     *  0,  0,  3,  0,  0,  0,  0,  0,  0,  3,  8,  0,  0,  0,  0,  0,  0,  7,JAT   81
     *  0,  0,  0,  0,  0,  0,  0,  7,  8,  0,  0,  0,  0,  0,  0,  7,  8,  0,JAT   82
     *  0,  0,  0,  0,  0,  7, 14,  0,  0,  0,  0,  0,  0,  7,  8,  0,  0,  0,JAT   83
     *  0,  0,  0,  7,  8,  0,  0,  0,  0,  0,  7,  8,  0,  0,  0,  0,  0,  0,JAT   84
     *  0,  7,  8,  0,  0,  0,  0,  0,  8,  0,  0,  0,  0,  0,  0,  8, 14,  0,JAT   85
     *  0,  0,  0,  0,  0,  0,  8, 14,  0,  0,  0,  0,  0,  0,  8,  0,  0,  0/JAT   86
      DATA (JATX (1),I=1377,1520)/
     *  0,  0,  0, 14,  0,  0,  0,  0,  0,  0, 14,  0,  0,  0,  0,  0,  0,  0,JAT   87
     *  0, 14,  3,  0,  0,  0,  0,  0,  6, 17,  9,  0,  0,  0,  0,  0,  5,  0,JAT   88
     *  9,  1,  0,  0,  0,  0,  5,  9,  8,  0,  0,  0,  0,  6, 17,  8,  0,  0,JAT   89
     *  0,  0,  0,  0,  6,  9,  8,  0,  0,  0,  0,  6,  9,  8,  0,  0,  0,  0,JAT   90
     *  0,  0,  9,  7,  8,  0,  0,  0,  0,  5,  3,  8,  0,  0,  0,  0,  0,  0,JAT   91
     * 13,  9,  3,  0,  0,  0,  0,  6,  5,  0,  0,  0,  0,  0,  5,  9,  3,  0,JAT   92
     *  1,  8,  0,  0,  0,  5,  4,  8,  0,  0,  0,  0,  4,  9,  3,  0,  0,  0,JAT   93
     *  0,  0,  0, 17,  7,  8,  0,  0,  0,  0,  9,  7,  0,  0,  0,  0,  0,  0,JAT   94
     *  0,  5,  9,  1,  8,  0,  0,  0,  5,  9,  1,  8,  0,  0,  0,  5/JAT   95
      DATA (JATX (1),I=1521,1680)/
     *  1,  8,  0,  0,  0,  0,  0,  9,  7,  8,  0,  0,  0,  0,  1,  7,  8,  0,JAT   96
     *  0,  0,  0,  0,  5,  8,  0,  0,  0,  0,  0,  0,  4,  7,  0,  0,  0,  0,JAT   97
     *  0,  0,997,  1,  8,  0,  0,  0,  0,  1,  7,  8,  0,  0,  0,  0,  0,  0,JAT   98
     *  1,  7,  8,  0,  0,  0,  0,  4,  8,  0,  0,  0,  0,  0,  0,  9,  8,  0,JAT   99
     * 14,  0,  0,  0,  0,  9, 14,  0,  0,  0,  0,  0,  0, 13,  1,  8,  0,  0,JAT  100
     *  0,  0,  0,  9,  7,  0,  0,  0,  0,  0,  0,  1,  8,  0,  0,  0,  0,  0,JAT  101
     *  0,  3,  8,  0,  0,  0,  0,  0,  5,  9,  0,  0,  0,  0,  0,  7,  0,  0,JAT  102
     *  8,  0,  0,  0,  0,  0,  6,  9,  8,  0,  0,  0,  0,  0,  6, 17,  0,  0,JAT  103
     *  0,  0,  0,  0,  6, 17,  0,  0,  0,  0,  0,  0,998,  1,  0,  0,  0,  0,JAT  104
     *  0,  0,  9,  7,  0,  0,  0,  0,  0,  1,  7,  8,  0,  0,  0,  0,  0/JAT  105
      DATA (JATX (1),I=1681,1824)/
     *  5, 17,  1,  0,  0,  0,  0,  5,  1,  8,  0,  0,  0,  0,  0, 13,  5,  0,JAT  106
     *  8,  2,  0,  0,  0,  5,  4,  8,  0,  0,  0,  0,  5,  8,  0,  0,  0,  0,JAT  107
     *  0,  0,  0,  4,  9,  8,  0,  0,  0,  0,999,  1,  0,  0,  0,  0,  0,JAT  108
     *  0,  6,  7,  0,  0,  0,  0,  0,  0,  6,  8,  0,  0,  0,  0,  0, 17,  0,JAT  109
     *  9,  0,  0,  0,  0,  0,  4,  1,  0,  0,  0,  0,  0,  0,  9,  8,  0,  0,JAT  110
     *  0,  0,  0,  0,  3,  7,  8,  0,  0,  0,  0,  0,  6,  1,  0,  0,  0,  0,JAT  111
     *  0,  0,  6, 14,  0,  0,  0,  0,  0,  0,  6, 14,  0,  0,  0,  0,  0,  0,JAT  112
     *  6,  7,  0,  0,  0,  0,  0,  0,  6, 14,  0,  0,  0,  0,  0,  7, 14,  0,JAT  113
     *  0,  0,  0,  0,  0,  6, 17,  0,  0,  0,  0,  0,  0,  6, 17,  0,  0/JAT  114
      DATA (JATX (1),I=1825,1984)/
     *  0,  0,  0,  6,  1,  9,  0,  0,  0,  0,  0, 13,  8,  0,  0,  0,  0,JAT  115
     *  0,  6, 17,  0,  0,  0,  0,  0,  6,  1,  9, 17,  0,  0,  0,  0,  6,JAT  116
     *  1, 17,  0,  0,  0,  0,  0,  6,  1,  9,  0,  0,  0,  0,  6,  9,  7,JAT  117
     *  0,  0,  0,  0, 17, 14,  0,  0,  0,  0,  0,  0, 13,  9,  0,  0,  0,JAT  118
     *  0,  0,  9,  7,  8,  0,  0,  0,  0,  0,  9,  0,  0,  0,  0,  0,  0,JAT  119
     * 17,  0,  0,  0,  0,  0,  0,  0,  7,  0,  0,  0,  0,  0,  0,  8,  0,JAT  120
     *  0,  0,  0,  0,  0,  6,  7,  8,  0,  0,  0,  0,  0,  7,  0,  0,  0,JAT  121
     *  0,  0,  0,  5,  9,  8,  0,  0,  0,  0,  0, 18,  0,  0,  0,  0,  0,JAT  122
     *  0,  2,  0,  0,  0,  0,  0,  0,  3,  8,  0,  0,  0,  0,  0, 13,  0,JAT  123
     *  9,  3,  0,  0,  0,  0, 13, 17,  8,  0,  0,  0,  0,  5,  1,  0/JAT  124
      DATA (JATX (1),I=1985,2128)/
     *  0,  0,  0,  0,  6, 14,  0,  0,  0,  0,  0,  6,  3,  0,  0,  0,  0,JAT  125
     *  0,  0, 17,  1,  7,  0,  0,  0,  0,  0, 17,  1,  7,  8,  0,  0,  0,JAT  126
     * 17,  3,  8,  0,  0,  0,  0,  4,  1,  8,  0,  0,  0,  0, 13, 17,  0,JAT  127
     *  0,  0,  0,  0,  0, 13,  9,  0,  0,  0,  0,  0,  0, 13,  3,  8,  0,JAT  128
     *  0,  0,  0, 13,  7,  0,  0,  0,  0,  0, 13,  8, 14,  0,  0,  0,  0,JAT  129
     *  0,  6, 13,  0,  0,  0,  0,  0,  5,  7,  0,  0,  0,  0,  0,  3,  0,JAT  130
     *  0,  0,  0,  0,  0,  3,  7,  0,  0,  0,  0,  0,  0,  7, 14,  0,  0,JAT  131
     *  0,  0,  0,  0,  4,  8, 14,  0,  0,  0,  0, 13,  0,  0,  8,  0,  0,JAT  132
     *  0,  0, 13,  8,  0,  0,  0,  0,  0,  5,  0,  0,  0,  0,  8,  0,  0/JAT  133
      DATA (JATX (1),I=2129,2288)/
     *  5,  8,  0,  0,  0,  3,  0,  6,  5,  0,  0,  0,  0,  0,  4,  0,  0,JAT  134
     *  0,  0,  0,  0,  0,  4,  8,  0,  0,  0,  0,  0,  0,  6,  4,  8,  0,JAT  135
     *  0,  0,  0,  4,  7,  0,  0,  0,  0,  0, 17,  3,  0,  0,  0,  0,  0,JAT  136
     *  0,  9,  3,  0,  0,  0,  0,  0,  1,  3,  8,  0,  0,  0,  0,  3,  0,JAT  137
     *  8,  0,  0,  0,  0,  0,  8, 14,  0,  0,  0,  0,  0, 14,  0,  0,  0,JAT  138
     *  0,  0,  0,  0,  5,  3,  8,  0,  0,  0,  0,  4, 17,  0,  0,  0,  0,JAT  139
     *  0,  0,  4,  9,  0,  0,  0,  0,  0,  3,  0, 14,  0,  0,  0,  0,  0,JAT  140
     * 13,  4,  8,  0,  0,  0,  0,  5,  3,  8,  0,  0,  0,  0,  5,  3,  0,JAT  141
     *  8,  0,  0,  0,  0,  5,  3,  8,  0,  0,  0,  0,  5,  1,  8,  0,  0,JAT  142
     *  0,  0,  0,  6,  3,  8,  0,  0,  0,  0,  4,  9,  3,  0,  0,  0/JAT  143
      DATA (JATX (1),I=2289,2373)/
     *  0,  4,  9,  3,  0,  0,  0,  0, 13,  8, 14,  0,  0,  0,  0,  5,JAT  144
     *  4,  8,  0,  0,  0,  0,  5,  9,  8,  0,  0,  0,  0,  5,  1,  0,JAT  145
     *  0,  0,  0,  1,  3,  0,  0,  0,  0,  5,  1,  8,  0,  0,  0,JAT  146
     *  0,  0,  5,  1,  3,  0,  0,  0,  0,  5,  1,  0,  0,  0,  0,JAT  147
     *  5,  1,  3,  0,  0,  0,  0, 13,  1,  3,  0,  0,  0,  0,  3,  8,JAT  148
     * 14,  0,  0,  0,  0/                                              JAT  149
      DATA (SORCX(I),I=   1, 152)/
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,          SORC   1
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,          SORC   2
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,          SORC   3
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,          SORC   4
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,          SORC   5
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,          SORC   6
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,          SORC   7
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,          SORC   8
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,          SORC   9
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,          SORC  10
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,          SORC  11
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,          SORC  12
     *2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,          SORC  13
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*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H   ,4H   ,        SORC  14
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H   ,4H   ,        SORC  15
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H   ,4H   ,        SORC  16
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H   ,4H   ,        SORC  17
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H   ,4H   ,        SORC  18
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   /        SORC  19
 DATA (SORCX(I),I= 153, 304)/
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H   ,4H   ,        SORC  20
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H   ,4H   ,        SORC  21
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H   ,4H   ,        SORC  22
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H   ,4H   ,        SORC  23
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H   ,4H   ,        SORC  24
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   ,        SORC  25
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC  26
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H   ,4H   ,        SORC  27
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H   ,4H   ,        SORC  28
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   ,        SORC  29
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H   ,4H   ,        SORC  30
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H   ,4H   ,        SORC  31
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H   ,4H   ,        SORC  32
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H   ,4H   ,        SORC  33
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   ,        SORC  34
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   ,        SORC  35
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H   ,4H   ,        SORC  36
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H   ,4H   ,        SORC  37
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   /        SORC  38
 DATA (SORCX(I),I= 305, 456)/
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  39
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  40
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  41
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H   ,4H   ,        SORC  42
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  43
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  44
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  45
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  46
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H   ,4H   ,        SORC  47
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  48
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC  49
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  50
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  51
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  52
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  53
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  54
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  55
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  56
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H   ,4H   /        SORC  57
 DATA (SORCX(I),I= 457, 608)/
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/68 ,4H   ,4H   ,        SORC  58
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  59
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  60
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  61
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  62
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  63
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H   ,4H   ,        SORC  64
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H   ,4H   ,        SORC  65
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  66
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H   ,4H   ,        SORC  67
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H   ,4H   ,        SORC  68
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H   ,4H   ,        SORC  69
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/61 ,4H   ,4H   ,        SORC  70
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/63 ,4H   ,4H   ,        SORC  71
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H   ,4H   ,        SORC  72
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H   ,4H   ,        SORC  73
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H   ,4H   ,        SORC  74
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/63 ,4H   ,4H   ,        SORC  75
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   /        SORC  76
 DATA (SORCX(I),I= 609, 760)/
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/63 ,4H   ,4H   ,        SORC  77
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H   ,4H   ,        SORC  78
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H   ,4H   ,        SORC  79
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H   ,4H   ,        SORC  80
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H   ,4H   ,        SORC  81
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H   ,4H   ,        SORC  82
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H   ,4H   ,        SORC  83
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H   ,4H   ,        SORC  84
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H   ,4H   ,        SORC  85
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H   ,4H   ,        SORC  86
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H   ,4H   ,        SORC  87
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H   ,4H   ,        SORC  88
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H   ,4H   ,        SORC  89
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC  90
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H   ,4H   ,        SORC  91
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H   ,4H   ,        SORC  92
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   ,        SORC  93
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H   ,4H   ,        SORC  94
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   /        SORC  95
 DATA (SORCX(I),I= 761, 912)/
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC  96
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   ,        SORC  97
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H   ,4H   ,        SORC  98
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC  99
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC 100
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/67 ,4H   ,4H   ,        SORC 101
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   ,        SORC 102
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   ,        SORC 103
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H   ,4H   ,        SORC 104
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H   ,4H   ,        SORC 105
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC 106
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H   ,4H   ,        SORC 107
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H   ,4H   ,        SORC 108
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H   ,4H   ,        SORC 109
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC 110
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H   ,4H   ,        SORC 111
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H   ,4H   ,        SORC 112
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H   ,4H   ,        SORC 113
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H   ,4H   /        SORC 114
 DATA (SORCX(I),I= 913,1064)/
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC 115
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H   ,4H   ,        SORC 116
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H   ,4H   ,        SORC 117
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/63 ,4H   ,4H   ,        SORC 118
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H   ,4H   ,        SORC 119
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H   ,4H   ,        SORC 120
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC 121
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1 12,4H/67 ,4H   ,4H   ,        SORC 122
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H   ,4H   ,        SORC 123
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H   ,4H   ,        SORC 124
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H   ,4H   ,        SORC 125
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H   ,4H   ,        SORC 126
*2HJA,4HNAF ,4HTAPE,4H 7/7,4H1  6,4H/68 ,4H   ,4H   ,        SORC 127
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*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    /
 DA7A (SORCX(1),1=1065,1216)/
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  6,4H/61 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  9,4H/67 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  6,4H/62 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/70 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    /
 DA7A (SORCX(1),1=1217,1368)/
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  6,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  6,4H/61 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/66 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H    ,4H    /
 DA7A (SORCX(1),1=1369,1520)/
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/70 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  3,4H/66 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/60 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H    ,4H    ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/66 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,
*2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  6,4H/62 ,4H    ,4H    ,
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SORC 128  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,  SORC 185
SORC 129  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/61 ,4H    ,4H    ,  SORC 186
SORC 130  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,  SORC 187
SORC 131  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,  SORC 188
SORC 132  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,  SORC 189
SORC 133  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    /  SORC 190
           DATA (SORCX(1),1=1521,1672)/
SORC 134  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,  SORC 191
SORC 135  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H    ,4H    ,  SORC 192
SORC 136  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,  SORC 193
SORC 137  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  6,4H/62 ,4H    ,4H    ,  SORC 194
SORC 138  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  9,4H/67 ,4H    ,4H    ,  SORC 195
SORC 139  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H    ,4H    ,  SORC 196
SORC 140  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/61 ,4H    ,4H    ,  SORC 197
SORC 141  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,  SORC 198
SORC 142  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,  SORC 199
SORC 143  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H    ,4H    ,  SORC 200
SORC 144  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,  SORC 201
SORC 145  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,  SORC 202
SORC 146  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/66 ,4H    ,4H    ,  SORC 203
SORC 147  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,  SORC 204
SORC 148  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,  SORC 205
SORC 149  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/69 ,4H    ,4H    ,  SORC 206
SORC 150  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,  SORC 207
SORC 151  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,  SORC 208
SORC 152  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    /  SORC 209
           DATA (SORCX(1),1=1673,1824)/
SORC 153  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,  SORC 210
SORC 154  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,  SORC 211
SORC 155  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/65 ,4H    ,4H    ,  SORC 212
SORC 156  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/62 ,4H    ,4H    ,  SORC 213
SORC 157  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,  SORC 214
SORC 158  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,  SORC 215
SORC 159  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,  SORC 216
SORC 160  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,  SORC 217
SORC 161  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H    ,4H    ,  SORC 218
SORC 162  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/63 ,4H    ,4H    ,  SORC 219
SORC 163  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  3,4H/63 ,4H    ,4H    ,  SORC 220
SORC 164  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/68 ,4H    ,4H    ,  SORC 221
SORC 165  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,  SORC 222
SORC 166  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,  SORC 223
SORC 167  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,  SORC 224
SORC 168  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H    ,4H    ,  SORC 225
SORC 169  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,  SORC 226
SORC 170  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H    ,4H    ,  SORC 227
SORC 171  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    /  SORC 228
           DATA (SORCX(1),1=1825,1976)/
SORC 172  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/67 ,4H    ,4H    ,  SORC 229
SORC 173  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,  SORC 230
SORC 174  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,  SORC 231
SORC 175  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H    ,4H    ,  SORC 232
SORC 176  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,  SORC 233
SORC 177  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H    ,4H    ,  SORC 234
SORC 178  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H    ,4H    ,  SORC 235
SORC 179  *2HJA,4HNAF  ,4H7APE,4H 7/7,4H1 12,4H/68 ,4H    ,4H    ,  SORC 236
SORC 180  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H    ,4H    ,  SORC 237
SORC 181  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,  SORC 238
SORC 182  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,  SORC 239
SORC 183  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/65 ,4H    ,4H    ,  SORC 240
SORC 184  *2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H    ,4H    ,  SORC 241
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*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H     ,4H     /
 DATA (SORCX(I),I=1977,2128)/
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H     ,4H     /
 DATA (SORCX(I),I=2129,2280)/
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/69 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 **,4H/60 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 **,4H/61 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 **,4H/61 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/70 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/** ,4H     ,4H     ,
*2HCO,4HNVA1,4HR 2P,4HH-12,4H2 12,4H/61 ,4H     ,4H     ,
*2H  ,4H     ,4H     ,4H     ,4H     ,4H     ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/65 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     /
 DATA (SORCX(I),I=2281,2432)/
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/60 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/62 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  0,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  0,4H/70 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/61 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/62 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/65 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  0,4H/62 ,4H     ,4H     ,
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*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H 67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/6S ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H     ,4H     /
 DATA (SORCX(I),I=2433,2584)/
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/6S ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/61 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/63 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/63 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/62 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/68 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/6S ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/70 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/6S ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/6S ,4H     ,4H     /
 DATA (SORCX(I),I=2585,2712)/
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/6S ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/66 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/6S ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  0,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  9,4H/67 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/6S ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1 12,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  3,4H/64 ,4H     ,4H     ,
*2HJA,4HNAF  ,4HTAPE,4H 7/7,4H1  6,4H/67 ,4H     ,4H     /
 DATA (AMOAD(I),I=  1, 171)/
*4HCO2 ,4HH2  ,4HH2O ,4HCO  ,4HC* F,4HC2H2,4HCLH ,4HFH  ,4HC   ,
*4HC2  ,4HC3  ,4HC4  ,4HC F ,4HC2 F,4HC3 F,4HC4 F,4HAL  ,4HCAL ,
*4HALCL,4HALCL,4HALCL,4HALCL,4HALCL,4HALCL,4HALCL,4HALF ,4HALFO,
*4HALF2,4HALF3,4HALH ,4HALHO,4HALHO,4HALN ,4HALO ,4HAL2C,4HAL2O,
*4HAL2O,4HB   ,4HBCL ,4HBCLF,4HBCLF,4HBCLO,4HBCL2,4HBCL2,4HBCL3,
*4HBF  ,4HBFO ,4HBF2 ,4HBF3 ,4HBH  ,4HBHO ,4HBHO2,4HBH2 ,4HBH2O,
*4HBH3 ,4HBH3O,4HBN  ,4HBO  ,4HB2  ,4HB2CL,4HB2H6,4HB2O2,4HB2O3,
*4HB3CL,4HB3F3,4HB3H3,4HB3H6,4HBSH9,4HB10H,4HBE  ,4HC2BF,4HBECL,
*4HBECL,4HBECL,4HBEF ,4HBEF2,4HBEH ,4HBEHO,4HBEH2,4HBEH2,4HBEO ,
*4HBE2C,4HBE2O,4HBE3O,4HBE4O,4HBESO,4HBE6O,4HCCL ,4HCCLF,4HCCLF,
*4HCCLN,4HCCL2,4HCCL3,4HCCL4,4HCF  ,4HCFN ,4HCF2 ,4HCF2O,4HCF3 ,
*4HCF4 ,4HCH  ,4HCHCL,4HCHCL,4HCHCL,4HCHFO,4HCHF3,4HCHN ,4HCHNO,
*4HCHO ,4HCH2 ,4HCH2C,4HCH2C,4HCH2F,4HCH2O,4HCH3 ,4HCH3C,4HCH3C,
*4HCH3F,4HCH3F,4HCH4 ,4HCN  ,4HC2F2,4HC2F4,4HC2H4,4HC2H4,4HC2N2,
*4HC3O2,4HC4H2,4HC4N2,4HCL  ,4HCLF ,4HCLFL,4HCLFO,4HCLF3,4HCLF3,
*4HCLHO,4HCLH3,4HCLLI,4HCLLI,4HCLNO,4HCLO ,4HCLO2,4HCLS1,4HCL2H,
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*4HCL2L,4HCL2O,4HCL2S,4HCL3F,4HCL3H,4HCL3L,4HCL4S,4HF    ,4HFHO ,   AMOA  17
*4H2H3S,4HFL1 ,4HFLIO,4HFN   ,4HFNO ,4HF4SI,4HSO  ,4HFS1 ,4HF2H2,   AMOA  18
*4HF2LI,4HF2O ,4HF2SI,4HF3HS,4HF3LI,4HF3N ,4HH    ,4HHLI ,4HHLIO/   AMOA  19
 DATA (AMOAD(I),I=172,339)/
*4HMN  ,4HNO  ,4HNSI ,4HN2LI,4HN2N ,4HN2O2,4HN3N ,4HN4N2,4HN4SI,   AMOA  20
*4HLI  ,4HLIN ,4HLIO ,4HLI2 ,4HLI2O,4HN   ,4HNO  ,4HNO2 ,4HNSI ,   AMOA  21
*4HN2O ,4HN2O3,4HN2O4,4HN2O5,4HO   ,4HOSI ,4HO2SI,4HO3  ,4HS1  ,   AMOA  22
*4HS12 ,4HS13 ,4HCCL2,4HBF2H,4HBF2O,4HCCLO,4HCFO ,4HC2F6,4HFNO2,   AMOA  23
*4HBLIO,4HALF4,4HCB  ,4HBF2H,4HB2BE,4HBEF3,4HCLNO,4HF2N ,4H83FH,   AMOA  24
*4HB3F2,4HB3H3,4HFNO3,4HHNO ,4HBO2 ,4HBEN ,4HHNO2,4HHNO2,4HHNO3,   AMOA  25
*4HBE2O,4HF2OS,4HF3SI,4HALHO,4HF4N2,4HHO2 ,4HLI2O,4H82F4,4HNO3 ,   AMOA  26
*4HCF4O,4HCCL2,4HCCL3,4HF2N2,4HF2N2,4HH2N2,4HBCL2,4H82H4,4HALBO,   AMOA  27
*4H8BEO,4H82O ,4HBE2F,4HCN2 ,4HCN2 ,4HC2O ,4HCLF5,4HBEH ,4HFO2 ,   AMOA  28
*4HL1NO,4HC2H ,4HCSI ,4HCSI2,4HC2N ,4HC2S1,4HNS12,4HC2CL,4HC2CL,   AMOA  29
*4HC2HF,4HALO2,4HC2CL,4HC2HC,4HCHCL,4HCHF ,4HC2F3,4HCL3S,4HAL2F,   AMOA  30
*4HF3NO,4HF2  ,4HCL2 ,4HN2  ,4HO2  ,4HCNO ,4HN3  ,4H82F4,4HA   ,   AMOA  31
*4HME  ,4HLI2O,4HALF6,4HALCL,4H83H3,4HCSI*,4HC2LI,4HCLH4,4HCLH4*,   AMOA  32
*4HCLLI,4H8EH2,4HALCL,4HALF3,4HALLI,4HALN*,4HAL2O,4HC3AL,4H8N* ,   AMOA  33
*4HLI* ,4HLI3N,4HN4SI,4H8E2O,4HAL* ,4HAL2O,4HB*  ,4HB2O3,4HCB4*,   AMOA  34
*4HBE* ,4HBEO*,4HC8E2,4HBE3N,4HCLLI,4HFLI*,4HHLIO,4HLI2O,4HO2SI,   AMOA  35
*4HSI* ,4H8LIO,4H8ECL,4H8EF2,4HLI2O,4HAL2B,4H84LI,4H86LI,4H88LI,   AMOA  36
*4H82H4,4HCLI2,4H8EF3,4HAL6O,4H828E,4H83F3,4H8IOH,4HHLI*,         AMOA  37
*4H8HO2,4H8H3O,4H85H9,4H8H4L,4HALH4,4HLI2O/                       AMOA  38
 DATA (AMOBO(I),I=  1,171)/
*4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   AMOB   1
*4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   AMOB   2
*4H    ,4HF   ,4HF2  ,4HO   ,4H2   ,4H2F  ,4H3   ,4H    ,4H    ,   AMOB   3
*4H    ,4H    ,4H    ,4H    ,4H2   ,4H    ,4H    ,4HL6  ,4H    ,   AMOB   4
*4H2   ,4H    ,4H    ,4H    ,4H2   ,4H    ,4H    ,4HF   ,4H    ,   AMOB   5
*4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H2   ,   AMOB   6
*4H    ,4H3   ,4H    ,4H    ,4H    ,4H4   ,4H    ,4H    ,4H    ,   AMOB   7
*4H3O3 ,4HO3  ,4HO6  ,4HN3  ,4H    ,4H14  ,4H    ,4H    ,4H    ,   AMOB   8
*4HF   ,4H2   ,4H    ,4H    ,4H    ,4H    ,4H    ,4HO2  ,4H    ,   AMOB   9
*4HL4  ,4H2   ,4H3   ,4H4   ,4H5   ,4H6   ,4H    ,4HO   ,4H3   ,   AMOB  10
*4H    ,4HO   ,4HF   ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   AMOB  11
*4H    ,4H    ,4HF2  ,4H2F  ,4H3   ,4H    ,4H    ,4H    ,4H    ,   AMOB  12
*4H    ,4H    ,4HLF  ,4HL2  ,4H2   ,4H    ,4H    ,4HL   ,4HL3S ,   AMOB  13
*4H    ,4H3S1 ,4H    ,4H    ,4H    ,4H    ,4H    ,4HO   ,4H    ,   AMOB  14
*4H    ,4HSI  ,4H    ,4H    ,4H    ,4HI2  ,4H3   ,4H    ,4HS1  ,   AMOB  15
*4H    ,4HSI  ,4H    ,4HO   ,4H    ,4H    ,4H    ,4H    ,4H2S1 ,   AMOB  16
*4HI2  ,4H    ,4HI   ,4HS1  ,4HS1  ,4H13  ,4HI   ,4H    ,4H    ,   AMOB  17
*4HI   ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4HS1  ,   AMOB  18
*4H2   ,4H    ,4H    ,4HI   ,4H3   ,4H    ,4H    ,4H    ,4H    /   AMOB  19
 DATA (AMOBO(I),I=172,339)/
*4H    ,4H    ,4H    ,4H2O2 ,4H    ,4H    ,4H    ,4H    ,4H    ,   AMOB  20
*4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   AMOB  21
*4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   AMOB  22
*4H    ,4H    ,4HF2  ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   AMOB  23
*4H2   ,4HL1  ,4H    ,4HO   ,4HO4  ,4HL1  ,4H2   ,4H    ,4H2O3 ,   AMOB  24
*4HHO3 ,4HO3  ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   AMOB  25
*4H    ,4H1   ,4H    ,4H    ,4H    ,4H    ,4H2   ,4H    ,4H    ,   AMOB  26
*4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4HH   ,4HO4  ,4H2   ,   AMOB  27
*4H2   ,4H    ,4H2O  ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,   AMOB  28
*4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H4   ,4H6   ,   AMOB  29
*4H    ,4H    ,4H2   ,4HL   ,4H    ,4H    ,4HN   ,4HI   ,4H6   ,   AMOB  30
*4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4H    ,4HO   ,4H    ,   AMOB  31
*4H    ,4H2*  ,4HL13*,4HO*  ,4HO3* ,4H    ,4H2*  ,4HN*  ,4HNO4*,   AMOB  32
*4HO4* ,4HO2*  ,4H3*  ,4H*   ,4HO2* ,4H    ,4H5S1*,4H4*  ,4H    ,   AMOB  33
*4H    ,4H*   ,4H3*  ,4H4S1*,4H    ,4H3*  ,4H    ,4H*   ,4H    ,   AMOB  34
*4H    ,4H    ,4H*   ,4H2*  ,4H*   ,4H    ,4H*   ,4H*   ,4H*   ,   AMOB  35
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*4H    ,4H2*  ,4H2*  ,4H*   ,4H3S1*,4HE04*,4H207*,4H201*,4H201*,   AMOB  36
*4HO4* ,4HO3* ,4HL1* ,4HL12*,4H13S*,4H3O6*,4HO3* ,4H14* ,4H    ,   AMOB  37
*4H*   ,4H3*  ,4H*   ,4H1*  ,4HLI* ,4HSS1*/                       AMOB  38
 DATA (RAX(I),I=  1,114)/
*-9.4054E+4,-9.4054E+4,-9.9600E-1,-9.9600E-1,-5.7798E+4,-5.7798E+4,RA    1
*-2.6417E+4,-2.6417E+4, 0.0000E+0, 0.0000E+0, 5.4190E+4, 5.4190E+4,RA    2
*-2.2063E+4,-2.2063E+4,-6.5140E+4,-6.5140E+4, 1.7089E+5, 1.7089E+5,RA    3
* 2.0022E+5, 2.0022E+5, 1.9600E+5, 1.9600E+5, 2.3200E+5, 2.3200E+5,RA    4
* 1.7089E+5, 1.7089E+5, 2.0022E+5, 2.0022E+5, 1.9600E+5, 1.9600E+5,RA    5
* 2.3200E+5, 2.3200E+5, 7.8000E+4, 7.8000E+4, 1.6480E+5, 1.6480E+5,RA    6
*-1.2300E+4,-1.2300E+4,-1.2000E+5,-1.2000E+5,-2.3760E+5,-2.3760E+5,RA    7
*-8.3200E+4,-8.3200E+4,-7.5000E+4,-7.5000E+4,-1.8860E+5,-1.8860E+5,RA    8
*-1.3970E+5,-1.3970E+5,-6.3400E+4,-6.3400E+4,-1.4020E+5,-1.4020E+5,RA    9
*-1.6500E+5,-1.6500E+5,-2.8903E+5,-2.8903E+5, 6.2000E+4, 6.2000E+4,RA   10
* 8.0000E+3, 8.0000E+3,-1.1000E+5,-1.1000E+5, 1.0400E+5, 1.0400E+5,RA   11
* 2.0000E+4, 2.0000E+4,-3.0964E+5,-3.0964E+5,-3.1400E+4,-3.1400E+4,RA   12
*-9.7000E+4,-9.7000E+4, 1.3280E+5, 1.3280E+5, 3.3800E+4, 3.3800E+4,RA   13
*-7.5000E+4,-7.5000E+4,-2.1160E+5,-2.1160E+5,-7.5600E+4,-7.5600E+4,RA   14
*-2.0000E+4,-2.0000E+4,-1.5400E+5,-1.5400E+5,-9.6310E+4,-9.6310E+4,RA   15
*-2.7700E+4,-2.7700E+4,-1.4400E+5,-1.4400E+5,-1.3000E+5,-1.3000E+5,RA   16
*-2.7142E+5,-2.7142E+5, 1.0580E+5, 1.0580E+5,-2.0000E+4,-2.0000E+4,RA   17
*-1.3400E+5,-1.3400E+5, 4.8000E+4, 4.8000E+4,-1.1400E+5,-1.1400E+5,RA   18
* 2.5500E+4, 2.5500E+4,-2.3716E+5,-2.3716E+5, 1.1400E+5, 1.1400E+5/RA   19
 DATA (RAX(I),I=115,228)/
* 1.1300E-1, 1.1300E-1, 1.9500E+5, 1.9500E+5,-1.1690E+5,-1.1690E+5,RA   20
* 9.8000E+3, 9.8000E+3,-1.0900E+5,-1.0900E+5,-1.9914E+5,-1.9914E+5,RA   21
*-3.9000E+5,-3.9000E+5,-5.6530E+5,-5.6530E+5,-5.4300E+5,-5.4300E+5,RA   22
*-1.2190E+5,-1.2190E+5, 1.7500E+4, 1.7500E+4, 1.1300E+4, 1.1300E+4,RA   23
* 7.8255E+4, 7.8255E+4, 1.3500E+5, 1.3500E+5, 1.4500E+4, 1.4500E+4,RA   24
*-1.3700E+5,-1.3700E+5,-8.6100E+4,-8.6100E+4,-4.9678E+4,-4.9678E+4,RA   25
*-1.9025E+5,-1.9025E+5, 7.6768E+4, 7.6768E+4,-2.5000E+4,-2.5000E+4,RA   26
* 3.0000E+4, 3.0000E+4,-1.5640E+5,-1.5640E+5, 3.1000E+4, 3.1000E+4,RA   27
*-1.7900E+5,-1.7900E+5,-9.8000E+4,-9.8000E+4,-2.5200E+5,-2.5200E+5,RA   28
*-3.8000E+5,-3.8000E+5,-5.0500E+5,-5.0500E+5,-6.3600E+5,-6.3600E+5,RA   29
* 1.2000E+5, 1.2000E+5,-1.0200E+5,-1.0200E+5,-1.6920E+5,-1.6920E+5,RA   30
* 3.2970E+4, 3.2970E+4,-5.2600E+4,-5.2600E+4,-6.9000E+4,-6.9000E+4,RA   31
*-2.2940E+4,-2.2940E+4, 6.1000E+4, 6.1000E+4, 8.6000E+3, 8.6000E+3,RA   32
*-4.3500E+4,-4.3500E+4,-1.5270E+5,-1.5270E+5,-1.1240E+5,-1.1240E+5,RA   33
*-2.2304E+5,-2.2304E+5, 1.4200E+5, 1.4200E+5,-1.1510E+5,-1.1510E+5,RA   34
*-6.7700E+4,-6.7700E+4,-2.4660E+4,-2.4660E+4,-9.0000E+4,-9.0000E+4,RA   35
*-1.6660E+5,-1.6660E+5, 3.2300E+4, 3.2300E+4,-2.4300E+4,-2.4300E+4,RA   36
* 1.0400E+4, 1.0400E+4, 9.2070E+4, 9.2070E+4,-6.2600E+4,-6.2600E+4,RA   37
*-2.2830E+4,-2.2830E+4,-1.0771E+5,-1.0771E+5,-2.7700E+4,-2.7700E+4/RA   38
 DATA (RAX(I),I=229,342)/
* 3.4820E+4, 3.4820E+4,-2.0660E+4,-2.0660E+4,-1.2640E+5,-1.2640E+5,RA   39
*-5.6000E+4,-5.6000E+4,-2.9462E+5,-2.9462E+5,-1.7895E+4,-1.7895E+4,RA   40
* 1.0400E+5, 1.0400E+5, 5.0000E+3, 5.0000E+3,-1.5740E+5,-1.5740E+5,RA   41
* 1.2540E+4, 1.2540E+4,-1.2580E+4,-1.2580E+4, 7.3870E+4, 7.3870E+4,RA   42
*-2.2380E+4,-2.2380E+4,-6.8500E+4,-6.8500E+4, 1.2750E+5, 1.2750E+5,RA   43
* 2.8922E+4, 2.8922E+4,-1.2140E+4,-1.2140E+4,-1.8020E+5,-1.8020E+5,RA   44
*-5.1200E+3,-5.1200E+3,-3.7970E+4,-3.7970E+4,-3.1500E+5,-3.1500E+5,RA   45
*-2.2000E+4,-2.2000E+4,-4.8000E+4,-4.8000E+4,-4.6778E+4,-4.6778E+4,RA   46
*-3.4000E+3,-3.4000E+3, 1.2370E+4, 1.2370E+4, 2.4192E+4, 2.4192E+4,RA   47
* 2.5000E+4, 2.5000E+4, 4.5700E+4, 4.5700E+4,-7.5000E+4,-7.5000E+4,RA   48
*-1.4305E+5,-1.4305E+5, 2.1000E+4, 2.1000E+4,-4.0000E+4,-4.0000E+4,RA   49
*-2.0100E+5,-2.0100E+5,-1.1200E+5,-1.1200E+5,-2.4013E+5,-2.4013E+5,RA   50
*-1.5840E+5,-1.5840E+5, 1.8860E+4, 1.8860E+4,-3.1000E+4,-3.1000E+4,RA   51
*-1.0500E+5,-1.0500E+5,-8.1450E+4,-8.1450E+4,-2.2000E+4,-2.2000E+4,RA   52
* 5.9500E+4, 5.9500E+4,-1.5700E+4,-1.5700E+4,-3.8598E+5,-3.8598E+5,RA   53
* 2.6000E+4, 2.6000E+4,-4.6000E+3,-4.6000E+3,-1.9400E+5,-1.9400E+5,RA   54
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*-2.2533E+5,-2.2533E+5, 5.8600E+3, 5.8600E+3,-1.4050E+5,-1.4050E+5,RA   55
*-2.8300E+5,-2.8300E+5,-3.6262E+5,-3.6262E+5,-3.1430E+4,-3.1430E+4,RA   56
* 5.2100E+4, 5.2100E+4, 3.3610E+4, 3.3610E+4,-5.8843E+4,-5.8843E+4/RA   57
 DATA (RAX(I),I=343,456)/
* 8.1000E+4, 8.1000E+4, 9.4920E+3, 9.4920E+3, 9.0000E+4, 9.0000E+4,RA   58
*-1.8143E+5,-1.8143E+5, 4.0070E+4, 4.0070E+4,-3.2530E+4,-3.2530E+4,RA   59
*-1.0970E+4,-1.0970E+4, 2.2790E+4, 2.2790E+4, 7.8000E+3, 7.8000E+3,RA   60
* 3.8410E+4, 3.8410E+4, 8.0000E+4, 8.0000E+4, 2.0100E+4, 2.0100E+4,RA   61
* 5.0400E+4, 5.0400E+4,-3.9900E+4,-3.9900E+4, 1.1296E+5, 1.1296E+5,RA   62
* 2.1580E+4, 2.1580E+4, 7.9100E+3, 7.9100E+3, 8.9000E+4, 8.9000E+4,RA   63
* 1.9610E+4, 1.9610E+4, 1.9800E+4, 1.9800E+4, 2.1700E+3, 2.1700E+3,RA   64
* 2.7000E+3, 2.7000E+3, 5.9559E+4, 5.9559E+4,-2.4000E+4,-2.4000E+4,RA   65
*-7.3000E+4,-7.3000E+4, 3.4100E+4, 3.4100E+4, 1.0770E+5, 1.0770E+5,RA   66
* 1.4100E+5, 1.4100E+5, 1.5200E+5, 1.5200E+5,-1.1750E+5,-1.1750E+5,RA   67
*-1.7540E+5,-1.7540E+5,-2.0000E+5,-2.0000E+5,-1.5000E+4,-1.5000E+4,RA   68
*-4.1000E+4,-4.1000E+4,-3.2120E+5,-3.2120E+5,-2.6000E+4,-2.6000E+4,RA   69
*-1.6038E+5,-1.6038E+5,-4.4300E+5,-4.4300E+5, 1.9800E+5, 1.9800E+5,RA   70
*-2.5900E+5,-2.5900E+5,-3.2300E+5,-3.2300E+5,-2.1200E+5,-2.1200E+5,RA   71
* 2.9000E+3, 2.9000E+3, 1.0100E+4, 1.0100E+4,-3.8200E+5,-3.8200E+5,RA   72
*-4.7500E+5,-4.7500E+5,-2.9100E+5,-2.9100E+5, 2.5000E+3, 2.5000E+3,RA   73
* 2.3800E+4, 2.3800E+4,-6.8000E+4,-6.8000E+4, 1.0198E+5, 1.0198E+5,RA   74
*-1.8340E+4,-1.8340E+4,-1.8840E+4,-1.8840E+4,-3.2100E+4,-3.2100E+4,RA   75
*-1.5000E+4,-1.5000E+4,-2.3100E+5,-2.3100E+5,-2.6300E+5,-2.6300E+5/RA   76
 DATA (RAX(I),I=457,570)/
*-4.3000E+4,-4.3000E+4,-2.0000E+3,-2.0000E+3, 5.0000E+3, 5.0000E+3,RA   77
*-5.8000E+4,-5.8000E+4,-3.4220E+5,-3.4220E+5, 1.7000E+4, 1.7000E+4,RA   78
*-1.8280E+5,-1.8280E+5, 5.7000E+4, 5.7000E+4, 1.9000E+4, 1.9000E+4,RA   79
* 1.6400E+4, 1.6400E+4, 1.9400E+4, 1.9400E+4, 5.0900E+4, 5.0900E+4,RA   80
*-5.9300E+4,-5.9300E+4,-3.0700E+5,-3.0700E+5,-1.2940E+5,-1.2940E+5,RA   81
*-1.1520E+5,-1.1520E+5, 2.3000E+4, 2.3000E+4,-2.8790E+5,-2.8790E+5,RA   82
* 1.3970E+5, 1.3970E+5, 1.1300E+5, 1.1300E+5, 6.8500E+4, 6.8500E+4,RA   83
*-5.7000E+4,-5.7000E+4, 2.7640E+5, 2.7640E+5, 3.0000E+3, 3.0000E+3,RA   84
* 4.3000E+4, 4.3000E+4, 1.1400E+5, 1.1400E+5, 1.7200E+5, 1.7200E+5,RA   85
* 1.2600E+5, 1.2800E+5, 1.3300E+5, 1.3300E+5, 1.4700E+5, 1.4700E+5,RA   86
* 9.5000E+4, 9.5000E+4,-2.9700E+3,-2.9700E+3,-3.2080E+4,-3.2080E+4,RA   87
* 3.0000E+4, 3.0000E+4,-4.4000E+4,-4.4000E+4, 5.0100E+4, 5.0100E+4,RA   88
* 5.1100E+4, 5.1100E+4, 8.0000E+4, 8.0000E+4, 3.0000E+4, 3.0000E+4,RA   89
*-1.1840E+5,-1.1840E+5,-9.6000E+4,-9.6000E+4,-6.2945E+5,-6.2945E+5,RA   90
*-3.9000E+4,-3.9000E+4,-2.4800E-1,-2.4800E-1,-8.5600E-1,-8.5600E-1,RA   91
*-1.1000E-1,-1.1000E-1, 5.7400E-1, 5.7400E-1, 3.8100E+4, 3.8100E+4,RA   92
* 9.9000E+4, 9.9000E+4,-4.5350E+5,-4.5350E+5, 0.0000E+0, 0.0000E+0,RA   93
* 0.0000E+0, 0.0000E+0,-1.5120E+5,-1.5120E+5,-8.0870E+5,-8.0870E+5,RA   94
*-1.8960E+5,-1.8960E+5,-3.0170E+5,-3.0170E+5,-1.7100E+4,-1.7100E+4/RA   95
 DATA (RAX(I),I=571,678)/
*-1.4200E+4,-1.4200E+4,-7.5180E+4,-7.5180E+4,-7.0690E+4,-7.0690E+4,RA   96
*-8.5684E+4,-8.5684E+4,-2.1650E+5,-2.1650E+5,-1.6128E+5,-1.6128E+5,RA   97
*-3.6100E+5,-3.6100E+5,-2.8433E+5,-2.8433E+5,-7.6000E+4,-7.6000E+4,RA   98
*-6.1881E+5,-6.1881E+5,-5.1550E+4,-5.1550E+4,-5.9970E+4,-5.9970E+4,RA   99
* 5.6900E+2, 5.6900E+2,-4.7200E+4,-4.7200E+4,-1.7800E+5,-1.7800E+5,RA  100
*-5.0603E+5,-5.0603E+5, 0.0000E+0, 2.0720E+3,-4.0040E+5,-3.7336E+5,RA  101
*-3.7300E-1, 5.2600E+3,-3.0364E+5,-2.9928E+5,-9.2960E+3, 1.8095E+4,RA  102
*-7.7800E-1, 2.8810E+3,-1.4310E+5,-1.2956E+5,-2.1700E+4,-3.7980E+3,RA  103
*-1.4060E+5,-1.1640E+5,-9.7578E+4,-9.3394E+4,-1.4745E+5,-1.4308E+5,RA  104
*-1.1584E+5,-1.1326E+5,-1.4310E+5,-1.3213E+5,-2.1770E+5,-2.1574E+5,RA  105
*-3.7300E-1, 1.1585E+4,-2.4329E+5,-2.3882E+5,-1.1860E+5,-1.1742E+5,RA  106
*-2.4540E+5,-2.4427E+5,-3.9424E+5,-3.8844E+5,-5.4500E+5,-5.4500E+5,RA  107
*-8.0360E+5,-7.9279E+5,-1.1137E+6,-1.1137E+6,-1.4136E+6,-1.4136E+6,RA  108
*-3.3710E+5,-3.3710E+5,-2.9064E+5,-2.8163E+5,-3.9024E+5,-3.9024E+5,RA  109
*-5.3900E+5,-5.3122E+5,-1.6298E+6,-1.6298E+6,-7.4196E+5,-7.4196E+5,RA  110
*-5.8650E+5,-5.8650E+5,-1.7000E+3,-1.7000E+3,-2.1660E+4,-1.8573E+4,RA  111
*-1.9187E+5,-1.9187E+5,-2.6147E+5,-2.6147E+5, 1.0240E+4, 1.0240E+4,RA  112
*-4.5522E+4,-4.5522E+4,-2.8000E+4,-2.8000E+4,-6.1207E+5,-6.0064E+5/RA  113
 DATA (RBX(I),I= 1,114)/
* 3.6636E+4, 3.6561E+4, 2.1269E+4, 2.1223E+4, 3.0390E+4, 3.0250E+4,RB     1
* 2.2420E+4, 2.2374E+4, 1.4448E+4, 1.4420E+4, 4.8489E+4, 4.8318E+4,RB     2
* 2.1947E+4, 2.1886E+4, 2.1122E+4, 2.1070E+4, 1.3525E+4, 1.3549E+4,RB     3
* 2.4726E+4, 2.4686E+4, 3.1054E+4, 3.0987E+4, 5.1213E+4, 5.1129E+4,RB     4
* 1.3525E+4, 1.3549E+4, 2.4726E+4, 2.4686E+4, 3.1054E+4, 3.0987E+4,RB     5
* 5.1213E+4, 5.1129E+4, 1.3478E+4, 1.3453E+4, 2.4162E+4, 2.4159E+4,RB     6
* 2.4452E+4, 2.4416E+4, 3.6772E+4, 3.6769E+4, 5.2128E+4, 5.2116E+4,RB     7
* 3.9207E+4, 3.9202E+4, 3.7095E+4, 3.7094E+4, 5.2477E+4, 5.2472E+4,RB     8
* 5.2813E+4, 5.2810E+4, 2.4041E+4, 2.4037E+4, 3.8703E+4, 3.8694E+4,RB     9
* 3.6410E+4, 3.6403E+4, 5.1759E+4, 5.1747E+4, 2.3426E+4, 2.3399E+4,RB    10
* 3.6795E+4, 3.6751E+4, 4.8162E+4, 4.8078E+4, 2.3907E+4, 2.3902E+4,RB    11
* 2.7098E+4, 2.6860E+4, 1.1624E+5, 1.1623E+5, 3.6362E+4, 3.6353E+4,RB    12
* 5.0533E+4, 5.0508E+4, 1.3430E+4, 1.3421E+4, 2.4011E+4, 2.4007E+4,RB    13
* 3.5833E+4, 3.5815E+4, 5.0433E+4, 5.0397E+4, 3.7931E+4, 3.7894E+4,RB    14
* 3.6371E+4, 3.6362E+4, 5.1151E+4, 5.1127E+4, 5.1710E+4, 5.1696E+4,RB    15
* 2.3314E+4, 2.3296E+4, 3.7346E+4, 3.7300E+4, 3.5292E+4, 3.5262E+4,RB    16
* 4.9760E+4, 4.9711E+4, 2.2704E+4, 2.2654E+4, 3.5728E+4, 3.5638E+4,RB    17
* 4.5848E+4, 4.5714E+4, 3.4655E+4, 3.4537E+4, 6.0567E+4, 6.0406E+4,RB    18
* 4.2788E+4, 4.2548E+4, 7.9067E+4, 7.8804E+4, 2.3376E+4, 2.3372E+4/RB    19
 DATA (RBX(I),I=115,228)/
* 2.2704E+4, 2.2654E+4, 2.3823E+4, 2.3815E+4, 7.9958E+4, 7.9934E+4,RB    20
* 9.6344E+4, 9.5925E+4, 5.1841E+4, 5.1759E+4, 6.3798E+4, 6.3695E+4,RB    21
* 1.2637E+5, 1.2631E+5, 1.2341E+5, 1.2329E+5, 1.6128E+5, 1.6099E+5,RB    22
* 1.5092E+5, 1.5038E+5, 1.7703E+5, 1.7637E+5, 3.1602E+5, 3.1503E+5,RB    23
* 1.3463E+4, 1.3414E+4, 3.6864E+4, 3.6800E+4, 2.3994E+4, 2.3981E+4,RB    24
* 3.8830E+4, 3.8814E+4, 3.9166E+4, 3.9157E+4, 2.3487E+4, 2.3473E+4,RB    25
* 3.8343E+4, 3.8318E+4, 2.2993E+4, 2.2952E+4, 3.2298E+4, 3.2206E+4,RB    26
* 3.4725E+4, 3.4620E+4, 6.0021E+4, 5.9850E+4, 2.3213E+4, 2.3192E+4,RB    27
* 8.4462E+4, 8.4456E+4, 4.9893E+4, 4.9853E+4, 7.7045E+4, 7.6928E+4,RB    28
* 1.0799E+5, 1.0790E+5, 1.3734E+5, 1.3722E+5, 1.6650E+5, 1.6643E+5,RB    29
* 2.4046E+4, 2.4035E+4, 4.9932E+4, 4.9882E+4, 6.5474E+4, 6.5434E+4,RB    30
* 3.8740E+4, 3.8687E+4, 5.0652E+4, 5.0612E+4, 6.7015E+4, 6.6997E+4,RB    31
* 6.7715E+4, 6.7706E+4, 2.3487E+4, 2.3466E+4, 3.7082E+4, 3.7024E+4,RB    32
* 3.5398E+4, 3.5402E+4, 4.9141E+4, 4.9079E+4, 4.9935E+4, 4.9896E+4,RB    33
* 6.4612E+4, 6.4560E+4, 2.3649E+4, 2.3501E+4, 6.2381E+4, 6.2270E+4,RB    34
* 6.2873E+4, 6.2769E+4, 6.3546E+4, 6.3452E+4, 4.6418E+4, 4.6289E+4,RB    35
* 6.1282E+4, 6.1151E+4, 3.5031E+4, 3.4925E+4, 4.6394E+4, 4.6264E+4,RB    36
* 3.3029E+4, 3.2942E+4, 3.3928E+4, 3.3780E+4, 5.9007E+4, 5.8816E+4,RB    37
* 5.9743E+4, 5.9566E+4, 5.8208E+4, 5.8000E+4, 4.4062E+4, 4.3866E+4/RB    38
 DATA (RBX(I),I=229,342)/
* 4.2953E+4, 4.2729E+4, 5.6383E+4, 5.6125E+4, 1.0933E+5, 1.0276E+5,RB    39
* 5.5601E+4, 5.5326E+4, 1.0889E+5, 1.0170E+5, 5.3539E+4, 5.3203E+4,RB    40
* 2.3199E+4, 2.3264E+4, 5.2455E+4, 5.2399E+4, 7.9427E+4, 7.9342E+4,RB    41
* 6.7903E+4, 6.7560E+4, 8.1821E+4, 8.1457E+4, 5.1247E+4, 5.1146E+4,RB    42
* 6.5476E+4, 6.5349E+4, 2.3148E+5, 2.0516E+5, 8.0342E+4, 8.0185E+4,RB    43
* 1.4005E+4, 1.4022E+4, 2.4128E+4, 2.4125E+4, 5.1955E+4, 5.1946E+4,RB    44
* 6.5192E+4, 6.5147E+4, 5.2124E+4, 5.2118E+4, 6.7201E+4, 6.7186E+4,RB    45
* 3.3045E+4, 3.2971E+4, 6.0870E+4, 6.0708E+4, 2.4412E+4, 2.4410E+4,RB    46
* 3.6031E+4, 3.6018E+4, 3.7158E+4, 3.7122E+4, 2.4063E+4, 2.4059E+4,RB    47
* 3.6601E+4, 3.6585E+4, 2.4459E+4, 2.4452E+4, 6.3245E+4, 6.3137E+4,RB    48
* 5.2917E+4, 5.2916E+4, 3.6728E+4, 3.6725E+4, 3.7086E+4, 3.7058E+4,RB    49
* 6.8307E+4, 6.8300E+4, 6.5717E+4, 6.5658E+4, 8.3389E+4, 8.3380E+4,RB    50
* 6.8406E+4, 6.8402E+4, 1.3679E+4, 1.3682E+4, 3.2413E+4, 3.2325E+4,RB    51
* 6.0393E+4, 6.0226E+4, 2.4126E+4, 2.4121E+4, 3.6145E+4, 3.6136E+4,RB    52
* 2.3772E+4, 2.3763E+4, 3.5233E+4, 3.5195E+4, 6.6377E+4, 6.6350E+4,RB    53
* 2.4026E+4, 2.4014E+4, 2.4024E+4, 2.4011E+4, 6.1598E+4, 6.1466E+4,RB    54
* 5.2110E+4, 5.2104E+4, 3.6168E+4, 3.6158E+4, 3.6302E+4, 3.6281E+4,RB    55
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 • 6.4044E+4, 6.3964E+4, 8.3438E+4, 8.3429E+4, 5.0832E+4, 5.0812E+4,RB    56
 • 1.3423E+4, 1.3423E+4, 2.3944E+4, 2.3917E+4, 3.2653E+4, 3.2575E+4,RB    57
 DATA (R8X(I),I=343,456)/
 • 2.1853E+4, 2.1791E+4, 2.1490E+4, 2.1430E+4, 2.3024E+4, 2.2965E+4,RB    58
 • 7.4448E+4, 7.4278E+4, 3.0777E+4, 3.0632E+4, 4.4765E+4, 4.3911E+4,RB    59
 • 4.1281E+4, 4.1692E+4, 6.8946E+4, 6.8644E+4, 5.8733E+4, 5.8520E+4,RB    60
 • 1.3544E+4, 1.3491E+4, 2.4621E+4, 2.4619E+4, 2.4312E+4, 2.4309E+4,RB    61
 • 2.5481E+4, 2.5480E+4, 3.9025E+4, 3.9016E+4, 1.3441E+4, 1.3428E+4,RB    62
 • 2.2751E+4, 2.2715E+4, 3.4548E+4, 3.4500E+4, 2.5350E+4, 2.5253E+4,RB    63
 • 3.6642E+4, 3.6578E+4, 6.1892E+4, 6.1812E+4, 7.8738E+4, 7.8637E+4,RB    64
 • 9.1618E+4, 9.1590E+4, 1.3517E+4, 1.3521E+4, 2.3392E+4, 2.3358E+4,RB    65
 • 3.8088E+4, 3.8062E+4, 3.6031E+4, 3.6031E+4, 1.4028E+4, 1.4017E+4,RB    66
 • 2.7148E+4, 2.7207E+4, 4.0085E+4, 4.0180E+4, 6.6260E+4, 6.6232E+4,RB    67
 • 4.7424E+4, 4.7320E+4, 5.0099E+4, 5.0060E+4, 3.5564E+4, 3.5527E+4,RB    68
 • 3.4858E+4, 3.4815E+4, 1.0819E+5, 1.0814E+5, 4.9552E+4, 4.9497E+4,RB    69
 • 4.7690E+4, 4.7583E+4, 8.3209E+4, 8.3197E+4, 2.3410E+4, 2.3394E+4,RB    70
 • 6.0783E+4, 6.0652E+4, 9.3760E+4, 9.3629E+4, 6.4982E+4, 6.4939E+4,RB    71
 • 5.0000E+4, 4.9951E+4, 3.5807E+4, 3.5793E+4, 1.1854E+5, 1.1830E+5,RB    72
 • 1.2099E+5, 1.2081E+5, 1.1592E+5, 1.1561E+5, 6.4805E+4, 6.4746E+4,RB    73
 • 3.2885E+4, 3.2791E+4, 3.8070E+4, 3.8041E+4, 2.3677E+4, 2.3665E+4,RB    74
 • 4.7029E+4, 4.6920E+4, 4.7029E+4, 4.6923E+4, 6.1092E+4, 6.0961E+4,RB    75
 • 3.7585E+4, 3.7550E+4, 5.0567E+4, 5.0537E+4, 5.1433E+4, 5.1417E+4,RB    76
 DATA (R8X(I),I=457,570)/
 • 3.4347E+4, 3.4252E+4, 8.0723E+4, 8.0667E+4, 3.2652E+4, 3.2565E+4,RB    77
 • 5.2945E+4, 5.2944E+4, 7.7198E+4, 7.7129E+4, 4.9870E+4, 4.9836E+4,RB    78
 • 7.7756E+4, 7.7698E+4, 4.0361E+4, 4.0117E+4, 5.1927E+4, 5.1917E+4,RB    79
 • 5.0054E+4, 5.0017E+4, 5.0199E+4, 5.0157E+4, 4.4024E+4, 4.3839E+4,RB    80
 • 4.8875E+4, 4.8799E+4, 1.2623E+5, 1.2587E+5, 4.9904E+4, 4.9851E+4,RB    81
 • 4.9563E+4, 4.9507E+4, 3.4683E+4, 3.4636E+4, 6.6188E+4, 6.6148E+4,RB    82
 • 3.6474E+4, 3.6401E+4, 3.7735E+4, 3.7695E+4, 3.8754E+4, 3.8640E+4,RB    83
 • 8.3046E+4, 8.3036E+4, 2.2804E+4, 2.2745E+4, 3.5873E+4, 3.5850E+4,RB    84
 • 3.5992E+4, 3.5974E+4, 3.5656E+4, 3.5649E+4, 2.6352E+4, 2.6346E+4,RB    85
 • 3.8763E+4, 3.9000E+4, 3.8486E+4, 3.8465E+4, 3.8235E+4, 3.8419E+4,RB    86
 • 3.9098E+4, 3.9081E+4, 8.1904E+4, 8.1863E+4, 1.1426E+5, 1.1462E+5,RB    87
 • 4.9819E+4, 4.9700E+4, 3.8959E+4, 3.8943E+4, 5.3275E+4, 5.3223E+4,RB    88
 • 5.0294E+4, 5.0184E+4, 3.7368E+4, 3.7217E+4, 3.3421E+4, 3.3480E+4,RB    89
 • 7.9023E+4, 7.8929E+4, 5.2748E+4, 5.2746E+4, 1.1374E+5, 1.1372E+5,RB    90
 • 6.5539E+4, 6.5495E+4, 2.4439E+4, 2.4434E+4, 2.4399E+4, 2.4437E+4,RB    91
 • 2.2237E+4, 2.2184E+4, 2.3444E+4, 2.3455E+4, 3.7050E+4, 3.6991E+4,RB    92
 • 3.7294E+4, 3.7247E+4, 8.9744E+4, 8.9759E+4, 1.4940E+4, 1.4940E+4,RB    93
 • 1.3423E+4, 1.3423E+4, 9.7824E+4, 9.6836E+4, 2.3621E+5, 2.4108E+5,RB    94
 • 5.1913E+4, 5.1490E+4, 1.5413E+5, 1.4023E+5, 3.2732E+4, 3.2600E+4/RB    95
 DATA (R8X(I),I=571,678)/
 • 7.4462E+4, 7.4491E+4, 1.3848E+5, 1.1401E+5, 2.5545E+5, 2.2548E+5,RB    96
 • 1.0402E+5, 1.0402E+5, 1.1324E+5, 1.0988E+5, 8.1055E+4, 8.1055E+4,RB    97
 • 6.7244E+4, 6.8882E+4, 7.0768E+4, 6.9567E+4, 3.1163E+4, 3.1305E+4,RB    98
 • 1.3648E+5, 1.3652E+5, 1.1773E+5, 1.1664E+5, 2.9520E+4, 2.9088E+4,RB    99
 • 1.8540E+4, 1.8557E+4, 9.0932E+4, 8.5948E+4, 1.1464E+5, 1.0904E+5,RB   100
 • 1.1348E+5, 1.1392E+5, 3.1984E+4, 2.0502E+4, 8.4352E+4, 8.5659E+4,RB   101
 • 1.7557E+4, 1.7458E+4, 1.6282E+5, 7.9819E+4, 8.2956E+4, 7.9040E+4,RB   102
 • 2.1622E+4, 1.8284E+4, 3.4148E+4, 3.5875E+4, 5.3322E+4, 5.2443E+4,RB   103
 • 7.9275E+4, 8.6459E+4, 5.0220E+4, 3.6114E+4, 4.5984E+4, 4.1446E+4,RB   104
 • 7.4176E+4, 5.6036E+4, 6.2000E+4, 6.2362E+4, 4.6168E+4, 4.9499E+4,RB   105
 • 1.8585E+4, 1.7562E+4, 8.9856E+4, 8.6401E+4, 4.3712E+4, 7.6316E+4,RB   106
 • 6.6176E+4, 6.7602E+4, 1.0901E+5, 1.0255E+5, 1.2664E+5, 1.2647E+5,RB   107
 • 2.4077E+5, 2.8657E+5, 2.8869E+5, 2.8080E+5, 3.5247E+5, 3.5114E+5,RB   108
 • 1.8472E+5, 1.6346E+5, 1.8475E+5, 1.1471E+5, 9.8927E+4, 9.8479E+4,RB   109
 • 2.1619E+5, 1.4600E+5, 3.4298E+5, 3.4250E+5, 1.8890E+5, 1.8887E+5,RB   110
 • 1.7372E+5, 1.4218E+5, 3.9649E+5, 3.1616E+5, 6.6016E+4, 4.0258E+4,RB   111
 • 7.6683E+4, 5.8951E+4, 1.2929E+5, 1.1440E+5, 1.9946E+5, 1.8184E+5,RB   112
 • 7.3949E+4, 7.5675E+4, 7.7546E+4, 7.7316E+4, 1.6486E+5, 1.5528E+5/RB   113
 DATA (RCX(I),I= 1,114)/
 • 1.3073E+1, 1.4266E+1, 6.2626E+0, 8.0030E+0, 8.4750E+0, 1.3201E+1,RC     1
 • 7.7994E+0, 8.6695E+0, 5.5039E+0, 5.2640E+0, 1.5270E+1, 1.9961E+1,RC     2
 • 7.0559E+0, 8.6336E+0, 6.4131E+0, 8.5586E+0, 4.8618E+0, 5.1472E+0,RC     3
 • 7.6672E+0, 0.4361E+0, 1.0223E+1, 1.2524E+1, 1.8890E+1, 2.0473E+1,RC     4
 • 4.8618E+0, 5.1472E+0, 7.6672E+0, 8.4361E+0, 1.0223E+1, 1.2524E+1,RC     5
 • 1.8890E+1, 2.0473E+1, 4.9186E+0, 3.6204E+0, 8.8685E+0, 8.9314E+0,RC     6
 • 8.8663E+0, 6.3652E+0, 1.3841E+1, 1.3895E+1, 1.9896E+1, 1.9831E+1,RC     7
 • 1.4792E+1, 1.4879E+1, 1.3889E+1, 1.3905E+1, 1.9763E+1, 1.9848E+1,RC     8
 • 1.9819E+1, 1.9859E+1, 8.8747E+0, 8.8956E+0, 1.4731E+1, 1.4863E+1,RC     9
 • 1.3753E+1, 1.3873E+1, 1.9613E+1, 1.9812E+1, 8.3995E+0, 8.8103E+0,RC    10
 • 1.3954E+1, 1.4697E+1, 1.7182E+1, 1.9427E+1, 8.8324E+0, 8.9166E+0,RC    11
 • 7.4257E+0, 1.1932E+1, 4.3627E+1, 4.3696E+1, 1.3728E+1, 1.3868E+1,RC    12
 • 1.9348E+1, 1.9752E+1, 4.9516E+0, 4.4697E+0, 8.8644E+0, 8.9247E+0,RC    13
 • 1.3537E+1, 1.3826E+1, 1.9091E+1, 1.9701E+1, 1.4041E+1, 1.4729E+1,RC    14
 • 1.3734E+1, 1.3869E+1, 1.9362E+1, 1.9757E+1, 1.9805E+1, 1.9805E+1,RC    15
 • 8.5411E+0, 8.8544E+0, 1.3850E+1, 1.4690E+1, 1.3261E+1, 1.3767E+1,RC    16
 • 1.8819E+1, 1.9642E+1, 7.6267E+0, 8.7023E+0, 1.2678E+1, 1.4479E+1,RC    17
 • 1.5770E+1, 1.9165E+1, 1.1721E+1, 1.4340E+1, 2.1500E+1, 2.5055E+1,RC    18
 • 1.3189E+1, 1.8704E+1, 2.6959E+1, 3.3451E+1, 8.2881E+0, 9.1753E+0/RC    19
 DATA (RCX(I),I=115,228)/
 • 8.0618E+0, 7.7613E+0, 8.7727E+0, 8.9040E+0, 3.0296E+1, 3.0696E+1,RC    20
 • 3.3132E+1, 4.1735E+1, 1.8895E+1, 2.0480E+1, 2.3379E+1, 2.5350E+1,RC    21
 • 4.8252E+1, 4.9358E+1, 4.7011E+1, 4.9093E+1, 5.8656E+1, 6.6062E+1,RC    22
 • 5.2294E+1, 6.4872E+1, 6.3194E+1, 7.6347E+1, 1.1480E+2, 1.3442E+2,RC    23
 • 4.8632E+0, 1.2613E-1, 1.3425E+1, 1.4605E+1, 8.8465E+0, 8.3859E+0,RC    24
 • 1.4570E+1, 1.4830E+1, 1.4701E+1, 1.4858E+1, 8.6483E+0, 8.8767E+0,RC    25
 • 1.4356E+1, 1.4786E+1, 7.9351E+0, 8.7476E+0, 1.0877E+1, 1.3410E+1,RC    26
 • 1.2445E+1, 1.4409E+1, 2.0591E+1, 2.4957E+1, 8.4776E+0, 8.8434E+0,RC    27
 • 3.1674E+1, 3.1768E+1, 1.9009E+1, 1.9680E+1, 2.9266E+1, 3.1244E+1,RC    28
 • 4.1684E+1, 4.3259E+1, 5.3057E+1, 5.5060E+1, 6.4519E+1, 6.6878E+1,RC    29
 • 8.8371E+0, 8.1161E+0, 1.8741E+1, 1.9639E+1, 2.5002E+1, 2.5645E+1,RC    30
 • 1.3602E+1, 1.4660E+1, 1.8952E+1, 1.9683E+1, 2.5461E+1, 2.5747E+1,RC    31
 • 2.5642E+1, 2.5789E+1, 8.6071E+0, 8.4381E+0, 1.3444E+1, 1.4627E+1,RC    32
 • 1.3370E+1, 1.1708E+1, 1.8462E+1, 1.9579E+1, 1.9033E+1, 1.9605E+1,RC    33
 • 2.4711E+1, 2.5583E+1, 6.8476E+0, 9.3941E+0, 2.2838E+1, 2.5287E+1,RC    34
 • 2.2981E+1, 2.5319E+1, 2.3204E+1, 2.5368E+1, 1.6457E+1, 1.9247E+1,RC    35
 • 2.2414E+1, 2.5196E+1, 1.1517E+1, 1.4771E+1, 1.5903E+1, 1.9200E+1,RC    36
 • 1.1411E+1, 1.3313E+1, 1.0825E+1, 1.4553E+1, 2.0506E+1, 2.4892E+1,RC    37
 • 2.0803E+1, 2.4958E+1, 2.0187E+1, 2.4817E+1, 1.4656E+1, 1.8920E+1/RC    38
 DATA (RCX(I),I=229,342)/
 • 1.3065E+1, 1.8745E+1, 1.8470E+1, 2.4566E+1, 2.9517E+1, 3.6151E+1,RC    39
 • 1.8105E+1, 2.4479E+1, 2.8473E+1, 3.5392E+1, 1.6198E+1, 2.4178E+1,RC    40
 • 7.2259E+0, 1.1874E+1, 1.9595E+1, 2.0602E+1, 2.9900E+1, 3.1393E+1,RC    41
 • 2.1864E+1, 3.0094E+1, 2.7425E+1, 3.5956E+1, 1.8327E+1, 2.0390E+1,RC    42
 • 2.3721E+1, 2.6229E+1, 4.1216E+1, 6.8354E+1, 2.8903E+1, 3.2053E+1,RC    43
 • 5.4085E+0, 5.0523E+0, 8.8816E+0, 8.9283E+0, 1.9658E+1, 1.9833E+1,RC    44
 • 2.4888E+1, 2.5623E+1, 1.9752E+1, 1.9844E+1, 2.5522E+1, 2.5762E+1,RC    45
 • 1.1268E+1, 1.3494E+1, 2.1872E+1, 2.5073E+1, 8.9130E+0, 8.9360E+0,RC    46
 • 1.3638E+1, 1.3849E+1, 1.3087E+1, 1.3746E+1, 8.8561E+0, 8.9228E+0,RC    47
 • 1.3573E+1, 1.3835E+1, 8.9199E+0, 8.5056E+0, 2.3168E+1, 2.5320E+1,RC    48
 • 1.9851E+1, 1.9868E+1, 1.3843E+1, 1.3894E+1, 1.3836E+1, 1.1870E+1,RC    49
 • 2.5697E+1, 2.5801E+1, 2.4386E+1, 2.5558E+1, 3.1609E+1, 3.1752E+1,RC    50
 • 2.5748E+1, 2.5812E+1, 5.0377E+0, 4.9836E+0, 1.0934E+1, 1.3424E+1,RC    51
 • 2.1758E+1, 2.5047E+1, 8.8383E+0, 8.9196E+0, 1.3716E+1, 1.3865E+1,RC    52
 • 8.7447E+0, 8.8969E+0, 1.3032E+1, 1.3731E+1, 2.5287E+1, 2.5708E+1,RC    53
 • 8.7682E+0, 8.6738E+0, 8.8434E+0, 8.3281E+0, 2.2687E+1, 2.5213E+1,RC    54
 • 1.9770E+1, 1.9846E+1, 1.3717E+1, 1.3866E+1, 1.3697E+1, 1.1741E+1,RC    55
 • 2.3921E+1, 2.5457E+1, 3.1611E+1, 3.1752E+1, 1.9463E+1, 1.9777E+1,RC    56
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* 4.9680E+0, 4.9679E+0, 8.5329E+0, 8.3574E+0, 1.1100E+1, 1.3459E+1/RC    57
 DATA (RCX(I),I=343,456)/
* 6.8359E+0, 8.4101E+0, 6.5792E+0, 8.5195E+0, 7.9169E+0, 7.2567E+0,RC    58
* 2.5898E+1, 3.6833E+1, 9.3122E+0, 1.3169E+1, 1.3018E+1, 1.4067E+1,RC    59
* 1.2062E+1, 1.6483E+1, 2.2059E+1, 3.0219E+1, 4.0626E+1, 2.4833E+1,RC    60
* 4.7171E+0,-1.7656E+0, 8.9014E+0, 8.9335E+0, 8.8922E+0, 8.9209E+0,RC    61
* 8.9393E+0, 8.9114E+0, 1.4716E+1, 1.4862E+1, 4.9246E+0, 2.7772E+0,RC    62
* 8.0817E+0, 8.1730E+0, 1.2860E+1, 1.3683E+1, 1.6441E+0, 1.1811E+1,RC    63
* 1.3357E+1, 1.4603E+1, 2.3037E+1, 2.4463E+1, 2.9560E+1, 3.1322E+1,RC    64
* 3.5291E+1, 3.9643E+1, 4.9618E+0, 4.5011E+0, 8.6251E+0, 7.6812E+0,RC    65
* 1.4344E+1, 1.4782E+1, 1.3495E+1, 1.3816E+1, 4.6321E+0, 5.8115E+0,RC    66
* 1.1408E+1, 9.5560E+0, 1.4478E+1, 1.6115E+1, 2.5248E+1, 2.5700E+1,RC    67
* 1.7271E+1, 1.4375E+1, 1.9088E+1, 1.8322E+1, 1.3044E+1, 1.3737E+1,RC    68
* 1.2914E+1, 1.3705E+1, 4.1643E+1, 4.2645E+1, 1.8636E+1, 1.9611E+1,RC    69
* 1.7383E+1, 1.9372E+1, 3.1552E+1, 3.1736E+1, 2.5887E+0, 8.8649E+0,RC    70
* 2.1908E+1, 2.1139E+1, 3.5278E+1, 3.7234E+1, 2.4928E+1, 2.5602E+1,RC    71
* 1.8802E+1, 1.9644E+1, 1.3603E+1, 1.3839E+1, 4.3962E+1, 4.8559E+1,RC    72
* 4.5666E+1, 4.8829E+1, 4.2053E+1, 4.8223E+1, 2.4549E+1, 2.5557E+1,RC    73
* 1.1372E+1, 1.2458E+1, 1.4365E+1, 1.3756E+1, 8.6972E+0, 8.8862E+0,RC    74
* 1.6571E+1, 1.9308E+1, 1.6512E+1, 1.9303E+1, 2.1982E+1, 2.5156E+1,RC    75
* 1.4119E+1, 1.4734E+1, 1.9231E+1, 1.9729E+1, 1.9548E+1, 1.9746E+1/RC    76
 DATA (RCX(I),I=457,570)/
* 1.1822E+1, 1.4389E+1, 3.1049E+1, 3.1623E+1, 1.1132E+1, 1.3451E+1,RC    77
* 1.9847E+1, 1.9867E+1, 2.9318E+1, 3.0475E+1, 1.9170E+1, 1.9711E+1,RC    78
* 2.9625E+1, 3.0481E+1, 1.4352E+1, 1.4249E+1, 1.9659E+1, 1.9822E+1,RC    79
* 1.9070E+1, 1.9696E+1, 1.8957E+1, 1.9675E+1, 1.4473E+1, 1.8946E+1,RC    80
* 1.7894E+1, 1.9709E+1, 4.4084E+1, 5.2850E+1, 1.8648E+1, 1.9625E+1,RC    81
* 1.8570E+1, 1.9605E+1, 1.2838E+1, 1.3688E+1, 2.6969E+1, 2.5644E+1,RC    82
* 1.2824E+1, 1.4545E+1, 1.4169E+1, 1.4353E+1, 1.3517E+1, 1.5962E+1,RC    83
* 3.1596E+1, 3.1747E+1, 7.7319E+0, 6.6106E+0, 1.3408E+1, 1.3861E+1,RC    84
* 1.3519E+1, 1.3825E+1, 1.1310E+1, 1.7205E+1, 8.8341E+0, 9.9762E+0,RC    85
* 1.3883E+1, 1.7844E+1, 1.4542E+1, 1.4598E+1, 1.3884E+1, 1.5388E+1,RC    86
* 1.4723E+1, 1.4255E+1, 3.0922E+1, 3.1551E+1, 4.4168E+1, 4.3150E+1,RC    87
* 1.7254E+1, 2.0259E+1, 1.4702E+1, 1.3924E+1, 1.9567E+1, 2.0616E+1,RC    88
* 1.7524E+1, 2.0305E+1, 1.4512E+1, 1.3461E+1, 1.0778E+1, 1.6542E+1,RC    89
* 2.9602E+1, 3.1352E+1, 1.9821E+1, 1.9860E+1, 4.3216E+1, 4.3559E+1,RC    90
* 2.4887E+1, 2.8629E+1, 8.9359E+0, 8.9185E+0, 8.9338E+0, 9.7059E+0,RC    91
* 7.6039E+0, 8.5895E+0, 8.0726E+0, 9.7778E+0, 1.3671E+1, 1.4231E+1,RC    92
* 1.3863E+1, 1.4657E+1, 3.6212E+1, 3.6925E+1, 4.1810E+0, 4.1810E+0,RC    93
* 4.9678E+0, 4.9678E+0, 1.7190E+1, 1.9109E+1, 4.1911E+1, 4.8303E+1,RC    94
* 1.9205E+1, 2.0298E+1, 4.4964E+1, 5.5060E+1, 1.1363E+1, 1.2437E+1/RC    95
 DATA (RCX(I),I=571,678)/
* 2.4353E+1, 2.4320E+1, 1.0318E+1, 3.0286E+1, 2.6256E+1, 7.7366E+1,RC    96
* 3.8500E+1, 3.8500E+1, 1.5654E+1, 1.7603E+1, 3.0000E+1, 3.0000E+1,RC    97
* 2.4146E+1, 2.4695E+1, 2.2076E+1, 3.5026E+1, 1.2408E+1, 1.1942E+1,RC    98
* 4.0773E+1, 4.0808E+1, 4.1234E+1, 4.4855E+1, 1.1280E+1, 1.0308E+1,RC    99
* 6.8219E+0, 6.9988E+0, 3.0774E+1, 3.3646E+1, 1.2728E+1, 4.3491E+1,RC   100
* 4.3367E+1, 4.0269E+1, 2.6809E+0, 7.5880E+0, 8.8773E+1, 3.4662E+1,RC   101
* 5.6068E+0, 7.2001E+0,-1.7948E+0, 2.9804E+1, 2.3000E+1, 3.2500E+1,RC   102
* 4.2931E+0, 7.4250E+0, 1.0622E+1, 1.6000E+1, 1.8114E+1, 2.2002E+1,RC   103
* 3.2065E+1, 3.4001E+1, 1.0370E+1, 1.7521E+1, 1.0053E+1, 1.5340E+1,RC   104
* 9.9257E+0, 2.0740E+1, 1.7845E+1, 2.4000E+1, 1.7404E+1, 2.0511E+1,RC   105
* 5.4604E+0, 6.5009E+0, 1.4373E+1, 3.4558E+1, 2.2462E+1, 2.9000E+1,RC   106
* 1.1416E+1, 1.3845E+1, 3.0894E+1, 4.0000E+1, 3.5032E+1, 3.9538E+1,RC   107
* 4.7558E+1, 1.0114E+2, 8.1614E+1, 7.6250E+1, 1.1085E+2, 1.1098E+2,RC   108
* 3.7206E+1, 6.1372E+1, 7.0881E+0, 4.4321E+1, 3.2377E+1, 3.3346E+1,RC   109
* 2.2189E+1, 5.3500E+1, 1.2060E+2, 1.1204E+2, 7.0971E+1, 6.6165E+1,RC   110
* 3.7881E+1, 6.9517E+1, 8.4657E+1, 1.7419E+2, 3.7210E+0, 1.4900E+1,RC   111
* 1.3631E+1, 2.8636E+1, 2.6043E+1, 4.2291E+1, 3.9686E+1, 6.7238E+1,RC   112
* 2.9515E+1, 2.7617E+1, 2.8410E+1, 2.7439E+1, 5.1062E+1, 6.0000E+1/RC   113
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 DATA (RDX(I),I= 1,114)/
* 7.3366E-4, 2.0983E-4, 9.3467E-4, 3.6202E-4, 1.8325E-3, 2.3113E-4,RD     1
* 4.4145E-4, 8.6597E-5, 2.4001E-4, 2.1613E-4, 2.1387E-3, 4.3148E-4,RD     2
* 7.1091E-4, 1.3281E-4, 8.2886E-4, 1.3813E-4, 7.5355E-5, 7.6670E-5,RD     3
* 7.5822E-4, 4.4717E-4, 1.0866E-3, 2.3055E-4, 7.0445E-4, 5.8077E-5,RD     4
* 7.5355E-5, 7.6670E-5, 7.5822E-4, 4.4717E-4, 1.0866E-3, 2.3055E-4,RD     5
* 7.0445E-4, 5.8077E-5, 3.0353E-5, 2.7750E-4, 1.2781E-4, 1.0929E-4,RD     6
* 1.5288E-4, 6.7172E-4, 2.5915E-5, 2.3900E-6, 8.5923E-5, 6.2719E-6,RD     7
* 4.1685E-5, 3.8524E-6, 8.0914E-6, 9.4385E-7, 4.0610E-5, 3.6685E-6,RD     8
* 1.9832E-5, 1.9300E-6, 1.1610E-4, 9.8990E-5, 6.4798E-5, 6.2062E-6,RD     9
* 5.8926E-5, 5.5773E-6, 9.6159E-5, 8.8991E-6, 3.8821E-4, 1.7961E-4,RD    10
* 3.4815E-4, 3.0878E-5, 8.7846E-4, 6.4302E-5, 1.3162E-4, 9.4657E-5,RD    11
* 1.6050E-3,-2.3823E-4, 3.4088E-5, 3.2831E-6, 6.7860E-5, 6.3272E-6,RD    12
* 1.4485E-4, 1.7386E-5, 1.0087E-5, 1.0434E-4, 1.2265E-4, 9.6225E-5,RD    13
* 1.3827E-4, 1.2620E-5, 2.8693E-4, 2.5576E-5, 3.0983E-4, 2.5995E-5,RD    14
* 6.9913E-5, 6.1657E-6, 1.8822E-4, 1.7170E-5, 1.0708E-4, 1.0014E-5,RD    15
* 2.1969E-4, 8.6130E-5, 3.7919E-4, 3.1900E-5, 2.3841E-4, 2.1388E-5,RD    16
* 3.8529E-4, 3.4185E-5, 5.9728E-4, 1.7700E-4, 7.8461E-4, 6.2918E-5,RD    17
* 1.3535E-3, 1.0251E-4, 1.0922E-3, 8.3036E-5, 1.4850E-3, 1.1449E-4,RD    18
* 2.2724E-3, 1.7133E-4, 2.6030E-3, 1.9314E-4, 3.7280E-4, 1.3944E-4/RD    19
 DATA (RDX(I),I=115,228)/
* 3.6433E-4, 2.9029E-4, 1.6625E-4, 1.0910E-4, 1.8660E-4, 1.6391E-5,RD    20
* 3.6987E-3, 2.9316E-4, 7.0071E-4, 5.7198E-5, 8.7299E-4, 7.1736E-5,RD    21
* 5.2882E-4, 4.8179E-5, 9.8102E-4, 8.7625E-5, 2.9162E-3, 2.1768E-4,RD    22
* 5.1548E-3, 3.9398E-4, 5.7402E-3, 4.6496E-4, 8.5585E-3, 6.9335E-4,RD    23
* 6.9025E-5, 1.1652E-3, 5.3078E-4, 4.4508E-5, 1.2868E-4, 2.0527E-4,RD    24
* 1.2297E-4, 1.1118E-5, 7.5209E-5, 6.8970E-6, 1.8597E-4, 8.7495E-5,RD    25
* 1.9935E-4, 1.7525E-5, 5.0003E-4, 1.7303E-4, 9.8146E-4, 7.2205E-5,RD    26
* 8.4052E-4, 7.3480E-5, 1.7323E-3, 1.2728E-4, 2.3777E-4, 8.3268E-5,RD    27
* 4.9385E-5, 4.1204E-6, 3.1763E-4, 2.8757E-5, 9.2717E-4, 8.2272E-5,RD    28
* 7.5243E-4, 6.8660E-5, 9.5619E-4, 8.6866E-5, 1.1273E-3, 1.0265E-4,RD    29
* 1.8877E-4, 2.8723E-4, 4.0880E-4, 3.4643E-5, 3.0731E-4, 2.7982E-5,RD    30
* 7.2948E-4, 3.0807E-4, 3.3204E-4, 2.8100E-5, 1.3828E-4, 1.2769E-5,RD    31
* 7.1462E-5, 6.5675E-6, 2.0191E-4, 1.8735E-4, 5.1259E-4, 4.0900E-5,RD    32
* 2.1250E-4, 6.4005E-4, 5.0949E-4, 4.3548E-5, 3.0722E-4, 2.7627E-5,RD    33
* 4.1370E-4, 3.7228E-5, 1.2231E-3, 1.4108E-4, 1.0262E-3, 8.0162E-5,RD    34
* 9.7387E-4, 7.5464E-5, 8.9112E-4, 6.8074E-5, 1.1768E-3, 9.1902E-5,RD    35
* 1.1809E-3, 9.3695E-5, 1.2197E-3, 8.7105E-5, 1.3106E-3, 9.7479E-5,RD    36
* 8.9857E-4, 1.6437E-4, 1.4829E-3, 1.0672E-4, 1.8070E-3, 1.3783E-4,RD    37
* 1.6983E-3, 1.2812E-4, 1.9300E-3, 1.4910E-4, 1.7955E-3, 1.3899E-4/RD    38
 DATA (RDX(I),I=229,342)/
* 2.4465E-3, 1.6416E-4, 2.4825E-3, 1.8643E-4, 7.2006E-3, 2.5752E-3,RD    39
* 2.6195E-3, 1.9851E-4, 7.9027E-3, 2.9811E-3, 3.2452E-3, 2.4216E-4,RD    40
* 9.0172E-4,-6.5451E-5, 4.5856E-4, 3.9104E-5, 6.8847E-4, 5.9754E-5,RD    41
* 3.3338E-3, 2.4865E-4, 3.4888E-3, 2.6359E-4, 8.8905E-4, 7.0456E-5,RD    42
* 1.0967E-3, 8.8557E-5, 2.8392E-2, 9.6413E-3, 1.3689E-3, 1.0900E-4,RD    43
*-1.9018E-4,-1.2231E-5, 1.2827E-4, 6.4754E-5, 5.7674E-6, 4.9931E-6,RD    44
* 3.4901E-4, 3.1479E-5, 4.5044E-5, 4.2567E-6, 1.1625E-4, 1.0701E-5,RD    45
* 8.3692E-4, 5.9576E-5, 1.3981E-3, 1.1265E-4, 1.4821E-4, 1.3810E-4,RD    46
* 1.0098E-4, 9.2587E-6, 6.6075E-4, 3.8980E-4, 1.4248E-4, 1.1319E-4,RD    47
* 2.6917E-4, 1.8563E-4, 1.0883E-4, 1.9129E-4, 9.4109E-4, 7.6090E-5,RD    48
* 8.0293E-6, 7.3208E-7, 2.5386E-5, 2.5171E-6, 4.0963E-5, 4.4931E-4,RD    49
* 5.1291E-5, 5.0498E-6, 5.0965E-4, 4.0957E-5, 7.0103E-5, 6.5028E-6,RD    50
* 3.1893E-5, 3.1736E-6,-2.5008E-5,-2.2988E-6, 9.5597E-4, 6.9872E-5,RD    51
* 1.4399E-3, 1.1654E-4, 1.7500E-4, 1.3961E-4, 7.2541E-5, 6.8719E-6,RD    52
* 1.7802E-4, 1.1178E-4, 3.1554E-4, 2.6614E-5, 2.0345E-4, 1.8750E-5,RD    53
* 2.1314E-4, 2.0069E-4, 1.1234E-4, 2.1165E-4, 1.1189E-3, 9.2060E-5,RD    54
* 3.8246E-5, 3.7534E-6, 7.1801E-5, 6.5999E-6, 8.9468E-5, 5.1245E-4,RD    55
* 6.8033E-4, 5.5952E-5, 6.8483E-5, 5.2713E-6, 1.5219E-4, 1.4059E-5,RD    56
* 3.9647E-9, 9.2105E-9, 3.6515E-4, 3.2947E-4, 8.9020E-4, 6.4435E-5/RD    57
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 DATA (RDX(I),I=343,456)/
* 7.9725E-4, 1.6883E-4, 8.2277E-4, 1.5867E-4, 5.0314E-4, 4.9066E-4,RD   58
* 1.8823E-3, 1.3782E-4, 1.5057E-3, 1.0755E-4, 2.4202E-3, 1.7 8E-3,RD   59
* 2.6091E-3, 9.3925E-4, 3.1732E-3, 2.2817E-4, 1.0383E-3, 1.4814E-4,RD   60
* 1.5897E-4, 1.6205E-3, 2.1221E-4, 1.9830E-4, 1.5668E-4, 1.3999E-4,RD   61
* 3.2487E-4, 3.2372E-4, 7.0205E-5, 6.3054E-6, 2.7136E-5, 5.2336E-4,RD   62
* 3.5449E-4, 7.2652E-5, 3.8205E-4, 3.2990E-5, 1.1091E-3, 3.2451E-4,RD   63
* 5.4776E-4, 4.4671E-5, 6.5259E-4, 5.6218E-5, 8.1233E-4, 7.8511E-5,RD   64
* 1.9109E-4, 2.8051E-5, 5.6735E-6, 1.3392E-4, 1.7432E-4, 3.0516E-4,RD   65
* 2.0548E-4, 1.8160E-5, 2.7982E-4, 1.4 E-4, 2.8758E-4,-3.9209E-5,RD   66
*-5.0256E-4, 1.3766E-4, 2.9372E-4, 1.6 E-4, 2.1687E-4, 1.9884E-5,RD   67
* 9.1148E-4, 7.3435E-5, 2.9649E-4, 3.6902E-4, 3.0992E-4, 2.5770E-5,RD   68
* 3.5891E-4, 3.0492E-5, 4.0504E-4, 3.3874E-6, 4.4887E-4, 3.8862E-5,RD   69
* 8.9131E-4, 7.4341E-5, 9.0743E-5, 8.6956E-6, 2.1001E-4, 9.1818E-5,RD   70
* 1.3017E-3, 1.0181E-4, 8.9798E-4, 7.7545E-5, 3.3363E-4, 3.0097E-5,RD   71
* 3.8986E-4, 3.4027E-5, 1.1409E-4, 1.0626E-5, 2.0455E-3, 1.7094E-4,RD   72
* 1.4593E-3, 1.2684E-4, 2.6767E-3, 2.1543E-4, 4.6919E-4, 4.1367E-5,RD   73
* 8.6963E-4, 6.6541E-5, 2.0384E-4, 2.6957E-4, 1.9294E-4, 1.1068E-4,RD   74
* 1.0929E-3, 8.2045E-5, 1.1002E-3, 8.2404E-5, 1.2841E-3, 9.8751E-5,RD   75
* 2.8671E-4, 2.5420E-5, 2.3612E-4, 2.1361E-5, 1.2054E-4, 1.1331E-5/RD   76
 DATA (RDX(I),I=457,570)/
* 1.0009E-3, 7.4218E-5, 2.7814E-4, 2.5846E-5, 9.0831E-4, 6.6485E-5,RD   77
* 9.3983E-6, 8.3375E-7, 5.4533E-4, 4.8767E-5, 2.6057E-4, 2.4080E-5,RD   78
* 4.3665E-4, 4.7646E-5, 7.0355E-4,-1.5687E-6, 7.9249E-5, 7.4334E-6,RD   79
* 2.9459E-4, 2.6314E-5, 3.3446E-4, 2.9377E-5, 1.8080E-3, 1.3518E-4,RD   80
* 6.8486E-4, 5.3386E-5, 3.5174E-3, 2.6179E-4, 4.3850E-4, 3.6599E-5,RD   81
* 4.6749E-4, 3.9525E-5, 3.8753E-4, 3.3684E-5, 3.1693E-4, 2.8110E-5,RD   82
* 7.0381E-4, 5.2573E-5, 2.7247E-4, 1.0494E-4, 8.5235E-4,-1.0109E-4,RD   83
* 7.4495E-5, 6.9969E-6, 5.6507E-4, 6.6713E-4, 1.8332E-4, 1.6224E-5,RD   84
* 1.4362E-4, 1.2702E-5, 1.4264E-3,-9.5952E-5, 2.9723E-4, 7.1462E-6,RD   85
* 5.1301E-4, 2.3627E-4, 1.3584E-4, 5.8690E-5, 4.4857E-4, 6.2392E-4,RD   86
* 7.0958E-5, 1.3875E-4, 3.2053E-4, 3.9088E-5,-1.8914E-4,-4.7796E-5,RD   87
* 1.1982E-3, 8.8105E-5, 7.9677E-5, 2.2435E-4, 4.5768E-4, 3.6923E-5,RD   88
* 1.1070E-3, 8.1508E-5, 3.0211E-4, 1.1266E-4, 1.2786E-3, 1.3563E-5,RD   89
* 7.8411E-4, 6.5587E-5, 1.9091E-5, 1.7980E-6, 1.8692E-4, 1.7677E-5,RD   90
* 3.4511E-4, 3.0400E-5, 2.4729E-4, 2.1132E-4, 1.1774E-4, 3.9077E-5,RD   91
* 5.0147E-4, 9.7232E-5, 5.0308E-4, 1.1062E-4, 4.4650E-4, 1.2923E-4,RD   92
* 3.7648E-4, 3.8305E-5, 1.0778E-4,-2.4793E-5, 1.2296E-5, 1.2296E-5,RD   93
* 0.0000E+0, 0.0000E+0, 1.1762E-2, 1.0713E-2, 2.1943E-2, 2.4824E-2,RD   94
* 4.6588E-4,-1.1031E-4, 7.7667E-3, 1.2602E-3, 8.7132E-4, 4.1360E-4/RD   95
 DATA (RDX(I),I=571,678)/
* 2.4265E-3, 2.4485E-3, 2.4569E-2, 9.2427E-3, 4.1841E-2, 1.2406E-2,RD   96
*-5.6160E-8,-2.7880E-8, 1.0211E-2, 1.4457E-2,-4.3324E-8,-4.7945E-8,RD   97
  1.1 2E-4, 1.6917E-3, 2.9032E-3,-1.8099E-3,-1.0765E-4, 1.1715E-4,RD   98
* 6.7773E-3, 6.7855E-3, 2.4593E-3, 7.2347E-4, 4.1935E-4, 3.0361E-4,RD   99
*-3.4000E-5,-5.9239E-6, 3.1212E-3, 2.4790E-4, 7.0302E-3, 5.6028E-4,RD  100
* 9.3363E-4, 2.1458E-3, 5.3916E-3, 1.1641E-9, 2.2394E-3, 1.6019E-7,RD  101
* 7.8947E-4,-1.2806E-8, 3.7012E-2, 1.8529E-4, 5.3897E-3,-4.2766E-6,RD  102
* 2.2870E-3,-6.2543E-5, 1.5556E-3,-6.3330E-8, 2.1540E-3,-4.8056E-7,RD  103
*-2.5913E-4,-1.2666E-7, 5.0039E-3,-2.2539E-3, 4.2970E-3, 2.7940E-8,RD  104
* 1.0649E-2,-6.0536E-9, 3.5848E-3, 3.6321E-8, 2.9989E-4,-2.2319E-6,RD  105
* 9.1830E-4, 2.7940E-9, 1.1681E-2,-3.5856E-8,-3.2700E-3, 2.6077E-8,RD  106
* 7.9007E-3, 7.0875E-3, 6.3162E-3, 8.3819E-9, 7.9272E-3, 6.4265E-3,RD  107
* 2.6448E-2, 7.5265E-3, 1.6795E-2, 1.6077E-2, 1.4481E-2, 1.4015E-2,RD  108
* 2.0181E-2, 4.5369E-3, 3.6115E-2,-4.3586E-7, 3.5619E-3, 3.0396E-3,RD  109
* 3.5092E-2, 1.8626E-8, 7.2511E-3, 9.6566E-3, 3.1133E-3, 4.6023E-3,RD  110
* 1.7185E-2,-4.9290E-3, 4.1026E-2,-1.6885E-2, 1.2609E-2,-6.0536E-8,RD  111
* 9.3034E-3,-1.8283E-5, 1.4124E-2, 3.1587E-3, 1.1492E-2, 3.1862E-3,RD  112
*-4.0598E-4, 8.8853E-4, 8.8418E-4, 1.1652E-3, 7.4406E-3, 1.0431E-7/RD  113
 DATA (REX(I),I=  1,114)/
*-7.5453E+5,-2.3397E+4, 6.1092E+4,-1.8688E+6,-3.8537E+5,-4.8199E+6,RE    1
*-2.6202E+5,-1.5517E+5,-5.5964E+5, 1.3133E+ , 9.0355E+5,-3.8898E+6,RE    2
*-1.3630E+5,-9.6431E+5, 2.4880E+4,-2.5924E+6, 2.2087E+4,-1.7826E+6,RE    3
* 1.8767E+5, 2.4237E+5,-4.8592E+5,-2.7825E+6,-1.1239E+6,-9.2316E+5,RE    4
* 2.2087E+4,-1.7826E+6, 1.8767E+5, 2.4237E+5,-4.4592E+5,-2.7825E+6,RE    5
*-1.1239E+6,-9.2316E+5, 2.3393E+4, 4.2753E+6,-1.5810E+5,-1.2884E+5,RE    6
*-5.5823E+4, 7.4694E+6,-2.5916E+5,-2.2401E+5,-4.8925E+5,-4.0093E+5,RE    7
*-3.3255E+5,-2.7931E+5,-1.5981E+5,-1.4502E+5,-3.8557E+5,-3.3371E+5,RE    8
*-2.8367E+5,-2.5430E+5,-1.6192E+5,-2.5325E+4,-4.9824E+5,-3.9996E+5,RE    9
*-3.6152E+5,-2.7984E+5,-5.9318E+5,-4.7849E+5,-3.0152E+5,-1.7189E+5,RE   10
*-9.2207E+5,-6.1044E+5,-8.1729E+5,-2.1366E+6,-1.9755E+5,-1.4804E+5,RE   11
*-4.9078E+4, 5.8484E+5,-6.1006E+5,-5.5956E+5,-3.7134E+5,-2.8505E+5,RE   12
*-9.4781E+5,-7.0767E+5, 1.9783E+3, 1.5432E+6,-1.7425E+5,-1.3841E+5,RE   13
*-5.0053E+5,-3.4550E+5,-8.9623E+5,-6.2244E+5,-5.2422E+5,-3.9295E+5,RE   14
*-3.6968E+5,-2.8292E+5,-7.2949E+5,-5.2546E+5,-6.0225E+5,-4.6570E+5,RE   15
*-2.8742E+5,-1.5837E+5,-6.6952E+5,-4.9208E+5,-6.0339E+5,-3.7899E+5,RE   16
*-1.0456E+6,-7.0136E+5,-2.4292E+5,-3.9819E+5,-7.9721E+5,-7.8066E+5,RE   17
*-1.0900E+6,-2.7675E+6,-7.5323E+5,-1.3506E+6,-1.5903E+6,-2.3962E+6,RE   18
*-1.2396E+6,-2.8809E+6,-2.0825E+6,-5.0075E+6,-2.6408E+5,-2.1633E+6/RE   19
 DATA (REX(I),I=115,228)/
*-2.8543E+5, 2.7500E+6,-2.2966E+5,-1.5702E+5,-9.7323E+5,-8.1497E+5,RE   20
*-3.7939E+6,-4.3486E+6,-8.9827E+5,-7.5324E+5,-1.2457E+6,-1.0443E+6,RE   21
*-2.3061E+6,-1.7075E+6,-2.9596E+6,-2.0141E+6,-3.7641E+6,-7.8884E+6,RE   22
*-5.1282E+6,-9.3543E+6,-7.4612E+6,-7.2422E+6,-1.2333E+7,-1.2056E+7,RE   23
* 2.3229E+4, 1.4016E+7,-6.9566E+5,-4.7298E+5,-1.7104E+5, 1.5186E+6,RE   24
*-3.9923E+5,-2.7519E+5,-3.2309E+5,-2.3590E+5,-2.6939E+5,-1.5799E+5,RE   25
*-4.9727E+5,-3.3772E+5,-2.0885E+5,-2.4572E+5,-5.0394E+5,-2.2045E+6,RE   26
*-1.1207E+6,-7.8758E+5,-1.2869E+6,-3.4992E+6,-2.9400E+5,-1.6503E+5,RE   27
*-4.5954E+5,-4.0189E+5,-1.8019E+6,-7.4046E+5,-2.3217E+6,-1.4808E+6,RE   28
*-2.9253E+6,-2.0855E+6,-3.7585E+6,-2.6969E+6,-4.6062E+6,-3.3910E+6,RE   29
*-1.6167E+5, 2.0250E+6,-9.3953E+5,-7.0909E+5,-1.2558E+6,-9.1340E+5,RE   30
*-4.8370E+5,-5.1415E+5,-7.5237E+5,-5.7552E+5,-8.5223E+5,-6.7942E+5,RE   31
*-6.5952E+5,-5.6480E+5,-2.6692E+5, 1.1260E+6,-8.0892E+5,-6.1417E+5,RE   32
*-6.1877E+5, 3.0859E+6,-1.1277E+6,-8.2686E+5,-1.8609E+6,-7.3597E+5,RE   33
*-1.4684E+6,-1.0382E+6,-1.5722E+5, 8.3461E+5,-1.4660E+6,-1.9919E+6,RE   34
*-1.3388E+6,-1.9095E+6,-1.1671E+6,-1.8334E+6,-1.2701E+6,-1.7678E+6,RE   35
*-1.7235E+6,-2.1241E+6,-6.0798E+5,-3.2513E+6,-9.3816E+5,-2.5933E+6,RE   36
*-7.2917E+5,-1.1448E+6,-7.8497E+5,-2.5867E+6,-1.7272E+6,-3.0840E+6,RE   37
*-1.5576E+6,-2.9883E+6,-1.9268E+6,-3.0375E+6,-1.4260E+6,-2.2441E+6/RE   38
 DATA (REX(I),I=229,342)/
*-9.7562E+5,-3.9400E+6,-1.8171E+6,-4.0063E+6,-8.8224E+5,-2.8907E+6,RE   39
*-1.9908E+6,-4.0020E+6,-1.1531E+6,-3.1502E+6,-1.9174E+6,-4.8745E+6,RE   40
*-1.4391E+5,-1.4086E+7,-9.5227E+5,-6.8956E+5,-1.6537E+6,-1.1597E+6,RE   41
*-2.3854E+6,-5.6154E+6,-3.0504E+6,-5.9776E+6,-8.7164E+5,-9.7036E+5,RE   42
*-1.3495E+6,-1.2709E+6,-2.2963E+6,-1.0684E+7,-1.4872E+6,-1.5347E+6,RE   43
* 3.8368E+4, 1.0919E+5,-1.5682E+5,-1.2604E+5,-5.4568E+5,-4.6902E+5,RE   44
*-1.3175E+6,-9.5046E+5,-5.0195E+5,-4.3726E+6,-8.8644E+5,-6.5763E+5,RE   45
*-4.3759E+5,-2.2055E+6,-1.7187E+6,-1.6430E+6,-1.1522E+5,-1.0129E+5,RE   46
*-4.8910E+5,-3.4187E+5,-4.4067E+5,-3.2021E+5,-1.7988E+5,-1.3929E+5,RE   47
*-5.1418E+5,-3.7707E+5,-4.2351E+4, 1.2586E+6,-1.3421E+6,-1.2794E+6,RE   48
*-2.5425E+5,-2.4545E+5,-2.7402E+5,-2.3688E+5,-1.5678E+5, 5.7382E+6,RE   49
*-4.7137E+5,-3.9764E+5,-9.0138E+5,-8.9810E+5,-8.0780E+5,-7.1125E+5,RE   50
*-4.4935E+5,-4.0080E+5, 6.7596E+4, 5.1107E+4,-5.5054E+5,-2.2720E+6,RE   51
*-1.8532E+6,-1.7344E+6,-1.9327E+5,-1.4855E+5,-4.4233E+5,-3.4593E+5,RE   52
*-2.4128E+5,-1.5757E+5,-5.2714E+5,-3.8222E+5,-1.0280E+6,-7.7692E+5,RE   53
*-2.2601E+5, 5.5863E+5,-1.4872E+5, 1.6766E+6,-1.7843E+6,-1.5285E+6,RE   54
*-5.0996E+5,-4.5035E+5,-4.3492E+5,-3.4252E+5,-3.9070E+5, 5.2218E+6,RE   55
*-1.3501E+6,-1.1920E+6,-7.8986E+5,-6.9882E+5,-8.7226E+5,-6.7695E+5,RE   56
* 1.1896E+0, 2.3245E+2,-2.8394E+5, 1.3705E+6,-5.0873E+5,-2.3509E+6/RE   57
 DATA (REX(I),I=343,456)/
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*-9.8883E+4,-1.3473E+6,-4.3002E+3,-1.7546E+6,-2.5449E+5, 4.0544E+6,RE     58
*-1.4824E+6,-5.0686E+6,-4.7585E+5,-2.7345E+6,-4.1739E+5,-7.9846E+5,RE     59
*-9.5856E+5,-2.5002E+6,-1.8727E+6,-6.8527E+6,-2.0359E+6,-1.9226E+6,RE     60
* 5.4676E+4, 1.7736E+7,-1.3205E+5,-1.1547E+5,-1.4585E+5,-1.1448E+5,RE     61
*-4.0176E+4,-3.5152E+4,-3.7738E+5,-2.9410E+5, 9.5604E+3, 5.6773E+6,RE     62
*-2.7634E+5,-1.9289E+5,-7.3100E+5,-4.5391E+5,-8.4866E+4,-5.2893E+6,RE     63
*-7.2636E+5,-6.5269E+5,-1.2395E+6,-8.3000E+5,-1.7008E+6,-1.2088E+6,RE     64
*-1.6536E+6,-1.1840E+6, 2.9868E+4, 9.0498E+5,-2.5728E+5, 3.5603E+6,RE     65
*-5.8903E+5,-3.9980E+5,-6.0869E+5,-4.3034E+5, 8.6210E+4,-2.1789E+6,RE     66
*-5.3818E+5, 1.0352E+6,-1.0398E+5,-8.3945E+6,-1.0541E+6,-7.9957E+5,RE     67
*-1.2660E+6,-1.3260E+6,-1.0227E+6, 2.6258E+6,-4.1186E+5,-3.8171E+5,RE     68
*-6.2451E+5,-4.3747E+5,-2.2281E+6,-2.2043E+6,-1.0473E+6,-7.3497E+5,RE     69
*-1.2623E+6,-9.2565E+5,-8.5401E+5,-7.2386E+5,-2.8099E+5,-1.6056E+5,RE     70
*-1.5963E+6,-3.8294E+6,-2.0873E+6,-1.4945E+6,-1.3967E+6,-1.0574E+6,RE     71
*-9.4894E+5,-6.4929E+5,-5.2908E+5,-3.8732E+5,-3.5522E+6,-2.8099E+6,RE     72
*-3.3433E+6,-2.2874E+6,-3.6896E+6,-3.0010E+6,-1.3304E+6,-9.4744E+5,RE     73
*-6.8763E+5,-1.1759E+6,-6.8973E+5, 2.1691E+6,-2.5682E+5,-1.6482E+5,RE     74
*-1.0030E+6,-2.3129E+6,-9.5208E+5,-2.4934E+6,-1.5232E+6,-2.8375E+6,RE     75
*-6.8997E+5,-4.5358E+5,-8.9151E+5,-6.4868E+5,-6.8869E+5,-5.3122E+5/RE     76
 DATA (REX(I),I=457,570)/
*-7.9693E+5,-2.3611E+6,-1.5804E+6,-1.2268E+6,-5.0226E+5,-1.9251E+6,RE     77
*-2.4474E+5,-2.3180E+5,-1.6475E+6,-1.1218E+6,-1.1253E+6,-8.1434E+5,RE     78
*-1.5545E+6,-8.2094E+5,-6.3656E+5, 1.1025E+7,-5.4678E+5,-4.4220E+5,RE     79
*-1.0283E+6,-7.4084E+5,-9.3092E+5,-6.5560E+5,-1.2535E+6,-3.0707E+6,RE     80
*-9.4915E+5,-1.1762E+6,-3.2626E+6,-7.1782E+6,-9.0650E+5,-7.3072E+5,RE     81
*-1.0043E+6,-7.8609E+5,-6.6705E+5,-4.3729E+5,-9.9106E+5,-6.9513E+5,RE     82
*-5.1408E+5,-1.0949E+6,-6.6124E+5, 8.0499E+5,-6.1301E+5,-9.9653E+5,RE     83
*-9.1803E+5,-8.1021E+5,-2.5339E+5, 5.1599E+6,-4.3072E+5,-2.8683E+5,RE     84
*-4.3527E+5,-3.0031E+5,-4.9505E+5,-1.3554E+7, 5.1622E+5,-1.8784E+6,RE     85
*-3.9171E+5,-2.0812E+7,-5.1461E+5, 3.4016E+5,-4.8906E+5,-1.2630E+7,RE     86
*-3.5536E+5, 1.5128E+6,-1.1195E+6,-6.5354E+5,-1.3740E+6, 2.7797E+6,RE     87
*-8.2736E+5,-2.2654E+6,-3.9790E+5, 2.2859E+6,-6.1731E+5,-6.8148E+5,RE     88
*-7.6441E+5,-2.1231E+6,-1.3109E+6, 8.2234E+6,-5.5405E+5,-1.6813E+7,RE     89
*-1.6585E+6,-1.3728E+6,-3.0527E+5,-2.7940E+5,-1.3634E+6,-1.1139E+6,RE     90
*-1.1780E+6,-8.9808E+5,-1.9450E+5,-1.4829E+5,-9.3682E+4,-3.6901E+6,RE     91
*-2.3471E+5,-7.8141E+4,-2.3884E+5,-4.7637E+6,-7.1869E+5, 7.3957E+5,RE     92
*-7.0131E+5,-3.7492E+5,-3.0603E+6,-6.0407E+6, 3.7120E+6, 3.7120E+6,RE     93
* 0.0000E+0, 0.0000E+0,-3.4350E+5,-1.2926E+6,-8.8633E+5,-2.1941E+5,RE     94
*-7.4108E+5,-1.0694E+6,-4.0055E+6,-3.9246E+6,-6.6846E+5,-9.9102E+5/RE     95
 DATA (REX(I),I=571,678)/
*-7.1168E+5,-7.3230E+5,-2.5178E+5,-4.8928E+6,-1.6547E+6,-2.3330E+7,RE     96
*-8.2413E+0,-2.6613E+1,-4.0579E+5,-7.5950E+5,-7.5974E+0,-4.4184E+1,RE     97
*-5.2135E+5,-2.4708E+6,-5.9925E+5,-1.4869E+7,-6.7245E+5,-4.2966E+5,RE     98
*-1.2762E+6,-1.4163E+6,-1.6348E+6,-3.5714E+6,-1.0[illegible]E+6, 3.4232E+6,RE     99
* 9.2563E+4,-9.4536E+4,-2.3365E+6,-8.7827E+5,-1.9[illegible]E+6,-1.3110E+6,RE    100
*-2.8458E+6, 1.5416E+5, 2.7224E+5, 8.0000E+0,-1.1[illegible]E+6, 2.0400E+3,RE    101
*-3.9311E+5,-2.2480E+2, 1.0220E+6, 1.2669E+6,-1.0309E+6,-6.5536E+4,RE    102
*-4.0414E+4,-2.5559E+6,-5.2971E+5,-2.3040E+3,-2.1766E+6,-6.1440E+3,RE    103
*-2.2447E+6,-2.8483E+3,-3.0690E+4, 7.8920E+3,-1.0577E+5, 9.6000E+1,RE    104
*-5.1790E+3,-8.8008E+0,-8.0534E+5, 3.8400E+2,-7.6407E+5,-3.2448E+4,RE    105
*-8.5768E+4, 3.2808E+1,-3.4728E+5,-1.6000E+2,-8.5664E+5, 2.3000E+1,RE    106
*-1.2338E+4,-4.6327E+5,-8.9748E+5, 6.4000E+1,-1.1032E+6,-6.7520E+6,RE    107
*-2.0582E+6, 2.6593E+6,-2.4575E+6, 6.5076E+6,-3.9568E+6,-3.1940E+6,RE    108
*-2.0584E+6,-9.5881E+6, 1.6061E+6,-5.7200E+2,-1.5960E+6,-2.0438E+6,RE    109
*-3.6558E+4, 2.0000E+1,-5.3065E+6, 7.5876E+6,-6.2885E+6, 2.8575E+5,RE    110
*-1.8927E+6,-1.1414E+7,-5.5974E+6,-3.5214E+7,-7.2469E+4,-7.5000E+1,RE    111
*-6.3301E+5,-1.3168E+6,-1.4398E+6,-6.7226E+6,-5.1576E+6,-4.4040E+6,RE    112
*-1.4614E+6,-9.6596E+5,-1.1787E+6,-2.6523E+5,-2.2771E+6, 5.1200E+2/RE    113
 DATA (RFX(I),I=  1,114)/
* 7.9885E+1, 7.9858E+1, 4.8486E+1, 4.0469E+1, 6.8408E+1, 6.8438E+1,RF      1
* 6.5392E+1, 6.5376E+1, 1.2142E+1, 1.2132E+1, 8.5052E+1, 8.4992E+1,RF      2
* 6.2393E+1, 6.2372E+1, 5.8719E+1, 5.8781E+1, 4.9279E+1, 4.9287E+1,RF      3
* 6.8575E+1, 6.8561E+1, 8.1271E+1, 8.1240E+1, 9.4936E+1, 9.4906E+1,RF      4
* 4.9279E+1, 4.9287E+1, 6.8575E+1, 6.8561E+1, 8.1271E+1, 8.1240E+1,RF      5
* 9.4936E+1, 9.4906E+1, 5.0850E+1, 5.0841E+1, 7.3496E+1, 7.3495E+1,RF      6
* 7.5015E+1, 7.5003E+1, 9.8886E+1, 9.8885E+1, 1.1443E+2, 1.1443E+2,RF      7
* 9.2047E+1, 9.2045E+1, 1.0006E+2, 1.0006E+2, 1.1012E+2, 1.1012E+2,RF      8
* 1.1944E+2, 1.1944E+2, 7.1397E+1, 7.1396E+1, 8.7702E+1, 8.7699E+1,RF      9
* 9.3505E+1, 9.3502E+1, 1.0875E+2, 1.0875E+2, 6.3843E+1, 6.3833E+1,RF     10
* 0.0376E+1, 8.0361E+1, 9.9014E+1, 9.8984E+1, 7.0367E+1, 7.0365E+1,RF     11
* 7.3307E+1, 7.3303E+1, 2.1123E+2, 2.1123E+2, 9.2024E+1, 9.2021E+1,RF     12
* 1.0431E+2, 1.0430E+2, 4.8123E+1, 4.8120E+1, 7.8808E+1, 7.8806E+1,RF     13
* 9.2492E+1, 9.2486E+1, 1.0628E+2, 1.0627E+2, 8.7576E+1, 8.7563E+1,RF     14
* 9.5826E+1, 9.5823E+1, 1.1043E+2, 1.1043E+2, 1.1186E+2, 1.1186E+2,RF     15
* 6.6943E+1, 6.6936E+1, 8.3661E+1, 8.3645E+1, 8.7501E+1, 8.7490E+1,RF     16
* 1.0039E+2, 1.0038E+2, 5.9345E+1, 5.9327E+1, 7.6533E+1, 7.6501E+1,RF     17
* 9.2556E+1, 9.2509E+1, 6.9054E+1, 6.9012E+1, 1.0403E+2, 1.0487E+2,RF     18
* 7.6496E+1, 7.6411E+1, 1.3056E+2, 1.3047E+2, 6.9723E+1, 6.9722E+1/RF     19
 DATA (RFX(I),I=115,228)/
* 6.7042E+1, 6.7024E+1, 6.7853E+1, 6.7850E+1, 1.5138E+2, 1.5137E+2,RF     20
* 1.2575E+2, 1.2560E+2, 9.9465E+1, 9.9436E+1, 1.1852E+2, 1.1848E+2,RF     21
* 1.9304E+2, 1.9302E+2, 1.7915E+2, 1.7910E+2, 2.0845E+2, 2.0835E+2,RF     22
* 1.8065E+2, 1.8046E+2, 1.9419E+2, 1.9396E+2, 3.1670E+2, 3.1635E+2,RF     23
* 4.4030E+1, 4.4012E+1, 8.1636E+1, 8.1627E+1, 7.1911E+1, 7.1906E+1,RF     24
* 9.0965E+1, 9.0960E+1, 9.2843E+1, 9.2840E+1, 6.8408E+1, 6.8403E+1,RF     25
* 8.5725E+1, 8.5716E+1, 6.0793E+1, 6.0778E+1, 7.8558E+1, 7.8525E+1,RF     26
* 6.7706E+1, 6.7668E+1, 1.0569E+2, 1.0563E+2, 6.6153E+1, 6.6144E+1,RF     27
* 1.6203E+2, 1.6203E+2, 9.8877E+1, 9.8862E+1, 1.2476E+2, 1.2472E+2,RF     28
* 1.5661E+2, 1.5658E+2, 1.0436E+2, 1.0432E+2, 2.1164E+2, 2.1159E+2,RF     29
* 7.3628E+1, 7.3624E+1, 1.0616E+2, 1.0614E+2, 1.2068E+2, 1.2067E+2,RF     30
* 8.7655E+1, 8.7636E+1, 1.0092E+2, 1.0090E+2, 1.2091E+2, 1.2091E+2,RF     31
* 1.3804E+2, 1.3804E+2, 7.0137E+1, 7.0130E+1, 8.3644E+1, 8.3628E+1,RF     32
* 8.6869E+1, 8.6870E+1, 1.0063E+2, 1.0061E+2, 1.0311E+2, 1.0309E+2,RF     33
* 1.1365E+2, 1.1363E+2, 6.2339E+1, 6.2287E+1, 1.1586E+2, 1.1580E+2,RF     34
* 1.1950E+2, 1.1954E+2, 1.2117E+2, 1.2113E+2, 9.4506E+1, 9.4466E+1,RF     35
* 1.0914E+2, 1.0989E+2, 7.5404E+1, 7.5446E+1, 9.3005E+1, 9.2994E+1,RF     36
* 7.5400E+1, 7.9369E+1, 6.0992E+1, 6.8939E+1, 1.0776E+2, 1.0769E+2,RF     37
* 1.1015E+2, 1.1018E+2, 1.0232E+2, 1.0225E+2, 8.4985E+1, 8.4916E+1/RF     38
 DATA (RFX(I),I=229,342)/
* 7.6613E+1, 7.0535E+1, 9.7526E+1, 9.7436E+1, 1.6706E+2, 1.6420E+2,RF     39
* 9.3660E+1, 9.3578E+1, 1.5640E+2, 1.5327E+2, 8.2762E+1, 8.2643E+1,RF     40
* 6.6958E+1, 6.6981E+1, 1.0040E+2, 1.0030E+2, 1.3409E+2, 1.3486E+2,RF     41
* 1.0159E+2, 1.0147E+2, 1.1739E+2, 1.1726E+2, 9.0598E+1, 9.0562E+1,RF     42
* 1.1767E+2, 1.1762E+2, 2.4698E+2, 2.3556E+2, 1.3314E+2, 1.3309E+2,RF     43
* 5.1615E+1, 5.1621E+1, 7.2134E+1, 7.2132E+1, 1.8691E+2, 1.8690E+2,RF     44
* 1.1874E+2, 1.1872E+2, 1.1041E+2, 1.1041E+2, 1.2895E+2, 1.2894E+2,RF     45
* 0.2062E+1, 8.2836E+1, 1.0651E+2, 1.0648E+2, 7.1250E+1, 7.1250E+1,RF     46
* 9.0798E+1, 9.0793E+1, 9.2562E+1, 9.2549E+1, 7.4095E+1, 7.4094E+1,RF     47
* 9.1142E+1, 9.1136E+1, 7.7470E+1, 7.7475E+1, 1.1839E+2, 1.1835E+2,RF     48
* 1.1347E+2, 1.1347E+2, 9.4637E+1, 9.4636E+1, 9.8560E+1, 9.8558E+1,RF     49
* 1.3734E+2, 1.3734E+2, 1.2029E+2, 1.2027E+2, 1.4921E+2, 1.4921E+2,RF     50
* 1.3625E+2, 1.3625E+2, 4.9790E+1, 4.9791E+1, 7.9406E+1, 7.9375E+1,RF     51
* 1.0290E+2, 1.0284E+2, 6.7702E+1, 6.7688E+1, 8.8452E+1, 8.8449E+1,RF     52
* 7.0976E+1, 7.8973E+1, 8.7038E+1, 8.7816E+1, 1.2134E+2, 1.2133E+2,RF     53
* 7.1519E+1, 7.1514E+1, 7.3963E+1, 7.3958E+1, 1.0961E+2, 1.0957E+2,RF     54
* 1.0487E+2, 1.0487E+2, 8.0833E+1, 8.0830E+1, 9.1219E+1, 9.1212E+1,RF     55
* 1.1709E+2, 1.1706E+2, 1.4507E+2, 1.4507E+2, 1.0335E+2, 1.0334E+2,RF     56
* 3.8863E+1, 3.8863E+1, 6.8256E+1, 6.8247E+1, 7.7826E+1, 7.7799E+1/RF     57
 DATA (RFX(I),I=343,456)/
* 6.0958E+1, 6.0936E+1, 6.1384E+1, 6.1363E+1, 6.5956E+1, 6.5935E+1,RF     58
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     1.2263E+2,  1.2257E+2,  7.0228E+1,  7.0177E+1,  9.0130E+1,  8.9765E+1,RF     59
     7.6996E+1,  7.6930E+1,  1.0825E+2,  1.0814E+2,  9.2543E+1,  9.2468E+1,RF     60
     4.4660E+1,  4.4641E+1,  7.0199E+1,  7.0198E+1,  7.0616E+1,  7.0615E+1,RF     61
     6.8349E+1,  6.8349E+1,  8.7053E+1,  8.7050E+1,  4.8092E+1,  4.8087E+1,RF     62
     6.8867E+1,  6.8854E+1,  8.4819E+1,  8.4802E+1,  7.1982E+1,  7.1948E+1,RF     63
     8.1623E+1,  8.1601E+1,  1.2326E+2,  1.2323E+2,  1.3496E+2,  1.3492E+2,RF     64
     1.5674E+2,  1.5672E+2,  5.0093E+1,  5.0095E+1,  6.9754E+1,  6.9742E+1,RF     65
     8.5625E+1,  8.5616E+1,  8.6101E+1,  8.6094E+1,  5.1993E+1,  5.1990E+1,RF     66
     7.7469E+1,  7.7490E+1,  9.7574E+1,  9.7607E+1,  1.2564E+2,  1.2563E+2,RF     67
     9.4969E+1,  9.4932E+1,  1.0398E+2,  1.0397E+2,  9.2680E+1,  9.2667E+1,RF     68
     8.7342E+1,  8.7326E+1,  1.0585E+2,  1.0583E+2,  1.0156E+2,  1.0154E+2,RF     69
     9.8745E+1,  9.8707E+1,  1.4718E+2,  1.4717E+2,  6.8973E+1,  6.8967E+1,RF     70
     1.1113E+2,  1.1109E+2,  1.5228E+2,  1.5224E+2,  1.1556E+2,  1.1554E+2,RF     71
     1.0509E+2,  1.0508E+2,  8.8877E+1,  8.8872E+1,  1.0613E+2,  1.0604E+2,RF     72
     1.7259E+2,  1.7253E+2,  1.5752E+2,  1.5741E+2,  1.2164E+2,  1.2162E+2,RF     73
     7.8431E+1,  7.8315E+1,  8.5753E+1,  8.5743E+1,  6.9299E+1,  6.9295E+1,RF     74
     9.6285E+1,  9.6247E+1,  9.6340E+1,  9.6303E+1,  1.1091E+2,  1.1087E+2,RF     75
     8.2945E+1,  8.2933E+1,  1.0556E+2,  1.0555E+2,  1.0952E+2,  1.0951E+2,/RF     76
 DATA (RFX(I),I=457,576)/
     7.8170E+1,  7.8137E+1,  1.3662E+2,  1.3660E+2,  8.0021E+1,  7.9991E+1,RF     77
     1.0989E+2,  1.0989E+2,  1.3752E+2,  1.3750E+2,  9.9914E+1,  9.9902E+1,RF     78
     1.3925E+2,  1.3923E+2,  9.5725E+1,  9.5639E+1,  1.1378E+2,  1.1377E+2,RF     79
     1.0203E+2,  1.0201E+2,  1.0306E+2,  1.0304E+2,  8.5194E+1,  8.5129E+1,RF     80
     1.0286E+2,  1.0284E+2,  1.7982E+2,  1.7969E+2,  1.0442E+2,  1.0440E+2,RF     81
     1.0285E+2,  1.0284E+2,  8.2137E+1,  8.2120E+1,  1.2523E+2,  1.2522E+2,RF     82
     8.4611E+1,  8.4585E+1,  8.4446E+1,  8.4432E+1,  8.6498E+1,  8.6458E+1,RF     83
     1.4261E+2,  1.4261E+2,  5.9151E+1,  5.9130E+1,  9.1326E+1,  9.1318E+1,RF     84
     8.8165E+1,  8.8150E+1,  7.7346E+1,  7.7340E+1,  7.3827E+1,  7.3825E+1,RF     85
     8.9481E+1,  8.9566E+1,  8.6637E+1,  8.6629E+1,  8.7582E+1,  8.7647E+1,RF     86
     9.3694E+1,  9.3688E+1,  1.4892E+2,  1.4891E+2,  1.8975E+2,  1.8973E+2,RF     87
     9.4696E+1,  9.4653E+1,  9.0889E+1,  9.0883E+1,  1.0857E+2,  1.0855E+2,RF     88
     9.7807E+1,  9.7768E+1,  8.5112E+1,  8.5058E+1,  7.9301E+1,  7.9322E+1,RF     89
     1.3404E+2,  1.3401E+2,  1.2037E+2,  1.2037E+2,  1.8589E+2,  1.8588E+2,RF     90
     1.1923E+2,  1.1921E+2,  6.8573E+1,  6.8571E+1,  7.3749E+1,  7.3763E+1,RF     91
     6.3790E+1,  6.3772E+1,  6.7971E+1,  6.7975E+1,  8.5030E+1,  8.5009E+1,RF     92
     8.3960E+1,  8.3943E+1,  1.5084E+2,  1.5084E+2,  4.8462E+1,  4.8462E+1,RF     93
     4.1596E+1,  4.1596E+1,  8.3076E+1,  8.2669E+1,  2.2015E+2,  2.2231E+2,RF     94
     5.4989E+1,  5.4822E+1,  1.5160E+2,  1.4558E+2,  2.9255E+1,  2.9207E+1/RF     95
 DATA (RFX(I),I=571,678)/
     7.2826E+1,  7.2838E+1,  1.1607E+2,  1.0529E+2,  2.1518E+2,  2.0282E+2,RF     96
     1.2813E+2,  1.2813E+2,  8.8543E+1,  8.7005E+1,  1.1059E+2,  1.1059E+2,RF     97
     7.0772E+1,  7.1452E+1,  6.8213E+1,  6.7766E+1,  2.9859E+1,  2.9915E+1,RF     98
     1.2829E+2,  1.2830E+2,  1.1483E+2,  1.1440E+2,  2.5834E+1,  2.5668E+1,RF     99
     2.4230E+1,  2.4236E+1,  7.8085E+1,  7.5953E+1,  1.1284E+2,  1.1062E+2,RF    100
     1.0427E+2,  1.0444E+2,  2.8747E+1,  2.5938E+1,  7.8628E+1,  9.0875E+1,RF    101
     1.4504E+1,  1.6620E+1,  1.1345E+2,  8.2051E+1,  6.8180E+1,  7.6762E+1,RF    102
     1.8018E+1,  1.8432E+1,  2.9344E+1,  3.4760E+1,  4.3107E+1,  5.0250E+1,RF    103
     7.0635E+1,  8.3305E+1,  5.1462E+1,  5.0233E+1,  4.2744E+1,  4.5685E+1,RF    104
     6.1670E+1,  5.9465E+1,  5.6124E+1,  6.2633E+1,  4.7040E+1,  4.9611E+1,RF    105
     1.9109E+1,  2.5633E+1,  7.5236E+1,  8.0552E+1,  5.6904E+1,  8.0446E+1,RF    106
     6.0697E+1,  6.3138E+1,  1.0288E+2,  1.0441E+2,  1.1199E+2,  1.1193E+2,RF    107
     2.0892E+2,  2.4998E+2,  2.6722E+2,  2.6363E+2,  3.3754E+2,  3.3695E+2,RF    108
     1.6038E+2,  1.5120E+2,  1.4281E+2,  1.2088E+2,  9.7955E+1,  9.7777E+1,RF    109
     1.7563E+2,  1.5717E+2,  3.3667E+2,  3.3646E+2,  1.6765E+2,  1.6763E+2,RF    110
     1.7682E+2,  1.6311E+2,  3.3655E+2,  3.0192E+2,  4.7046E+1,  3.9714E+1,RF    111
     6.5637E+1,  5.7682E+1,  1.1247E+2,  1.0604E+2,  1.9140E+2,  1.8342E+2,RF    112
     7.8284E+1,  7.9020E+1,  8.3588E+1,  8.3470E+1,  1.5665E+2,  1.6186E+2/RF    113
 DATA (TUX(I),I=  1,171)/
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU      1
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU      2
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU      3
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU      4
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU      5
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU      6
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU      7
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU      8
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU      9
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     10
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     11
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     12
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     13
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     14
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     15
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     16
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     17
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     18
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500./  TU     19
 DATA (TUX(I),I=172,342)/
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     20
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     21
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     22
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     23
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     24
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     25
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  1000.,  1500.,  TU     26
     2500.,  6000.,  1000.,  1500.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     27
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     28
     2500.,  6000.,  1000.,  1500.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     29
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     30
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     31
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     32
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     33
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     34
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     35
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     36
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     37
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000./  TU     38
 DATA (TUX(I),I=343,513)/
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     39
     6000.,  1000.,  1500.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     40
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     41
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     42
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     43
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     44
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     45
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     46
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     47
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     48
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     49
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     50
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     51
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     52
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     53
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     54
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     55
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     56
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500./  TU     57
 DATA (TUX(I),I=514,678)/
     6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  TU     58
     2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  TU     59
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     * 6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,    TU     60
     * 2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,  2500.,    TU     61
     * 6000.,  2500.,  6000.,  2500.,  6000.,  2500.,  6000.,10000.,10000.,      TU     62
     * 3000.,  5000.,  1200.,  2000.,  1000.,  1600.,  1700.,  3000.,  1200.,    TU     63
     * 2000.,  2200.,  4000.,  1200.,  2000.,  1000.,  1500.,  1000.,  1500.,    TU     64
     * 1000.,  1500.,   700.,  1000.,  1000.,  1500.,  1500.,  2500.,  1700.,    TU     65
     * 3000.,  1700.,  3000.,  1700.,  3000.,  1700.,  3000.,  2000.,  3500.,    TU     66
     * 2200.,  4000.,  1300.,  2200.,  1700.,  3000.,  1700.,  3000.,   934.,    TU     67
     * 4000.,  2316.,  3500.,  2450.,  5000.,   722.,  4000.,  2743.,  3500.,    TU     68
     * 1556.,  6000.,  2818.,  6000.,  2400.,  3500.,  2473.,  4000.,   803.,    TU     69
     * 2000.,  1121.,  3000.,   744.,  3500.,  1857.,  4000.,  1696.,  4500.,    TU     70
     * 1685.,  4500.,  1116.,  4000.,   679.,  2000.,   824.,  2000.,  1474.,    TU     71
     * 4000.,  1700.,  3000.,  1190.,  3000.,  1200.,  2000.,  1200.,  2000.,    TU     72
     * 1000.,  1500.,   993.,  2000.,  1000.,  1500.,   745.,  2000.,  1700.,    TU     73
     * 3000.,  1700.,  3000.,  1000.,  1500.,  1000.,  1500.,   962.,  2000.,    TU     74
     * 1000.,  1500.,  1000.,  1500.,  1000.,  1500.,  1200.,  2000.,  1200.,    TU     75
     * 2000.,  1307.,  3000./                                                     TU     76
      DATA (KPHAX(I),I=  1,165)/
     *1,1,1,1,1,1,1,1,1,2,2,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA   1
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA   2
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA   3
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA   4
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1/KPHA   5
      DATA (KPHAX(I),I=166,330)/
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA   6
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA   7
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA   8
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA   9
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1/KPHA  10
      DATA (KPHAX(I),I=331,495)/
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA  11
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA  12
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA  13
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA  14
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1/KPHA  15
      DATA (KPHAX(I),I=496,627)/
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,KPHA  16
     *1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,2,KPHA  17
     *2,2,2,2,2,2,2,2,2,2,2,2,2,2,2,3,3,2,2,2,3,3,2,2,2,2,2,2,2,2,2,2,2,2,2,2,KPHA  18
     *3,3,2,2,2,2,2,2,2,2,3,2,2,3,2,2,3,2,2,3,2,2,3,2,2,3,2,2,3,2,2,3,2,2,3,2/KPHA  19
      DATA (KPHAX(I),I=628,678)/
     *3,2,3,2,3,2,3,2,3,2,3,2,3,2,2,2,3,2,2,2,2,2,2,2,2,3,2,2,2,3,2,2,2,2,2,KPHA  20
     *2,2,3,3,2,3,2,2,2,2,3,3,2,2,2,2,2,3/                                      KPHA  21
C
      END
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SECTION 5

LISTINGS OF THE DIFFUSION FACTOR DATA AND EQUILIBRIUM THERMOCHEMICAL DATA BUILT INTO THE GASKET PROGRAM

Diffusion factors are stored in the GASKET program for the fourteen selected species listed below. These factors are considered to be more accurate than the general correlation which is described in Section 4 of Volume I and which is used to compute the diffusion factors for the remaining species. The diffusion factors presented below were obtained from Reference 4.

The equilibrium thermochemical data listed below include all species tabulated in the JANAF Thermochemical Tables (Reference 5) which are comprised of the elements A, Al, B, Be, C, Cl, F, H, He, Li, N, O, and Si. These data, in addition to the diffusion factor data, are stored in the special data statement called DATX in the GASKET program. The order of the data and the formats of the cards used to generate the listing below are prescribed in Section 4 of Volume I.

DIFFUSION FACTORS

```
 14                                        FI'S FROM AERO 69-53
CO2      1.2495      N2       1.0275      O2       0.9553      O        0.7063
CO       1.0172      H        .19396      C        .6895       CH       .7495
H2        0.28302    H2O       0.7704      N        0.7553      HCN      1.1173
CH4      0.9503      OH       1.0333
```

EQUILIBRIUM THERMOCHEMICAL DATA, pp. 5-2 thru 5-9

```
  1  6  2   6 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61        CO2
-940539+5 366362+5 130738+2 733664-3-754525+6 796849+2  500, 2500,1  -0,CO2
-940539+5 366610+5 142661+2 209831-3-233974+5 786583+2 2500, 6000,1  -0,CO2
  8  1  -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61        H2
-986  0+0 212666+5 626264+1 934666-3 610915+5 484656+2  500, 2500,1  -0,H2
-996  0+0 212227+6 600304+1 362 19-1-158876+7 484694+2 2500, 6000,1  -0,H2
  2  1  1   6 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61        H2O
-877976+5 303898+6 847497+1 183253-2-305370+6 684879+2  500, 2500,1  -0,H2O
-877979+5 302498+5 132   4+2 231126-3-431992+7 684365+2 2500, 6000,1  -0,H2O
  1  6  1   8 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61        CO
-264169+8 224202+8 779944+1 441449-3-262 21+6 653923+2  500, 2500,1  -0,CO
-264169+8 223744+5 866947+1 635971-4-155174+6 653761+2 2500, 6000,1  -0,CO
  1106 -0 -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61        C+ F
   0  0+0 144470+6 550390+1 240 14-3-889435+6 121416+2  500, 2500,2  -0,C+ F
   0  0+0 144197+8 526396+1 216188-3 131328+7 121318+2 2800, 6000,2  -0,C+ F
  1  6  2   1 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61        C2H2
 841899+5 48   4+5 162700+2 213666-2-903850+6 650823+2  500, 2500,1  -0,C2H2
 841899+5 483179+5 199610+2 451477-3-365962+7 649917+2 2500, 6000,1  -0,C2H2
  1 17  1   1 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  9/64        CLH
-280629+5 219473+8 705892+1 710907-3-136296+6 623938+2  500, 2500,1  -0,CLH
-280629+5 216661+5 863363+1 132615-3-964314+6 623719+2 2500, 6000,1  -0,CLH
  1  9  1   1 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/68        FH
-681399+5 211218+5 641313+1 626856-3 240793+5 847192+2  500, 2500,1  -0,FH
-681399+5 210703+5 658886+1 138134-3-289239+7 [illegible]+2 2500, 6000,1  -0,FH
  1  6 -0  -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61        C
 170885+6 135249+5 466179+1 753854-4 220874+3 492766+2  500, 2500,1  -0,C
 170885+6 136492+5 514716+1 766698-4-175199+7 492872+2 2500, 6000,1  -0,C
  2  6 -0  -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69        C2
 200223+6 247256+5 766724+1 758223-3 187666+6 665756+2  500, 2500,1  -0,C2
 200223+6 246660+5 643612+1 447170-3 242365+6 665615+2 2500, 6000,1  -0,C2
  3  6 -0  -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69        C3
 195999+6 310836+5 102229+2 100666-2-448915+6 812712+2  500, 2500,1  -0,C3
 195999+6 309669+8 125242+2 230546-3-270246+7 812476+2 2500, 6000,1  -0,C3
  4  6 -0  -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69        C4
 231999+6 612126+5 188896+2 704455-3-112368+7 949387+2  500, 2500,1  -0,C4
 231999+6 511290+6 704734+2 580770-4-923163+6 946 62+2 2500, 6000,1  -0,C4
  1106 -0 -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61        C F
 170685+6 135249+5 466179+1 753554-4 220874+5 492786+2  500, 2500,1  -0,C F
 170885+6 135492+5 514716+1 766698-4-178199+7 492872+2 2500, 6000,1  -0,C F
  2106 -0 -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69        C2 F
 200223+6 247256+5 766724+1 758223-3 187666+6 665755+2  500, 2500,1  -0,C2 F
 200223+6 246660+5 643612+1 447170-3 242365+6 668615+2 2500, 6000,1  -0,C2 F
  3106 -0 -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69        C3 F
 195999+6 310836+5 102229+2 100665-2-445919+6 612712+2  500, 2500,1  -0,C3 F
 195999+6 309669+5 120242+2 230546-3-270248+7 812476+2 2500, 6000,1  -0,C3 F
  4106 -0 -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69        C4 F
 231999+6 512128+5 168898+2 704455-3-112368+7 949357+2  500, 2500,1  -0,C4 F
 231999+6 511280+5 204734+2 580770-4-923163+6 949 62+2 2500, 6000,1  -0,C4 F
  1 13 -0  -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/65        AL
 779999+5 134788+5 491860+1 303529-4 233929+5 506505+2  500, 2500,1  -0,AL
 779999+5 134527+5 362 42+1 277499-3 427534+7 508413+2 2508, 6000,1  -0,AL
  1  6  1  13 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/63        CAL
 164799+6 241619+5 886653+1 127608-3-150 98+6 734958+2  500, 2500,1  -0,CAL
 164799+6 241593+5 893143+1 109290-4-128639+6 734948+2 2500, 6000,1  -0,CAL
  1 13  1  17 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  6/70        ALCL
-122999+5 244516+5 884638+1 152881-3-558226+5 750155+2  500, 2500,1  -0,ALCL
-122999+5 244161+5 636523+1 671716-3 745942+7 750 29-2 2500, 6000,1  -0,ALCL
  1 13  1  17  1  9  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  9/64        ALCLF
-119999+6 367721+5 138415+2 259154-4-259155+6 980862+2  500, 2500,1  -0,ALCLF
-119999+6 367687+5 138947+2 239  5-5-224  9+6 980850+2 2500, 6000,1  -0,ALCLF
  1 13  1  17  2  9  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  9/64        ALCLF2
-237599+6 521248+5 196956+2 659232-4-489250+6 114429+3  500, 2500,1  -0,ALCLF2
-237589+6 521162+8 196306+2 627195-5-400930+6 114426+3 2500, 6000,1  -0,ALCLF2
```

```
  1 13  1  17  1  8  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  9/64        ALCLO
-831899+5 392 74+5 147926+2 416848-4-332846+6 880467+2  500, 2500,1  -0,ALCLO
-831999+5 392 19+5 148786+2 388241-5-279386+6 920447+2 2500, 6000,1  -0,ALCLO
  1 13  2  17 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  8/64        ALCL2
-749999+5 370880+5 138691+2 809140-8-159614+6 100 56+3  500, 2500,1  -0,ALCL2
-749999+5 370939+5 139 46+2 943858-6-145 21+6 100 56+3 2500, 6000,1  -0,ALCL2
  1 13  2  17  1  9  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  8/64        ALCL2F
-188599+6 524770+5 197633+2 406103-4-366886+6 118120+3  500, 2500,1  -0,ALCL2F
-183599+6 524717+5 198479+2 366648-5-333706+6 118118+3 2500, 6000,1  -0,ALCL2F
  1 13  3  17 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  6/70        ALCL3
-139699+6 524127+5 198187+2 198316-4-263666+6 119442+3  500, 2500,1  -0,ALCL3
-139699+6 528101+5 188880+2 193  1-5-284299+6 118441+3 2500, 6000,1  -0,ALCL3
  1 13  1   9 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  6/69        ALF
-633999+5 240411+5 667470+1 116104-3-161923+6 713971+2  500, 2500,1  -0,ALF
-633999+6 240372+5 869563+1 969696-4-253246+5 713987+2 2500, 6000,1  -0,ALF
  1 13  1   9  1  8  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/64        ALFO
-140199+6 387 28+5 147308+2 647877-4-490838+6 877 21+2  500, 2500,1  -0,ALFO
-140199+6 366943+5 146629+2 620818-8-399956+6 876991+2 2500, 6000,1  -0,ALFO
  1 13  2   9 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  9/64        ALF2
-164999+6 364104+5 137828+2 589760-4-361821+5 830 50+2  500, 2500,1  -0,ALF2
-164999+6 364 26+5 136732+2 587732-8-279841+6 930 83+2 2500, 6000,1  -0,ALF2
  1 13  3   9 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  6/70        ALF3
-268 34+6 517563+5 188134+2 961894-4-893177+6 108760+3  500, 2500,1  -0,ALF3
-209 34+6 517468+5 198118+2 889906-5-470488+6 106746+3 2500, 6000,1  -0,ALF3
  1 13  1   1 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  6/63        ALH
 618999+5 234264+5 830966+1 363206-3-301823+5 636427+2  500, 2500,1  -0,ALH
 619999+5 233966+5 881 31+1 179608-3-171880+6 638380+2 2500, 6000,1  -0,ALH
  1 13  1   1  8  8  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/66        ALHO2
-109999+8 481622+5 171817+2 876481-3-817293+6 990138+2  500, 2500,1  -0,ALHO2
-109999+5 480780+5 194272+2 643 23-4-813 59+7 988840+2 2500, 6000,1  -0,ALHO2
  1 13  1   7 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/67        ALN
 104  0+6 239 70+5 863244+1 131622-3-197654+6 703873+2  500, 2500,1  -0,ALN
 104  0+6 239 17+5 891661+1 946578-4-146 36+8 703804+2 2500, 6000,1  -0,ALN
  1 13  1   8 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  6/70        ALO
 199998+8 270884+5 742567+1 160497-2-490781+5 733071+2  500, 2500,1  -0,ALO
 199999+8 268898+5 119322+2-238234-3 884842+6 733 28+2 2500, 6000,1  -0,ALO
  2 13  6  17 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  6/78        AL2CL6
-309639+6 116238+6 438288+2 340863-4-610603+8 811226+3  508, 2500,1  -0,AL2CL6
-308639+6 116234+6 438986+2 328312-6-689580+6 811226+3 2508, 6000,1  -0,AL2CL6
  2 13  1   6 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  9/65        AL2O
-313999+5 363817+5 137264+2 678890-4-371343+6 920836+2  500, 2500,1  -0,AL2O
-313999+5 363529+5 138666+2 632719-5-288 47+6 920207+2 2508, 6000,1  -0,AL2O
  2 13  2   6 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  8/65        AL2O2
-969999+5 508329+5 183465+2 194849-3-947605+6 104307+3  500, 2500,1  -0,AL2O2
-969999+5 605 76+5 197824+2 178859-4-707671+6 164298+3 2500, 6000,1  -0,AL2O2
  1  5 -0  -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/64        B
 132799+6 134299+8 495187+1 100672-4 397630+4 481229+2  500, 2500,1  -0,B
 132799+6 134211+5 446966+1 104343-3 154317+7 461198+2 2500, 6000,1  -0,B
  1  5  1  17 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/64        BCL
 337999+5 240112+8 686436+1 122647-3-174247+6 708822+2  500, 2500,1  -0,BCL
 337999+5 240 74+5 892485+1 962254-4-138407+6 708808+2 2500, 6000,1  -0,BCL
  1  5  1  17  1  9  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 10/64        BCLF
-749999+5 366331+5 136367+2 136274-3-500832+6 924818+2  505, 2500,1  -0,BCLF
-749999+5 358183+5 136261+2 126198-4-348495+6 924856+8 2500, 6000,1  -0,BCLF
  1  5  1  17  2  9  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 10/64        BCLF2
-211599+6 504334+5 190913+2 286927-3-896232+6 108285+3  500, 2500,1  -0,BCLF2
-211599+6 603971+8 197  9+2 235758-4-622436+6 108272+3 2500, 6000,1  -0,BCLF2
  1  5  1  17  1  8  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  3/65        BCLO
-755999+5 379314+5 140407+2 309629-3-824215+6 878760+2  500, 2500,1  -0,BCLO
-755999+5 378942+5 147293+2 259964-4-392946+6 675626+2 2500, 6000,1  -0,BCLO
  1  5  2  17 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/64        BCL2
-199999+5 363709+5 137339+2 659132-4-189661+6 980289+2  500, 2500,1  -0,BCL2
-199999+5 363623+5 138694+2 616573-5-262915+6 950226+2 2508, 6000,1  -0,BCL2
  1  6  2  17  1  9  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71 12/64        BCL2F
-153999+6 511513+5 193624+2 166220-3-729489+6 110435+3  500, 2500,1  -0,BCL2F
-163999+6 511272+5 197874+2 171696-4-525489+6 110426+3 2500, 6000,1  -0,BCL2F
```

```
  1  5  3 17 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          BCL3
-963 99+5 517103+5 195845+2 107 79-3-602253+6 111861+3  500. 2500.1  -0.BCL3
-963 99+5 516964+5 196 53+2 100138-4-465702+6 111856+3 2500. 6000.1  -0.BCL3
  1  5  1  9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          BF
-276959+5 233144+5 654117+1 219694-3-287423+6 669430+2  500. 2500.1  -0.BF
-276999+5 232960+5 885438+1 861298-4-158369+6 669365+2 2500. 6000.1  -0.BF
  1  5  1  9  1  8 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/65          BFO
-143999+6 373450+5 138497+2 379194-3-669520+6 836613+2  500. 2500.1  -0.BFO
-143999+6 372958+5 146898+2 318998-4-491999+6 836451+2 2500. 6000.1  -0.BFO
  1  5  2  9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          BF2
-129999+6 352919+5 132607+2 238406-3-603390+6 675 11+2  500. 2500.1  -0.BF2
-129999+6 352618+5 137673+2 213876-4-378990+6 874905+2 2500. 6000.1  -0.BF2
  1  5  3  9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/69          BF3
-271419+6 497597+5 188194+2 385288-3-104558+7 100393+3  500. 2500.1  -0.BF3
-271419+6 497113+5 196421+2 341647-4-701362+6 100376+3 2500. 5000.1  -0.BF3
  1  5  1  1 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          BH
 105799+6 227 44+5 762672+1 597285-3-242917+6 593452+2  500. 2500.1  -0.BH
 105799+6 226539+5 870227+1 177  1-3-398189+6 593277+2 2500. 6000.1  -0.BH
  1  6  1  1  1  8 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          BHO
-199999+5 357284+5 126781+2 784410-3-797211+6 766332+2  500. 2500.1  -0.BHO
-199999+5 356380+5 144791+2 629181-4-780 58+6 765 12+2 2500. 6000.1  -0.BHO
  1  5  1  1  2  8 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          BHO2
-133999+6 468481+6 157697+2 135346-2-108998+7 925562+2  500. 2500.1  -0.BHO2
-133999+6 457141+5 191654+2 102513-3-276748+7 925 88+2 2500. 6000.1  -0.BHO2
  1  5  2  1 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          BH2
 479999+5 346553+5 117215+2 109222-2-753231+6 698537+2  500. 2500.1  -0.BH2
 479999+5 345371+5 143401+2 830362-4-135 58+7 698120+2 2500. 6000.1  -0.BH2
  1  5  2  1  2  8 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          BH202
-113999+6 605667+5 214998+2 148500-2-159 35+7 104631+3  500. 2500.1  -0.BH202
-113999+6 604 62+5 250550+2 114489-3-239619+7 104574+3 2500. 6000.1  -0.BH202
  1  5  3  1 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          BH3
 254999+5 427884+5 131669+2 227245-2-123962+7 764965+2  500. 2500.1  -0.BH3
 254999+5 425477+5 187 43+2 171329-3-288 93+7 764114+2 2500. 6000.1  -0.BH3
  1  5  3  1  3  8 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          BH303
-237159+6 790666+5 269587+2 260298-2-208253+7 130560+3  500. 2500.1  -0.BH303
-237159+6 788 43+5 334513+2 193137-3-500750+7 130468+3 2500. 6000.1  -0.BH303
  1  6  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/66          BN
 113999+6 233760+5 828808+1 372805-3-264 78+6 697230+2  500. 2500.1  -0.BN
 113999+6 233721+5 917535+1 139445-3-216328+7 697217+2 2500. 6000.1  -0.BN
  1  5  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/68          BO
 113  0+0 227 38+5 808184+1 364335-3-285432+6 670420+2  500. 2500.1  -0.BO
 113  0+0 226541+5 776128+1 290292-3 275  1+7 670244+2 2500. 6000.1  -0.BO
  2  5 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          B2
 194999+6 238226+5 877270+1 166254-3-229661+6 678529+2  500. 2500.1  -0.B2
 194999+6 238145+5 890396+1 109105-3-157 15+6 678500+2 2500. 6000.1  -0.B2
  2  5  4 17 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          B2CL4
-116899+6 799575+5 302956+2 186598-3-973231+6 151383+3  500. 2500.1  -0.B2CL4
-116899+6 799341+5 306958+2 163909-4-814968+6 151374+3 2500. 6000.1  -0.B2CL4
  2  5  6  1 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          B2H6
 979999+4 963437+5 331319+2 369871-2-379393+7 125747+3  500. 2500.1  -0.B2H6
 979999+4 959254+5 417345+2 293156-3-434658+7 125599+3 2500. 6000.1  -0.B2H6
  2  5  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          B2O2
-108999+6 518409+5 188946+2 700713-3-898271+6 994653+2  500. 2500.1  -0.B2O2
-108959+6 517585+5 204802+2 571980-4-753244+6 994361+2 2500. 6000.1  -0.B2O2
  2  5  3  6 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          B2O3
-199139+6 637980+5 233794+2 872993-3-124870+7 116516+3  500. 2500.1  -0.B2O3
-199139+6 636951+5 253503+2 717360-4-114429+7 116480+3 2500. 6000.1  -0.B2O3
  3  5  3 17  3  8 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/65          B3CL3O3
-389999+6 128374+6 482523+2 528816-3-230608+7 193 42+3  500. 2500.1  -0.B3CL3O3
-389999+6 128300+6 493581+2 481786-4-170755+7 193 18+3 2500. 6000.1  -0.B3CL3O3
  3  5  3  9  1  8 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/65          B3F3O3
-565299+6 123411+6 470108+2 981 75-3-295981+7 179148+3  500. 2500.1  -0.B3F3O3
-565299+6 123286+6 490930+2 576252-4-201406+7 179104+3 2500. 6000.1  -0.B3F3O3
  3  5  3  1  6  8 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          B3H3O6
-542999+6 161276+6 586562+2 291822-2-376405+7 208447+3  500. 2500.1  -0.B3H3O6
-542999+6 160994+6 660624+2 217680-3-788842+7 208347+3 2500. 6000.1  -0.B3H3O6

  3  5  6  1  3  7 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/65          B3H6N3
-121859+6 150922+6 522936+2 515479-2-512822+7 160650+3  500. 2500.1  -0.B3H6N3
-121899+6 150383+6 548718+2 193981-3-935434+7 160459+3 2500. 6000.1  -0.B3H6N3
  5  5  9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/65          B5H9
 174999+5 177 29+6    1939+2 574 16-2-746121+7 194159+3  500. 2500.1  -0.B5H9
 174999+5 176366+6 763468+2 464964-3-724219+7 193965+3 2500. 6000.1  -0.B5H9
 10  5 14  1 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          B10H14
 112999+5 316 18+6 114802+3 555654-2-123385+8 316702+3  500. 2500.1  -0.B10H14
 112999+5 315 28+6 134419+3 693385-3-120862+8 316353+3 2500. 6000.1  -0.B10H14
  1  4 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/61          BE
 782549+5 134635+5 486324+1 650247-4 232285+5 440297+2  500. 2500.1  -0.BE
 782549+5 134186+5-126130-0 116523-2 140160+6 440122+2 2500. 6000.1  -0.BE
  2  6  1  4 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/63          C2BE
 134999+6 366637+5 134248+2 530782-3-698664+6 816499+2  500. 2500.1  -0.C2BE
 134999+6 366  0+5 146 47+2 445 78-4-472984+6 816274+2 2500. 6000.1  -0.C2BE
  1  4  1 17 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/66          BECL
 144999+6 239937+5 684648+1 128679-3-171 42+5 719110+2  500. 2500.1  -0.BECL
 144999+6 239809+5 838594+1 208267-3 151 64+7 719 64+2 2500. 6000.1  -0.BECL
  1  4  1 17  1  9 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  5/65          BECLF
-136999+6 388298+5 145701+2 122968-3-399231+6 909681+2  500. 2500.1  -0.BECLF
-136999+6 386138+6 148299+2 111182-4-275190+6 909596+2 2500. 6000.1  -0.BECLF
  1  4  2 17 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/65          BECL2
-860999+5 391664+6 147 12+2 752 98-4-323 58+6 928430+2  500. 2500.1  -0.BECL2
-860999+5 391867+5 148580+2 689699-5-238895+6 928396+2 2500. 6000.1  -0.BECL2
  1  4  1  9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/63          BEF
-496779+5 234869+5 864634+1 185970-3-269381+6 684 81+2  500. 2500.1  -0.BEF
-496779+5 234731+6 887670+1 574948-4-187994+6 684 32+2 2500. 6000.1  -0.BEF
  1  4  2  9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/70          BEF2
-190249+6 383425+5 143557+2 199848-3-497274+6 887281+2  500. 2500.1  -0.BEF2
-190249+6 383175+5 147860+2 178251-4-337721+6 887163+2 2500. 6000.1  -0.BEF2
  1  4  1  1  1  8 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63          BEHO
-249999+5 322982+5 106773+2 961458-3-583938+6 768576+2  500. 2500.1  -0.BEHO
-249999+5 322 61+5 134 37+2 722 54-4-220481+7 785280+2 2500. 6000.1  -0.BEHO
  1  4  2  1 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/60          BEH2
 299999+5 347253+5 124447+2 860826-3-112 65+7 677 58+2  500. 2500.1  -0.BEH2
 299999+5 346200+5 144 90+2 734804-4-787575+6 676685+2 2500. 6000.1  -0.BEH2
  1  4  2  1  2  6 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/67          BEH2O2
-186399+6 600214+5 205907+2 173230-2-128666+7 105695+3  500. 2500.1  -0.BEH2O2
-186399+6 598503+6 249572+2 127277-3-349923+7 105635+3 2500. 6000.1  -0.BEH2O2
  1  4  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63          BEO
 309999+5 232131+5 847768+1 237773-3-293998+6 661833+2  500. 2500.1  -0.BEO
 309999+5 231921+6 884341+1 832665-4-165828+6 661459+2 2500. 6000.1  -0.BEO
  2  4  4 17 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/65          BE2CL4
-178999+6 844619+5 316744+2 493849-4-459843+6 162 31+3  500. 2500.1  -0.BE2CL4
-178999+5 844560+5 317684+2 412 42-5-401869+6 162 29+3 2500. 6000.1  -0.BE2CL4
  2  4  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63          BE2O2
-979999+5 498934+5 190 90+2 317632-3-106194+7 988766+2  500. 2500.1  -0.BE2O2
-979999+5 498530+5 196798+2 287570-4-740481+6 988623+2 2500. 6000.1  -0.BE2O2
  3  4  3  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63          BE3O3
-261999+6 770449+5 292658+2 927171-3-232168+7 124761+3  500. 2500.1  -0.BE3O3
-261999+6 769261+5 312435+2 822716-4-148 81+7 124720+3 2500. 6000.1  -0.BE3O3
  4  4  4  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63          BE4O4
-379999+6 107992+6 416841+2 752434-3-292631+7 166611+3  500. 2500.1  -0.BE4O4
-379999+5 107696+6 432592+2 686602-4-208583+7 166577+3 2500. 6000.1  -0.BE4O4
  5  4  5  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63          BE5O5
-504999+6 137342+6 530568+2 956192-3-375648+7 184361+3  500. 2500.1  -0.BE5O5
-504999+6 137219+6 550602+2 848661-4-269685+7 184318+3 2500. 6000.1  -0.BE5O5
  6  4  6  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63          BE6O6
-635999+6 166577+6 645186+2 112732-2-465615+7 211644+3  500. 2500.1  -0.BE6O6
-635999+6 166433+6 668778+2 102649-3-439100+7 211593+3 2500. 6000.1  -0.BE6O6
  1  6  1 17 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/60          CCL
 119999+6 246458+5 863715+1 138774-3-161675+6 716278+2  500. 2500.1  -0.CCL
 119999+6 246350+5 811812+1 287236-3 202508+7 716238+2 2500. 6000.1  -0.CCL
  1  6  1 17  1  9  1  8 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/61          CCLFO
-101999+6 499318+5 187407+2 408800-3-939527+6 106163+3  500. 2500.1  -0.CCLFO
-101999+6 498819+5 196392+2 346428-4-709 93+6 106145+3 2500. 6000.1  -0.CCLFO
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  1  6  1 17  3  9 -0 -C -C -0 -0 -0 -0 -0JAN4F TAPE 7/71  6/69         CCLF3
-169199+6 654737+5 25u 1H+2 307306-3-125579+7 120684+3  500. 2500.1  -0.CCLF3
-169199+6 654342+5 256454+2 279824-4-913396+6 120670+3 2500. 6000.1  -0.CCLF3
  1  6  1 17  1  7 -0 -0 -0 -0 -0 -0 -0 -0JAN4F TAPE 7/71  6/66         CCLN
 329699+5 387396+5 136 17+2 729482-3-483699+6 876548+2  500. 2500.1  -0.CCLN
 329699+5 386873+5 146601+2 308 6H-3-514152+6 876363+2 2500. 6000.1  -0.CCLN
  1  6  2 17  1  8 -0 -C -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/61         CCL20
-525999+5 506522+5 189516+2 332 45-3-782370+6 108918+3  500. 2500.1  -0.CCL20
-525999+5 506119+5 196832+2 280999-4-575524+6 108904+3 2500. 6000.1  -0.CCL20
  1  6  3 17  1  9 -0 -C -C -0 -0 -0 -0 -0JANAF T4PE 7/71  6/70         CCL3F
-689999+5 670149+6 254612+2 138280-3-652234+6 128914+3  500. 2500.1  -0.CCL3F
-689999+5 669969+5 257474+2 127695-4-679417+6 128908+3 2500. 6000.1  -0.CCL3F
  1  6  4 17 -0 -C -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/68         CCL4
-229399+5 677152+5 256419+2 714623-4-659515+6 130 40+3  500. 2500.1  -0.CCL4
-229399+5 677 59+5 257890+2 656752-5-564803+6 130 37+3 2500. 6000.1  -0.CCL4
  1  6  1  9 -0 -C -0 -0 -C -0 -0 -0 -0 -0JANAF TAPE 7/71  6/70         CF
 609999+5 234870+5 860711+1 208914-3-286925+6 701371+2  500. 2500.1  -0.CF
 609999+5 234657+5 843815+1 187354-3 112597+7 701296+2 2500. 6000.1  -0.CF
  1  6  1  9  1  7 -0 -0 -0 -0 -0 -0 -C -0JANAF TAPE 7/71  6/69         CFN
 859999+4 370824+5 134438+2 512591-3-598919+6 850489+2  500. 2500.1  -0.CFN
 859999+4 370238+5 146270+2 409  1-4-614166+6 836282+2 2500. 6000.1  -0.CFN
  1  6  2  9 -0 -C -0 -0 -C -0 -0 -0 -0 -CJANAF TAPE 7/71  6/70         CF2
-434999+5 353978+5 133699+2 212496-3-618773+6 860687+2  500. 2500.1  -0.CF2
-434999+5 354 19+5 117 83+2 640 47-3 308590+7 860701+2 2500. 6000.1  -0.CF2
  1  6  2  9  1  8 -0 -0 -C -0 -0 -0 -0 -0JANAF T4PE 7/71 12/69         CF20
-152699+6 491412+5 184618+2 509491-3-112766+7 100635+3  500. 2500.1  -0.CF20
-152699+6 490790+5 195785+2 435480-4-826862+6 100613+3 2500. 6000.1  -0.CF20
  1  6  3  9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  6/69         CF3
-112399+6 499352+6 190391+2 307225-3-106 69+7 103108+3  500. 2500.1  -0.CF3
-112399+6 498959+6 196861+2 276268-4-735969+6 103 95+3 2500. 6000.1  -0.CF3
  1  6  4  9 -0 -C -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/69         CF4
-223 39+6 646124+5 247109+2 413699-3-146842+7 113647+3  500. 2500.1  -0.CF4
-223 39+6 645596+5 255832+2 372280-4-103823+7 113628+3 2500. 6000.1  -0.CF4
  1  6  1  1 -0 -C -0 -0 -C -0 -0 -0 -0 -0JANAF TAPE 7/71 12/67         CH
 141999+6 236491+5 684765+1 122J13-2-157221+6 623391+2  500. 2500.1  -0.CH
 141999+6 235  6+5 939410+1 141 78-3 634614+6 622866+2 2500. 6000.1  -0.CH
  1  6  1  1  1 17  2  9 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/70         CHCLF2
-115 99+6 623813+5 228379+2 102625-2-146595+7 115861+3  500. 2500.1  -0.CHCLF2
-115 99+6 622701+5 252873+2 80162J-4-199187+7 115821+3 2500. 6000.1  -0.CHCLF2
  1  6  1  1  2 17  1  9 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/70         CHCL2F
-676999+5 628735+5 229814+2 973871-3-133876+7 119577+3  500. 2500.1  -0.CHCL2F
-676999+5 627688+5 253187+2 754636-4-190953+7 119540+3 2500. 6000.1  -0.CHCL2F
  1  6  1  1  3 17 -0 -0 -C -0 -0 -0 -0 -0J4NAF TAPE 7/71 12/68         CHCL3
-246599+5 635456+5 232 42+2 891117-3-116712+7 121166+3  500. 2500.1  -0.CHCL3
-246599+5 634516+5 253684+2 680740-4-183335+7 121133+3 2500. 6000.1  -0.CHCL3
  1  6  1  1  1  9  1  8 -C -0 -0 -0 -0 -0JANAF TAPE 7/71  6/61         CHFO
-899999+5 464183+5 164568+2 117584-2-127806+7 945 56+2  500. 2500.1  -0.CHFO
-899999+5 462892+5 192475+2 919 19-4-176785+7 944599+2 2500. 6000.1  -0.CHFO
  1  6  1  1  3  9 -0 -C -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/69         CHF3
-166599+6 612817+5 2241J7+2 118 93-2-172348+7 109137+3  500. 2500.1  -0.CHF3
-166599+6 611512+5 251959+2 9J6955-4-212412+7 109 91+3 2500. 6000.1  -0.CHF3
  1  6  1  1  1  7 -0 -C -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69         CHN
 322999+5 350311+5 115170+2 121972-2-607975+6 754838+2  500. 2500.1  -0.CHN
 322999+5 349247+5 147715+2 871 50-4-325134+7 754462+2 2500. 6000.1  -0.CHN
  1  6  1  1  1  7  1  8 -0 -0 -0 -0 -0 -0J4NAF TAPE 7/71 12/70         CHNO
-242999+5 463938+5 159 26+2 131 62-2-938162+6 930 47+2  500. 2500.1  -0.CHNO
-242999+5 462643+5 192  3+2 974790-4-259329+7 929589+2 2500. 6000.1  -0.CHNO
  1  6  1  1  1  8 -0 -C -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/70         CHO
 103999+5 330286+5 114114+2 898575-3-729166+6 794  0+2  500. 2500.1  -0.CHO
 103999+5 329424+5 133135+2 164370-3-114482+7 793695+2 2500. 6000.1  -0.CHO
  1  6  2  1 -0 -C -0 -0 -C -0 -0 -0 -0 -0JANAF T4PE 7/71  6/69         CH2
 920699+5 339279+5 106245+2 148288-2-784969+6 689910+2  500. 2500.1  -0.CH2
 920699+5 337799+5 145532+2 106718-3-258669+7 689395+2 2500. 6000.1  -0.CH2
  1  6  2  1  1 17  1  9 -C -0 -0 -0 -0 -0JANAF TAPE 7/71  6/70         CH2CLF
-625999+5 590 67+5 205 65+2 180700-2-172722+7 107761+3  500. 2500.1  -0.CH2CLF
-625999+5 588158+5 246?21+2 137830-3-305601+7 107693+3 2500. 6000.1  -0.CH2CLF
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  1  6  2  1  2 17 -0 -C -C -0 -0 -0 -0 -0JANAF TAPE 7/71 12/68         CH2CL2
-228299+5 597429+5 208 33+2 169827-2-155760+7 110247+3  500. 2500.1  -0.CH2CL2
-228299+5 595657+5 249576+2 128117-3-298829+7 110185+3 2500. 6000.1  -0.CH2CL2
  1  6  2  1  2  9 -C -0 -C -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69         CH2F2
-107709+6 582 79+6 201872+2 193  4-2-192677+7 102324+3  500. 2500.1  -0.CH2F2
-107709+6 580  1+5 248173+2 149102-3-303753+7 102251+3 2500. 6000.1  -0.CH2F2
  1  6  2  1  1  8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61         CH20
-276999+5 440617+5 146557+2 179555-2-142897+7 849849+2  500. 2500.1  -0.CH20
-276999+5 439055+5 169280+2 138986-3-224412+7 849156+2 2500. 6000.1  -0.CH20
  1  6  3  1 -0 -C -0 -C -C -0 -0 -0 -0 -0JANAF TAPE 7/71  6/69         CH3
 348199+5 429495+5 130653+2 224651-2-975622+6 786134+2  500. 2500.1  -0.CH3
 348199+5 427288+5 187465+2 164158-3-J93997+7 785354+2 2500. 6000.1  -0.CH3
  1  6  3  1  1 17 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/64         CH3CL
-206599+5 663030+5 184696+2 248246-2-181714+7 978262+2  500. 2500.1  -0.CH3CL
-206599+5 561252+6 246600+2 186431-3-430629+7 974351+2 2500. 6000.1  -0.CH3CL
  1  6  3  1  3 17  1 14 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60         CH3CL38
-126399+6 109331+6 292172+2 720 60-2-862237+6 187 67+3  500. 1000.1  -0.CH3CL38
-126399+6 102758+6 381511+2 257516-2-289 65+7 164201+3 1000. 1500.1  -0.CH3CL38
  1  6  3  1  1  9 -0 -0 -0 -0 -0 -0 -0 -0JAN4F TAPE 7/71 12/43         CH3F
-559999+5 556 15+5 181 46+2 261954-2-199 81+7 936679+2  500. 2500.1  -0.CH3F
-559999+5 553257+5 244791+2 198612-3-400196+7 935705+2 2500. 6000.1  -0.CH3F
  1  6  3  1  3  9  1 14 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/80         CH3F3SI
-294624+6 108886+6 284731+2 790267-2-115315+7 186396+3  500. 1000.1  -0.CH3F3SI
-294624+6 101705+6 353918+2 298113-2-315 21+7 183267+3 1000. 1500.1  -0.CH3F3SI
  1  6  4  1 -C -C -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61         CH4
-178949+5 533392+5 161977+2 324522-2-191745+7 827619+2  500. 2500.1  -0.CH4
-178949+5 532 32+5 241785+2 242182-3-487445+7 826431+2 2500. 6000.1  -0.CH4
  1  6  1  7 -0 -C -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/69         CN
 104  0+6 231992+5 722591+1 901725-3-143911+6 660577+2  500. 2500.1  -0.CN
 104  0+6 232642+5 118745+2-354511-4-140858+8 669809+2 2500. 6000.1  -0.CN
  2  6  2  9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/67         C2F2
 499999+4 524547+5 198954+2 458563-3-952266+6 100401+3  500. 2500.1  -0.C2F2
 499999+4 523988+6 206 20+2 391 44-4-689564+6 100381+3 2500. 6000.1  -0.C2F2
  2  6  4  9 -0 -0 -0 -C -L -0 -0 -0 -0 -0JANAF TAPE 7/71  6/69         C2F4
-157399+6 794274+5 299  1+2 688468-3-165373+7 134894+3  500. 2500.1  -0.C2F4
-157399+6 793422+6 313929+2 597540-4-115975+7 134864+3 2500. 6000.1  -0.C2F4
  2  6  4  1 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/65         C2H4
 125399+5 679 30+5 210640+2 333365-2-238541+7 101592+3  500. 2500.1  -0.C2H4
 125399+5 675604+6 300938+2 248653-J-861939+7 101471+3 2500. 6000.1  -0.C2H4
  2  6  4  1  1  8 -C -0 -C -0 -0 -0 -0 -0JANAF TAPE 7/71  9/65         C2H4C
-125799+5 818211+5 274248+2 348683-2-305 39+7 117388+3  500. 2500.1  -0.C2H40
-125799+5 814570+5 359562+2 263589-3-597760+7 117260+3 2500. 6000.1  -0.C2H40
  2  6  2  7 -0 -C -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61         C2N2
 738699+5 512470+6 183275+2 889 50-3-671640+6 985977+2  500. 2500.1  -0.C2N2
 738699+5 511460+5 203898+2 704562-4-970377+6 985620+2 2500. 6000.1  -0.C2N2
  3  6  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/68         C302
-223799+5 654763+5 2    7+2 109673-2-134954+7 117669+3  500. 2500.1  -0.C302
-223799+5 653493+5 2622   +2 685573-4-127 91+7 117624+3 2500. 6000.1  -0.C302
  4  6 12  1  1 14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60         C4H28I
-684999+5 231482+6 412155+2 283922-1-229628+7 246976+3  500. 1000.1  -0.C4H28I
-604999+5 205163+6 683543+2 964126-2-105840+6 238581+3 1000. 1500.1  -0.C4H28I
  4  6  2  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61         C4N2
 127499+6 803415+6 289 30+2 136592-2-148718+7 133142+3  500. 2500.1  -0.C4N2
 127499+6 801850+5 320530+2 108996-3-153471+7 133 86+3 2500. 6000.1  -0.C4N2
  1 17 -0 -0 -0 -0 -0 -C -C -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61         CL
 289219+5 140 53+5 540852+1-150184-3 383675+5 516149+2  500. 2500.1  -0.CL
 289219+5 140216+5 805231+1-122307-4 109169+6 516206+2 2500. 6000.1  -0.CL
  1 17  1  9 -C -C -0 -C -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/65         CLF
-121399+5 241277+5 888159+1 128272-3-156816+6 721336+2  500. 2500.1  -0.CLF
-121399+5 241247+5 892831+1 107617-3-126 41+6 721325+2 2500. 6000.1  -0.CLF
  1 17  1  9  2  3 -0 -C -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60         CLFLI2
-180159+6 519547+5 196982+2 647539-4-545679+6 106907+3  500. 2500.1  -0.CLFLI2
-180159+6 519463+5 198334+2 576739-5-469 19+6 106904+3 2500. 6000.1  -0.CLFLI2
  1 17  1  9  3  8 -C -0 -C -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61         CLFO3
-611999+4 651919+5 248877+2 349  7-3-131754+7 116738+3  500. 2500.1  -0.CLFO3
-611999+4 651473+5 256220+2 314790-4-950455+6 118723+3 2500. 6000.1  -0.CLFO3
```

```
 1 17  3   9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/65          CLF3     1  9  1  3  1  8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/65          FL10
-379699+5 52123E+5 197823+2 450444-4-501947+6 110408+3  500, 2500,1  -0,CLF3  -219999+5 361482+5 137180+2 725408+4-442333+6 884821+2  500, 2500,1  -0,FL10
-379699+5 521176+5 198439+2 425666-5-437255+6 110406+3 2500, 6000,1  -0,CLF3  -219999+5 361388+6 138648+2 687192+6-345928+6 884488+2 2500, 6000,1  -0,FL10
 1 17  3   9  1 14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60          CLF3S1   1  9  1  7 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/65          FN
-314999+6 672 12+5 255224+2 116247-3-808642+6 126948+3  500, 2500,1  -0,CLF3S1  594999+5 237720+5 874469+1 178 15-3-241277+6 709764+2  800, 2500,1  -0,FN
-314999+6 671861+5 257624+2 107 14-4-65743C+6 126943+3 2300, 6000,1  -0,CLF3S1  594999+5 237626+5 8896E9+1 111760-3-157572+6 709731+2 2500, 6000,1  -0,FN
 1 17  1   1  1  8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/61          CLN0     1  9  1  7  1  8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/61          FN0
-219999+5 33044E+5 112679+2 636916-3-43759+6 828621+2  500, 2500,1  -0,CLN0  -186999+5 352329+5 130324+2 315542-3-527139+6 878299+2  800, 2500,1  -0,FN0
-219999+5 329709+5 134941+2 595757-4-220548+7 828361+2 2500, 6000,1  -0,CLN0  -186999+5 351949+6 137315+2 266136-4-382215+6 878165+2 2500, 6000,1  -0,FN0
 1 17  3   1  1 14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60          CLN3S1   4  9  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/65          F4SI
-479999+5 608698+5 218716+2 139806-2-17186E+7 106509+3  500, 2500,1  -0,CLN3S1 -385979+6 663766+5 252868+2 203453-3-102796+7 121340+3  800, 2800,1  -0,F4SI
-479999+5 607 79+5 260731+2 112649-3-164356+7 106452+3 2500, 6000,1  -0,CLN3S1 -385979+6 663602+5 287 84+2 137496-4-77692?+6 1213310? 2500, 6000,1  -0,F4SI
 1 17  1   3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/62          CLL1     1  9  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/66          F0
-46777+5 24411E+6 891296+1 148214-3-115217+5 712502+2  500, 2500,1  -0,CLL1  259999+5 240260+5 876818+1 213141-3-226  6+6 715186+2  500, 2800,1  -0,F0
-46777+5 24410(+8 893601+1 138101-3-101288+6 712497+2 2500, 6000,1  -0,CLL1  259999+5 240140+5 867377+1 200690-3 55882?+6 715144+2 2800, 8000,1  -0,F0
 1 17  1   3  1  8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60          CLLI0    1  9  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69          F8I
-33999+4 36031?+5 136380+2 100985-3-45910?+8 907978+2  500, 2500,1  -0,CLLI0 -46999+4 240240+5 884339+1 122343-3-148717+6 739628+2  500, 2800,1  -0,F8I
-33999+4 36018?+5 138400+2 925873-5-34187+6 907932+2 2500, 6000,1  -0,CLLI0 -459999+4 240108+5 832808+1 211648-3 16765?+7 739581+2 2500, 6000,1  -0,F8I
 1 17  1   7  1  8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/66          CLN0     2  9  2  1  1 14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60          F2M28I
 123699+5 371577+5 130871+2 660746-3-440888+6 92561?+2  500, 2500,1  -0,CLN0  -193999+6 615980+5 226868+2 111895-2-178428+7 109614+3  500, 2600,1  -0,F2M26I
 123699+5 371223+5 13746?+2 389803-3-3282??+? 926491+2 2500, 6000,1  -0,CLN0  -193999+6 614662+5 282131+2 920597-4-152650+7 109867+3 2800, 6000,1  -0,F2M28I
 1 17  1   8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/61          CLO      2  9  2  3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/88          F2L12
 2419?9+5 240629+8 88561+1 142475-3-17988E+6 740955+2  500, 2500,1  -0,CLO   -225329+6 621 95+5 197698+2 382460-4-509989+6 104878+3  500, 2800,1  -0,F2L12
 2419?9+5 240587+5 892285+1 113191-3-139289+6 740940+2 2500, 6000,1  -0,CLO   -225329+6 521 44+5 198465+2 375339-5-450348+6 104873+3 2800, 6000,1  -0,F2L12
 1 17  2   8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61          CLO2     2  9  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69          F20
 249999+5 386  7+5 136732+2 299157-3-51481E+6 911417+2  500, 2500,1  -0,CLO2  585999+4 361676+5 137178+2 718  7+4-434922+6 888332+2  500, 2600,1  -0,F20
 249999+5 365846+6 138362+2 185627-3-377 68+6 911360+2 2500, 6000,1  -0,CLO2  585999+4 361581+5 138658+2 689989-5-342824+6 888299+2 2800, 6000,1  -0,F20
 1 17  1  14 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/67          CL51     2  9  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/68          F28I
 486999+5 244587+5 891988+1 108828-3-423514+5 774776+2  500, 2500,1  -0,CL5I  -14049?+6 383 24+5 136970+2 894682-4-390897+6 912194+2  500, 2800,1  -0,F28I
 4569?9+5 24451?+5 850856+1 191293-3 125859+7 774761+2 2500, 6000,1  -0,CL5I  -14049?+6 362805+5 117415+2 512455-3 52218?+7 912116+2 2500, 6000,1  -0,F28I
 2 17  2   1  1 14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60          CL2M2S1  3  9  1  1  1 14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/80          F3M8I
-749999+5 63245+5 231679+2 941 94-3-13421?+7 1183888+3  500, 2500,1  -0,CL2M2SI -28299?+6 640439+8 239210+2 680334-3-135 11+7 117 89+3  600, 2600,1  -0,F3M8I
-749999+5 631365+5 253204+2 760904-4-12794?+7 118350+3 2500, 8000,1  -0,CL2M2SI -28299?+6 639638+5 254586+2 559522-4-119197+7 117 61+3 2800, 8000,1  -0,F3M8I
 2 17  2   3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/62          CL2LI2   3  9  3  3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/68          F3LI3
-143 55+6 529175+5 198511+2 802933-5-25425C+6 11347+3  500, 2500,1  -0,CL2LI2 -362619+6 834382+5 316115+2 684535-4-789863+6 148 73+3  800, 2600,1  -0,F3LI3
-143 55+6 529165+5 198678+2 732 79-6-24544?+6 113473+3 2500, 8000,1  -0,CL2LI2 -362619+6 834292+5 317525+2 627129-5-898822+6 145 70+3 2500, 8000,1  -0,F3LI3
 2 17  1   8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/85          CL20     3  9  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/69          F3N
 209999+5 367280+5 138428+2 253860-4-274 23+6 946368+2  500, 2500,1  -0,CL20  -314299+5 508316+5 194630+2 152182-3-672260+8 103348+3  900, 2800,1  -0,F3N
 209999+5 367247+5 138941+2 251708-5-23687?+6 946356+2 2500, 6000,1  -0,CL20  -314299+5 508117+5 197771+2 140866-4-6?6939+8 103341+3 2500, 6000,1  -0,F3N
 2 17  1  14 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/70          CL2S1    1  1 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/85          M
-399999+5 37C86C+5 138342+2 409634-4-15678+6 985599+2  500, 2500,1  -0,CL2SI  520999+5 134230+5 496799+1 396467-8 118965-1 388687+2  500, 2500,1  -0,M
-399999+5 37C584+5 118702+2 449311-3 57382+7 985501+2 2500, 6000,1  -0,CL2SI  520999+5 134229+5 496794+1 921 55-8 23245?+3 388627+2 2500, 6000,1  -0,M
 3 17  1   9  1 14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60          CL3F51   1  1  1  3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/67          ML1
-200999+6 683 66+5 256970+2 512907-4-47136?+6 137338+3  500, 2500,1  -0,CL3FSI  336 99+5 239436+5 853292+1 368154-3-283991+8 602563+2  500, 2500,1  -0,ML1
-200999+6 682998+5 258  8+2 504977-5-39783?+6 137335+3 2500, 6000,1  -0,CL3FSI  336 99+5 239170+5 835743+1 329468-3 137 46+7 602489+2 2500, 6000,1  -0,ML1
 3 17  1   1  1 14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60          CL3H81   1  1  1  3  1  8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/66          ML10
-111999+6 65716E+5 24386+2 509646-3-901382+6 128286+3  500, 2500,1  -0,CL3H81 -588429+5 326533+5 111  3+2 890205-3-508733+8 778264+2  500, 2500,1  -0,ML10
-111999+6 656582+5 255576+2 409569-4-898103+6 128266+3 2500, 6000,1  -0,CL3H81 -588429+5 325746+5 134595+2 644349-4-235 91+7 777987+2 2500, 6000,1  -0,ML10
 3 17  3   3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/62          CL3LI3   1  1  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/65          MN
-24013+6 833890+5 316 89+2 701 33-4-80780+6 149212+3  500, 2500,1  -0,CL3LI3  809999+5 218531+6 683693+1 797260-3-900831+5 609577+2  500, 2500,1  -0,MN
-24013+6 833797+5 317525+2 650279-5-711252+6 149209+3 2500, 6000,1  -0,CL3LI3  809999+5 217912+5 861 13+3 168 34-3-134730+7 809388+2 2500, 6000,1  -0,MN
 4 17  1  14 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/70          CL4SI    1  1  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/70          MO
-15839+6 684 59+5 257480+2 318927-4-44934?+6 13625?+3  500, 2500,1  -0,CL4SI  949199+4 214898+6 657920+1 822769-3-430 21+4 813838+2  500, 2500,1  -0,MO
-15839+6 684 16+5 25812C+2 317363-5-40079?+6 13624?+3 2500, 6000,1  -0,CL4SI  949199+4 214295+5 851949+1 188668-3-176457+7 813627+2 2600, 6000,1  -0,MO
  1  9 -0  -0 -0 -0  -0 -0 -0  -0 -0 -0 -0 -0JANAF TAPE 7/71  9/65          F        1  1  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/69          M81
 188569+5 13678?+5 503772+1-250 79-4 675898+5 497396+2  500, 2500,1  -0,F      899999+5 230243+5 791695+1 503141-3-254490+6 659587+2  500, 2500,1  -0,M51
 1885?9+5 13682C+5 498358+1-229881-5 511 58+5 497907+2 2500, 6000,1  -0,F      899999+5 229653+5 728873+1 490859-3 405442+7 659348+2 2500, 6000,1  -0,M81
  1  9  1   1  1  8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/65          FM0      2  1  2  3  2  8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/66          M2L1202
-309999+5 324127+5 104339+2 955969-3-550539+6 794 60+2  500, 2500,1  -0,FM0   -181433+6 744484+5 258986+2 188235-2-148239+7 122627+3  500, 2500,1  -0,M2L1202
-309999+5 32324?+5 134245+2 658725-4-22719?+7 79374?+2 2500, 6000,1  -0,FM0   -181433+6 742781+5 308331+2 137823-3-506856+7 122567+3 2500, 6000,1  -0,M2L1202
  1  9  3   1  1 14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60          FM35     2  1  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/85          M2N
-104999+6 603932+5 217579+2 143990-2-18531?+7 1029000+3  500, 2500,1  -0,FM3SI  400699+5 307767+5 931217+1 180167-2-475 47+6 702280+2  500, 2500,1  -0,M2N
-104999+6 602262+5 250473+2 116541-3-173435+7 102841+3 2500, 6000,1  -0,FM3SI  400699+5 306320+5 131690+2 107546-3-273450+7 701769+2 2500, 6000,1  -0,M2N
  1  9  1   3 -0 -0  -0 -0 -0 -0  -0 -0 -0 -0JANAF TAPE 7/71 12/68          FLI      2  1  2  8 -0 -0  -0 -0 -0 -0  -0 -0 -0 -0JANAF TAPE 7/71 12/60          M202
-81449+5 241258+5 88383C+1 174998-3-19326?+6 67782+2  500, 2500,1  -0,FLI   -325259+5 447647+5 130185+2 242 20-2-41739?+6 901302+2  500, 1000,1  -0,M202
-81449+5 241208+5 891962+1 139607-3-148547+6 67780+2 2500, 6000,1  -0,FLI   -325299+5 439112+5 140670+2 174477-2-79046?+6 69765+2 1000, 1500,1  -0,M202
```

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  3  1  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/65          H3N
-109699+5 418805+5 120619+2 269909-2-958556+6 769962+2  500, 2500,1  -0,H3N
-109699+5 416923+5 164832+2 939260-3-250 24+7 749297+2 2500, 6000,1  -0,H3N
  4  1  2  7 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/65          H4N2
 227859+5 689459+5 220594+2 317316-2-187274+7 108246+3  500, 2500,1  -0,H4N2
 227899+5 686442+5 302187+2 228174-3-685272+7 108140+3 2500, 6000,1  -0,H4N2
  4  1  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/60          H4SI
 779999+4 587330+5 206262+2 183827-2-203595+7 928429+2  500, 2500,1  -0,H4SI
 779999+4 585202+5 248334+2 148146-3-192256+7 924677+2 2500, 6000,1  -0,H4SI
  1  3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/62           LI
 384 99+5 136438+5 47174+1 158973-3 546758+5 446594+2  500, 2500,1  -0,LI
 384 99+5 134907+5-176559+1 162 48-2 177356+8 446408+2 2500, 6000,1  -0,LI
  1  3  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/66          LIN
 799999+5 246207+5 890142+1 212214-3-132 50+6 701987+2  500, 2500,1  -0,LIN
 799999+5 246187+5 893384+1 198305-3-115469+6 701981+2 2500, 6000,1  -0,LIN
  1  3  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/64          LIO
 200999+5 243118+5 892224+1 156677-3-145648+6 706160+2  500, 2500,1  -0,LIO
 200999+5 243 93+5 892694+1 139989-3-114461+6 706161+2 2500, 6000,1  -0,LIO
  2  3 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/62           LI2
 503999+5 254806+6 893935+1 324872-3-401755+5 683492+2  500, 2500,1  -0,LI2
 503999+5 254804+5 894142+1 323724-3-351520+5 683492+2 2500, 6000,1  -0,LI2
  2  3  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/64          LI20
-398999+5 390281+5 147156+2 702 46-4-37738+6 870526+2  500, 2500,1  -0,LI20
-398999+5 390160+5 148620+2 630538-5-29417+6 870496+2 2500, 6000,1  -0,LI20
  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/61           N
 11296+6 134412+5 492481+1 271364+4 956 39+4 480916+2  500, 2500,1  -0,N
 11296+6 134277+5 277722+1 523356+3 56772+7 460868+2 2500, 6000,1  -0,N
  1  7  1  6 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/63          NO
 215799+5 227508+5 808175+1 354495-3-276336+6 668669+2  500, 2500,1  -0,NO
 215799+5 227145+5 877301+1 726516-4-19288+6 668541+2 2500, 6000,1  -0,NO
  1  7  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/64          NO2
 790999+4 345476+5 128604+2 382 47-3-731 64+6 648186+2  500, 2500,1  -0,NO2
 790999+4 345  4+5 136887+2 329899-4-45391D+6 646 21+2 2500, 6000,1  -0,NO2
  1  7  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/67          NSI
 889999+5 253504+5 764406+1 110914-2-648657+5 719821+2  500, 2500,1  -0,NSI
 889999+5 252531+5 118109+2-224515-3-52892+7 719478+2 2500, 6000,1  -0,NSI
  2  7  1  6 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/64          N2O
 196 99+5 36642+5 133569+2 547758-3-72635B+6 616233+2  500, 2500,1  -0,N2O
 196 99+5 36578+5 146 28+2 446710-4-652692+6 816  7+2 2500, 6000,1  -0,N2O
  2  7  3  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/64          N2O3
 197999+5 61892+5 230372+2 652593-3-12395+7 123258+3  500, 2500,1  -0,N2O3
 197999+5 61812+5 244627+2 562183-4-820998+6 123229+3 2500, 6000,1  -0,N2O3
  2  7  4  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/64          N2O4
 216999+4 787378+5 295602+2 812393-3-178876+7 134969+3  500, 2500,1  -0,N2O4
 216999+4 786374+5 313221+2 705107-4-120885+7 134924+3 2500, 6000,1  -0,N2O4
  2  7  5  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71 12/64          N2O5
 269999+4 916176+5 352907+2 191 87-3-165360+7 156735+3  500, 2500,1  -0,N2O5
 269999+4 915902+5 356432+2 200514-4-118397+7 156725+3 2500, 6000,1  -0,N2O5
  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/62               O
 595589+5 135166+5 496176+1 567346-5 298680+5 500932+2  500, 2500,1  -0,O
 595589+5 135210+5 450112+1 133922-3 904980+6 500947+2 2500, 6000,1  -0,O
  1  8  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/67          OSI
-239999+5 233921+5 862512+1 174322-3-25727B+6 69754+2  500, 2500,1  -0,OSI
-239999+5 233575+5 766721+1 305160-3 356 33+7 697421+2 2500, 6000,1  -0,OSI
  2  8  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/67          O2SI
-729999+5 380881+5 143437+2 205481-3-589 33+6 856255+2  500, 2500,1  -0,O2SI
-729999+5 380621+5 147816+2 181596-4-399  4+6 956163+2 2500, 6000,1  -0,O2SI
  3  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/61           O3
 340999+5 360506+5 134949+2 279823-3-508694+6 861 14+2  500, 2500,1  -0,O3
 340999+5 360368+5 136156+2 140117-3-430343+6 860944+2 2500, 6000,1  -0,O3
  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/67           S1
 10769+6 140282+5 463210+1 28/580-3 862 99+5 519934+2  500, 2500,1  -0,S1
 10769+6 140175+5 561149+1-392 86-4-21789+7 519896+2 2500, 6000,1  -0,S1
  2 14 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/67          SI2
 14099+6 27148+5 114 82+2-502556-3-53818+6 774695+2  500, 2500,1  -0,SI2
 14099+5 272 72+5 955600+1 137663-3 103517+7 774903+2 2500, 6000,1  -0,SI2

  3 14 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  3/67          8I3
 15199+6 400847+5 144776+2 293721-3-103976+6 975739+2  500, 2600,1  -0,8I3
 15199+6 401797+6 161149+2 189399-3-639446+7 976 76+2 2800, 6000,1  -0,8I3
  1  6  2 17  2  9 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  6/70      CCL2F2
-117499+6 662599+5 262460+2 216872-3-105405+7 128637+3  500, 2600,1  -0,CCL2F2
-117499+6 662319+5 266998+2 198840-4-799670+6 128628+3 2500, 6000,1  -0,CCL2F2
  1  5  2  9  1  1 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71 12/66      8F2M
-17539+6 474242+5 172707+2 911477-3-12669?+7 949886+2  500, 2800,1  -0,8F2M
-17539+6 473203+5 193764+2 734363-4-13259B+7 949318+2 2800, 6000,1  -0,8F2M
  1  6  2  9  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71 12/66      8F20
-19999+6 500992+6 190876+2 296490-3-102266+7 103963+3  600, 2800,1  -0,8F20
-19999+6 800597+6 163225+2 369 24-3 262577+7 103969+3 2800, 6000,1  -0,8F20
  1  6  1 17  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/65      CCLO
-149999+5 386638+5 130444+2 309923-3-411862+6 926801+2  600, 2500,1  -0,CCLO
-149999+5 385269+5 137371+2 257704-4-301705+6 926670+2 2600, 6000,1  -0,CCLO
  1  6  1  9  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/65      CFO
-409999+5 346660+6 129144+2 358914-3-624812+6 873417+2  500, 2800,1  -0,CFO
-409999+5 346146+5 137 86+2 304924-4-43746?+6 873263+2 2800, 6000,1  -0,CFO
  2  6  6  9 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/69          C2F6
-321199+6 108190+6 41843+2 405 36-3-222  8+7 186846+3  500, 2800,1  -0,C2F6
-321199+6 108140+6 426449+2 338746-5-220426+7 168828+3 2500, 6000,1  -0,C2F6
  1  9  1  7  2  6 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/65      FNO2
-259999+5 495524+6 186360+2 448866-3-104727+7 101661+3  500, 2800,1  -0,FNO2
-269999+5 494969+6 198111+2 388628-4-734965+6 101541+3 2800, 6000,1  -0,FNO2
  1  6  1  3  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/66      BLIO2
-180361+6 476899+6 173831+2 891309-3-126232+7 987481+2  800, 2800,1  -0,BLIO2
-160381+6 475633+6 193716+2 743411-4-P2564?+6 967 74+2 2600, 6000,1  -0,BLIO2
  1 13  4  9  1  3 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  6/70      ALF4LI
-442999+6 832 88+5 315620+2 907435-4-854 14+6 147177+3  500, 2800,1  -0,ALF4LI
-442999+6 831966+6 317363+2 669565-8-72386+8 147172+3 2800, 6000,1  -0,ALF4LI
  1  6  1  5 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  6/63          CB
 197999+6 234103+5 688668+1 210  9-3-28098?+6 689730+2  500, 2800,1  -0,CB
 197999+6 233939+6 886469+1 918182-4-160862+6 689672+2 2800, 6000,1  -0,CB
  1  6  2  9  1  1  1  8 -0 -0 -0 -0 -0JANAF T4PE 7/71  3/65          BF2NO
-258999+6 607832+5 219 76+2 130171-2-18982?+7 111133+3  800, 2800,1  -0,BF2NO
-268999+6 606522+6 261366+2 101  8-3-30294+7 111 86+3 2600, 6000,1  -0,BF2NO
  2  5  1  4  4  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  6/66      B2BED4
-322999+6 937396+5 352782+2 897983-3-20872?+7 152281+3  500, 2600,1  -0,B2BED4
-322999+6 936292+5 372344+2 775447-4-149446+7 152242+3 2500, 6000,1  -0,B2BED4
  1  4  3  9  1  3 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71 12/62      BEF3LI
-211999+6 649815+5 249279+2 333632-3-13967?+7 115557+3  500, 2800,1  -0,BEF3LI
-211999+6 649391+5 266324+2 300973-4-105736+7 115542+3 2500, 6000,1  -0,BEF3LI
  1 17  1  7  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71 12/66      CLNO2
 289999+4 499998+5 188 21+2 369664-3-94693?+6 108 93+3  500, 2800,1  -0,CLNO2
 289999+4 499513+6 198438+2 340266-4-64929?+6 100 76+3 2500, 6000,1  -0,CLNO2
  2  9  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  3/64          F2N
 100999+5 358 73+6 136 35+2 114 92-3-529 83+6 886773+2  500, 2800,1  -0,F2N
 100999+5 357925+5 136395+2 106264-4-387321+6 888720+2 2500, 6000,1  -0,F2N
  3  5  1  9  2  1  3  8 -0 -0 -0 -0 -0JANAF T4PE 7/71 12/66      B3FM203
-381999+6 116640+6 439614+2 204548-2-355220+7 186130+3  500, 2800,1  -0,B3FM203
-381999+6 118296+6 465292+2 170944-3-280989+7 186 43+3 2800, 6000,1  -0,B3FM203
  3  5  2  9  1  1  3  8 -0 -0 -0 -0 -0JANAF T4PE 7/71 12/65      B3F2NO3
-474999+6 120967+6 466663+2 145934-2-334327+7 172592+3  500, 2600,1  -0,B3F2NO3
-474999+6 120807+6 488286+2 128644-3-228744+7 172529+3 2800, 6000,1  -0,B3F2NO3
  3  6  3  1  3  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  3/65      B3N3O3
-290999+6 115921+6 420526+2 267668-2-368961+7 157518+3  500, 2500,1  -0,B3N3O3
-290999+6 118431+6 482236+2 215431-3-360102+7 157409+3 2500, 6000,1  -0,B3N3O3
  1  9  1  7  3  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  3/63          FNO3
 249999+4 648 46+5 246496+2 469189-3-133841+7 121641+3  500, 2800,1  -0,FNO3
 249999+4 647459+5 255566+2 413666-4-94743?+6 121621+3 2500, 6000,1  -0,FNO3
  1  1  1  7  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  3/63          HNO
 237999+5 32484?+5 113718+2 869626-3-687633+6 784313+2  500, 2800,1  -0,HNO
 237999+5 327909+5 134577+2 665408-4-117585+7 763961+2 2500, 6000,1  -0,HNO
  1  5  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF T4PE 7/71  6/68           8O2
-67999+5 380700+5 143647+2 203640-3-609733+6 857630+2  500, 2500,1  -0,8O2
-67999+5 380411+5 137558+2 269575-3 218913+7 857427+2 2500, 6000,1  -0,8O2
```

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 1  4  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/63          BEN
 101980+6 236767+5 889725+1 192939-3-2588226+6 692988+2  500, 2500,1  -0,BEN
 101980+6 2J6652+5 88881E+1 110676-3-.4481E+6 692948+2 2500, 6000,1  -0,BEN
  1  1  1  7  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/63          HNO2
-18839+5 47029J+5 165119+2 110 24-2-952 79+5 9634C3+2  500, 2500,1  -0,HNO2
-18839+5 469226+5 193 31+2 824 45-4-24934+7 983 26+2 2500, 6000,1  -0,HNO2
  1  1  1  7  3  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/63          HNO3
-320999+5 610921+5 219820+2 126411-2-15232Z+7 11091E+3  500, 2500,1  -0,HNO3
-320999+5 60961E+5 251557+2 987509-4-263753+7 110669+3 2500, 6000,1  -0,HNO3
  2  4  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63          PE20
-14999+5 375654+5 141185+2 286706-3-88997J+6 829455+2  500, 2500,1  -0,8E20
-14999+5 375496+5 147336+2 254197-4-45349B+6 629329+2 2500, 6000,1  -0,PE20
  2  9  1  8  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63          F20BI
-23099+6 505668+5 192311+2 236120-3-891509+6 10555?+3  500, 2500,1  -0,F20BI
-23099+6 505367+5 197292+2 213607-4-646599+6 10554643 2500, 6000,1  -0,F20BI
  3  9  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/70          F3BI
-262999+6 514326+5 195480+2 120540-3-68869+6 109519+3  500, 2500,1  -0,F3BI
-262999+6 514170+5 197958+2 113311-4-531215+6 109513+3 2500, 6000,1  -0,F3BI
  1 13  1  1  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/67          ALHO
-42999+5 34347J+5 118221+2 100 86-2-79692E+6 781703+2  500, 2500,1  -0,ALHO
-42999+5 342521+5 143890+2 742179-4-23611J+7 761368+2 2500, 6000,1  -0,ALHO
  4  9  2  7 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/64          F4N2
-19999+4 807234+5 J10486+2 278142-3-158 39+7 138617+3  500, 2500,1  -0,F4N2
-19999+4 806871+5 316228+2 258462-4-12263+7 136604+3 2500, 6000,1  -0,F4N2
  1  1  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/64          HO2
 49999+4 32652J+5 111320+2 908314-3-58226O+6 800215+2  500, 2500,1  -0,HO2
 49999+4 325647+5 134514+2 664851-4-19250J+7 799906+2 2500, 6000,1  -0,HO2
  2  3  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/64          LI2O2
-579999+5 529453+5 198478+2 939832-5-24474O+6 109891+3  500, 2500,1  -0,LI2O2
-579999+5 529441+5 198669+2 833753-6-231795+6 109890+3 2500, 6000,1  -0,LI2O2
  2  5  4  9 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          B2F4
-34219+6 771979+5 293178+2 545326-J-16474J+7 137525+3  500, 2500,1  -0,B2F4
-34219+6 771288+5 304751+2 487667-4-112180+7 137501+3 2500, 6000,1  -0,B2F4
  1  7  3  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          NO3
 16999+5 49870J+5 191696+2 260574-3-11252S+7 999138+2  500, 2500,1  -0,NO3
 16999+5 498383+5 197111+2 240799-4-81434O+6 999 18+2 2500, 6000,1  -0,NO3
  1  6  4  9  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/69          CF4O
-182799+6 777562+5 296249+2 436649-3-153450+7 139249+3  500, 2500,1  -0,CF4O
-182799+6 776979+5 304813+2 476462-4-82894+6 139228+3 2500, 6000,1  -0,CF4O
  1  6  2 17 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/68          CCL2
 569999+5 403610+5 143521+2 70J546-3-636557+6 95724942  500, 2500,1  -0,CCL2
 569999+5 401173+5 142490+2-150868-5 110255+8 956J86+2 2500, 6000,1  -0,CCL2
  1  6  3 17 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/70          CCLJ
 189999+5 519270+5 196590+2 792686-4-54577B+6 113779+3  500, 2500,1  -0,CCL3
 189999+5 519166+5 198218+2 743343-5-44219Y+6 113775+3 2500, 6000,1  -0,CCL3
  2  9  2  7 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/65          F2N2
 193999+5 501991+5 189566+2 334461-3-93092J+6 103 57+3  500, 2500,1  -0,F2N2
 193999+5 501573+5 194753+2 293767-4-65559B+6 103 42+3 2500, 6000,1  -0,F2N2
  2  1  2  7 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/65          H2N2
 508999+5 440241+5 144737+2 180804-2-12535I+7 65194I+2  500, 2500,1  -0,H2N2
 508999+5 438392+5 189461+2 135183-3-307 74+7 651288+2 2500, 6000,1  -0,H2N2
  1  5  2 17  1  1 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/66          BCL2H
-592999+5 4887454+5 178943+2 684859-3-94914746 1028664+3  500, 2500,1  -0,BCL2H
-592999+5 4879664+5 195 93+2 53386J-4-1176I6+7 1028J7+3 2500, 6000,1  -0,BCL2H
  2  5  4  1  4  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/66          B2H4O4
-306999+6 126227+6 440842+2 351745-2-32625E+7 17981E+3  500, 2500,1  -0,B2H4O4
-306999+6 125872+6 528498+2 261791-3-71782+7 17969I+3 2500, 6000,1  -0,B2H4O4
  1 1J  1  5  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/66          ALBO2
-129J59+6 499 35+5 186481+2 438499-3-90649E+6 10441B+3  500, 2500,1  -0,ALBO2
-12939+6 4985C9+5 196247+2 J65995-4-73071E+6 104399+J 2500, 6000,1  -0,ALBO2
  1  5  1  4  2  6 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/66          BBEO2
-11919+6 495630+5 185703+2 467487-3-10043+7 102855+3  500  2500,1  -0,BBEO2
-11919+6 495 86+5 19t 53+2 395249-4-786 92+6 1028J6+3 2500, 6000,1  -0,BBEO2
  2  5  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/66          B2O
 22999+5 34683J+5 128381+2 J87532-3-667 47+6 821J7I+2  500, 2500,1  -0,B2O
 229999+5 J46360+5 136875+2 330839-4-4J7289+6 82120J+2 2500, 6000,1  -0,B2O

  2  4  2  9  1  P -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  0/66          BE2F2O
-2678999+6 661584+5 249694+2 3I6935-3-991 57+6 125233+3  500, 2800,1  -0,BE2F2O
-2678999+6 661484+5 256442+2 261 99-4-695127+6 1262I0+3 2500, 6000,1  -0,BE2F2O
  1  6  2  7 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/70          CN2
 112999+6 377360+5 141695+2 272475-3-661240+6 644463+2  500, 2500,1  -0,CN2
 112999+6 376948+5 144532+2 104945-3 804991+6 644320+2 2500, 6000,1  -0,CN2
  2  6  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/66          C2O
 684999+5 367544+5 135167+2 652350-3-613 11+8 864965+2  500, 2800,1  -0,C2O
 684999+5 366404+5 139616+2-101 69-3-996633+6 664882+2 2500, 6000,1  -0,C2O
  1 17  8  9 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/66          CLF6
-569999+5 830461+5 318959+2 744951-4-915 31+6 142614+3  500, 2800,1  -0,CLF6
-569999+5 830363+5 317474+2 699687-5-810209+6 142610+3 2500, 6000,1  -0,CLF6
  1  4  1  1 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/66          BEN
 27639+6 228 40+5 773190+1 566 70-3-28338B+6 591810+2  800, 2800,1  -0,BEN
 27639+6 227446+5 681 63+1 667127-3 515993+7 891299+2 2500, 6000,1  -0,BEN
  1  9  2  6 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/66          FO2
 29999+4 356727+5 134 79+2 183316-3-43671B+6 91326+2  500, 2800,1  -0,FO2
 29999+4 358498+5 138 13+2 162242-4-256826+6 913183+2 2500, 6000,1  -0,FO2
  1  3  1  7  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/66          LINO
 4299999+5 359920+5 13819I+2 143616-3-435269+6 88184+2  500, 2800,1  -0,LINO
 4299999+5 359736+5 13824B+2  127 16-4-300310+6 881885+2 2500, 6000,1  -0,LINO
  2  6  1  1 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/66          C2H
 1139999+6 356561+5 113 96+2 142844-2-498 54+6 77346I+2  500, 2800,1  -0,C2H
 1139999+6 356400+5 172 51+2-959516-4-135545+8 773406+2 2500, 6000,1  -0,C2H
  1  6  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/67          C8I
 17199+6 263521+5 88341J+1 297232-3 516222+6 736268+2  500, 2800,I  -0,C8I
 17199+6 263460+5 997821+1-714616-5-157840+7 736247+2 2500, 6000,1  -0,C8I
  1  6  2 14 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/67          C8I2
 12799+6 387628+5 13883E+2 513613-3-39170E+6 89461+2  500, 2800,1  -0,C8I2
 12799+6 390  4+5 176442+2 236266-3-20812+8 698657+2 2500, 6000,1  -0,C8I2
  2  6  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/7I  3/67          C2N
 13299+6 384663+5 14541J+2 135841-3-51461+6 886366+2  500, 2500,1  -0,C2N
 13299+6 364653+5 14597R+2 586896-4 340163+6 666291+2 2500, 6000,1  -0,C2N
  2  6  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/7I  3/67          C26I
 14699+6 382352+5 13884J+2 448567-3-489657+6 675617+2  500, 2500,1  -0,C2BI
 14699+6 384190+5 15386J+2 623925-3-112301+6 678466+2 2500, 6000,1  -0,C2BI
  1  7  2 14 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/67          NBI2
 9499999+5 390978+5 14723+2 709563-4-355356+6 936941+2  500, 2500,1  -0,NBI2
 9499999+5 390611+5 142581+2 138752-3 181202+7 938663+2 2500, 6000,1  -0,NBI2
  1  6  4 17 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/67          C2CL4
-29699+4 819 39+5 30921?+2 320835-3-111947+7 148923+3  500, 2800,1  -0,C2CL4
-29899+4 616825+5 318507+2 390880-4-65354J+6 148908+3 2500, 6000,1  -0,C2CL4
  2  6  6 17 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/67          C2CL6
-320799+5 114658+6 44167?+2-169144-3-1373J6+7 189745+3  500, 2800,1  -0,C2CL6
-320799+5 114620+6 431497+2-477963-4 277968+7 189732+3 2500, 6000,1  -0,C2CL6
  2  6  1  1  1  9 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/67          C2HF
 299999+5 49819J+5 172540+2 119418-2-82736+6 946986+2  500, 2800,1  -0,C2HF
 299999+5 49699?+5 202593+2 681 54-4-226843+7 946533+2 2500, 6000,1  -0,C2HF
  1 13  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/68          AL02
-4399999+5 389593+5 147 2e+2 796767-4-J97099+6 908887+2  500, 2800,1  -0,AL02
-4399999+5 389426+5 139242+2 224362-3 220592+7 908827+2 2500, 6000,1  -0,AL02
  2  6  2 17 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/66          C2CL2
 500999+5 53275+5 195665+2 457660-3-617312+6 108671+3  500, 2800,1  -0,C2CL2
 500999+5 53222B+5 206159+2 369235-4-80139E+6 108852+3 2500, 6000,1  -0,C2CL2
  2  6  1  1  1 17 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/66          C2HCL
 5109999+5 502940+5 175238+2 110696-2-764412+6 978 67+2  500, 2800,1  -0,C2HCL
 5109999+5 501839+5 203 A8+2 815 85-4-212305+7 977678+2 2500, 6000,1  -0,C2HCL
  1  6  1  1  1 17 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/69          CHCL
 799999+5 373662+5 145125+2 302110-3-131 94+7 851119+2  500, 2800,1  -0,CHCL
 799999+5 37217+5 134CC6+2 112657-3 822341+7 850585+2 2500, 6000,1  -0,CHCL
  1  6  1  1  1  9 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/69          CHF
 299999+5 3J4212+5 107783+2 127857-2-554 46+6 793  6+2  500, 2800,1  -0,CHF
 29999+5 344799+5 165423+2 1356J5+4-168651+7 134 42+3 2500, 6000,1  -0,CHF
  2  6  3  9  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/69          C2F3N
-11839+6 790225+5 296 19+2 764111-3-16565J+7 134 42+3  500, 2800,1  -0,C2F3N
-11839+6 789288+5 313823+2 655874-4-137200+7 134  9+3 2500, 6000,1  -0,C2F3N
```

```
  3 17  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/69          CL38I
-959999+5 527482+5 198206+2 190914-4-305273+6 120372+3  500. 2500.1  -0.CL38I
-959999+5 527456+5 198597+2 179801-5-279475+6 120371+3 2500. 6000.1  -0.CL38I
  2 13  6  9 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/70          AL2F6
-629449+6 113740+6 432161+2 186920-3-136338+7 185892+3  500. 2500.1  -0.AL2F6
-629449+6 113715+6 435993+2 176772-4-111393+7 185885+3 2500. 6000.1  -0.AL2F6
  3  9  1  7  1  8 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/70          F3NO
-389999+5 655385+5 248870+2 345108-3-117800+7 119228+3  500. 2800.1  -0.F3NO
-389999+5 654954+5 256290+2 303997-4-89M 75+6 119212+3 2500. 6000.1  -0.F3NO
  2  9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/60            F2
-248  0+0 244390+5 883592+1 247292-3-194499+8 685728+2  500. 2500.1  -0.F2
-248  0+0 244339+5 891845+1 211324-3-148286+6 685710+2 2500. 6000.1  -0.F2
  2 17 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 **/80          CL2
-856  0+0 243985+5 893383+1 117741-3-93682+5 737494+2  500. 2800.1  -0.CL2
-856  0+0 244366+5 870592+1 390773-4-389 1A+7 737629+2 2500. 6000.1  -0.CL2
  2  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 **/81          N2
-110  0+0 222368+5 760394+1 501487-3-234708+6 637903+2  500. 2800.1  -0.N2
-110  0+0 221842+5 858948+1 972320-4-781411+5 637717+2 2500. 6000.1  -0.N2
  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 **/81          O2
 574  0+0 234441+6 807265+1 503 78-3-238837+6 679715+2  500. 2500.1  -0.O2
 574  0+0 234554+5 977777+1 110622-3-476367+7 679755+2 2500. 6000.1  -0.O2
  1  6  1  7  1  8 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/70          CNO
 380999+5 370504+5 136709+2 446500-3-718686+6 850301+2  500. 2500.1  -0.CNO
 380999+5 369913+5 142307+2 129228-3 739573+6 850 92+2 2500. 6000.1  -0.CNO
  3  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/70          N3
 989999+5 372936+5 138634+2 376483-3-701306+6 839596+2  500. 2500.1  -0.N3
 989999+5 372469+5 146566+2 383 53-4-374915+8 839432+2 2500. 6000.1  -0.N3
  2  5  4  9  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/**      82F40
-45349+6 897442+5 362122+2 107778-3-366 31+7 150838+3  500. 2500.1  -0.82F40
-45349+6 897594+5 369245+2-247926-4-604 71+7 150844+3 2500. 6000.1  -0.82F40
  1 18                                  CONVAIR 2PM-122 12/81          A
+000000+0+149400+5+418099+1+122980-4+371200+7+484819+22000. 10000.1    A
+000000+0+149400+5+418099+1+122980-4+371200+7+484819+22000. 10000.1    A
  1  2                                                                 HE
 000000+0 134230+5 496780+1 000000+0 000000+0 415956+2  500. 3000.1    HE
 000000+0 134230+5 496780+1 000000+0 000000+0 415956+2 3000. 5000.1    HE
  4  7  3 14 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/67          N45I3*
-177999+6 114639+8 327276+2 703 25-2-199 44+7 112842+3  500. 1700.2  -0.N45I3*
-177999+6 109 39+8 434915+2 560279-3-131105+7 110824+3 1700. 3000.2  -0.N45I3*
  1  6  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/67          C8I*
-170999+5 327319+5 113633+2 871318-3-86846+8 292555+2  500. 2200.2  -0.C8I*
-170999+5 325997+5 124369+2 413599-3-991 20+6 292 69+2 2200. 4000.2  -0.C8I*
  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/67          8I*
-373  0+0 106854+5 5A6 41+1 918302-3-85769+5 191 90+2  500. 1685.2  -0.8I*
 115849+5 175619+5 649998+1 279396-8 319999+2 256330+2 1685. 4500.3  -0.8I*
  2  8  1 14 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/67          C25I*
-217699+6 462679+5 174 37+2 299889-3-764 67+8 470401+2  500. 1696.2  -0.025I*
-215739+6 494990+5 205108+2-223191-5-324479+5 498114+2 1696. 4500.3  -0.025I*
  2  3  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63          LI202*
-151199+6 978239+5 171905+2 117623-1-34349+8 830765+2  500. 1200.2  -0.LI202*
-151199+6 968358+5 191 8R+2 107129-1-129259+7 826686+2 1200. 2000.2  -0.LI202*
  1 13  6  9  3  3 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/70      ALF6LI3*
-808699+8 236210+6 519111+2 219428-1-886327+8 220146+3  500. 1000.2  -0.ALF6LI3*
-808699+6 241 83+6 483635+2 248236-1-219408+6 222306+3 1000. 1600.2  -0.ALF6LI3*
  1 13  1 17  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/64      ALCLO*
-18959+6 519127+5 192 49+2 465883-3-741 82+6 549886+2  500. 1700.2  -0.ALCLO*
-18959+6 514898+5 202980+2-110110-3-106939+7 548219+2 1700. 3000.2  -0.ALCLO*
  3  5  3  1  3  2 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/65      R3H3O3*
-301699+6 154130+5 4A9635+2 976674-2-408548+7 151598+3  500. 1200.2  -0.R3H3O3*
-301699+6 140231+5 550600+2 126 19-2-392461+7 145584+3 1200. 2000.2  -0.R3H3O3*
  2  6  2  3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/60      C2LI2*
-141999+5 744621+5 243527+2 242647-2-711675+6 728282+2  500. 1200.2  -0.C2LI2*
-141999+5 744908+5 243197+2 243852-2-702303+6 728384+2 1200. 2000.2  -0.C2LI2*
  1 17  4  1  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/65      CLH4N*
-751799+5 138480+6 103183+2 245692-1-251778+6 116 72+3  500. 1000.2  -0.CLH4N*
-751799+5 114 15+6 302857+2 924270-2-489275+7 105293+1 1000. 1500.2  -0.CLH4N*

  1 17  A  1  1  7  4  8 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/82      CLM4N04*
-708869+5 258A49+5 262559+2 418A06-1-166474+7 216177+3  500. 1000.2  -0.CLM4N04*
-706899+5 2254R0+6 773687+2 124 59-1-233297+8 202824+3 1000. 1500.2  -0.CLM4N04*
  1 17  1  3  4  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  0/64      CLLI04*
-866839+5 104 20+6 385  0+2-461696+7-8241324+1 128132+3  500. 1000.3  -0.CLLI04*
-856839+5 104 20+6 38A  0+2-278805+7-2661292+2 128132+3 1000. 1800.3  -0.CLLI04*
  1  4  2  1  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/88      8EM202*
-21649+6 113246+6 156538+2 162106-1-A08794+6 886427+2  500.  700.2  -0.8EM202*
-21649+6 109879+6 176 32+2 1A4669+1-759495+6 870 A9+2  700. 1000.2  -0.PEM202*
  1 13  3 17 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  0/70      ALCL3*
-16127+6 110549+6 300  0+2-433242+7-759739+1 110589+3  500. 1000.3  -0.ALCL3*
-16127+6 110549+6 300  0+2-479453+7-441838+2 110889+3 1000. 1800.3  -0.ALCL3*
  1 13  3  9 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/70      ALF3*
-36099+6 67244C+5 241463+2 813425-3-5213A0+5 707722+2  800. 1800.2  -0.ALF3*
-36099+6 68881B+6 236983+2 169166-2-247 81+7 714520+2 1500. 2600.2  -0.ALF3*
  1 13  1  3  2  8 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/61      ALLI02*
-28432B+6 707677+5 220756+2 290316-2-899247+6 682133+2  500. 1700.2  -0.ALLI02*
-28A32B+6 695688+8 380256+2-180991-2-148895+8 677688+2 1700. 3000.2  -0.ALLI02*
  1 13  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/82      ALN*
-75999+5 311629+5 124 81+2-107446-3-672448+6 298589+2  500. 1700.2  -0.ALN*
-75999+8 313 53+5 119423+2 117146-3-A29660+5 299148+2 1700. 3000.2  -0.ALN*
  3  6  4 13 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/68      C3AL4*
-315A99+5 117727+6 412343+2 2A5929-2-163476+7 114830+3  500. 1700.2  -0.C3AL4*
-518499+5 116637+6 448883+2 723474-3-357136+7 114403+3 1700. 3000.2  -0.C3AL4*
  1  5  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/66      8N*
-599699+5 298201+5 112801+2 419380-3-107  0+7 288337+2  500. 2000.2  -0.8N*
-599899+5 290878+6 103883+2 303612-3 JA2321+7 256684+2 2000. 3800.2  -0.8N*
  1  3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  0/62          LI*
 568999+3 185406+5 682152+1-339996-A 925625+5 242300+2  800. 2200.3  -0.LI*
 568999+3 185572+6 679881+1-592388-5-9A5356+5 242364+2 2200. 4000.3  -0.LI*
  3  3  1  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/86      LI3N*
-471999+5 909316+5 307740+2 312122-2-233851+7 780883+2  500. 1300.2  -0.LI3N*
-47199+5 859483+8 336465+2 2A7899-3-87826+6 759532+2 1300. 2200.2  -0.LI3N*
  1 13 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/67          AL*
     0  0+0 319839+6 268 85+1 539158-2 272240+6 287468+2  800.  934.2  -0.AL*
 207199+4 205 19+6 768799+1 116415-8 799999+1 289383+2  934. 4000.3  -0.AL*
  2 13  3  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/64      AL203*
-400399+6 843519+5 287731+2 223942-2-116653+7 786282+2  800. 2318.2  -0.AL203*
-373355+6 856887+5 346222+2 160187-6 204799+4 908747+2 2316. 3800.3  -0.AL203*
  1  5 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64          8*
-373  0+0 175672+6 560678+1 789478-3-393109+6 148 35+2  500. 2450.2  -0.8*
 525999+4 174579+5 730  6+1-128 56-7-223999+3 166199+2 2450. 8000.3  -0.8*
  2  8  3  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/64      8203*
-303839+6 162815+6-179A79+1 370119-1 102203+7 113452+3  500.  722.2  -0.8203*
-29927+6 798183+8 298 4A+2 185288-3 126688+7 820508+2  722. 4000.3  -0.8203*
  1  6  4  5 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/66      C84*
-92959+4 829559+5 229998+2 538973-2-103 91+7 681797+2  500. 2743.2  -0.C8A*
 18094+5 790399+5 325201+2-427663-5-685359+5 767624+2 2743. 3800.3  -0.C84*
  1  4 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/61          8E*
-778  0+0 216219+5 429311+1 228705-2-404141+5 150178+2  500. 1556.2  -0.8E*
 288 99+4 182842+5 792505+1-825429-A-265595+7 184323+2 1556. 6000.3  -0.8E*
  1  4  1  8 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  9/63      8EO*
-143 99+6 341479+5 106216+2 155564-2-529709+8 293446+2  500. 2818.2  -0.8EO*
-12956+6 368749+5 160  A+2-833299-7-23039?+4 347896+2 2818. 8000.3  -0.8EO*
  1  6  2  4 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/63      C8E2*
-216999+5 533215+5 181141+2 215398-2-217657+7 431 74+2  500. 2400.3  -0.C8E2*
-379799+4 524429+5 220 21+2-480562-6-614399+A 502501+2 2400. 3500.3  -0.C8E2*
  3  4  2  7 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  3/87      8E3N2*
-1A0599+6 792749+5 320BA7+2-259129-3-224A87+7 706384+2  500. 2473.2  -0.8E3N2*
-11639+6 864589+5 320  6+2-126659-6-204799+A 833 53+2 2473. 4000.3  -0.8E3N2*
  1 17  1  3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71  6/62      CLLI*
-975779+5 502199+5 103698+2 50039A-2-306903+5 514617+2  500.  883.2  -0.CLLI*
-933939+5 361136+5 175206+2-225386-2 789199+4 802333+2  883. 2000.3  -0.CLLI*
  1  9  1  3 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0 -OJANAF TAPE 7/71 12/68      FLI*
-14749+6 459835+5 100526+2 A29701-2-105768+8 427443+2  500. 1121.2  -0.FLI*
-1A3 60+6 414459+5 153399+2 272396-7 959999+2 4568A8+2 1121. 3000.3  -0.FLI*
```

```
    1   1   1   3   1   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/66         HL10*
-115839+6 741759+6 992866+1 106492-1-517899+4 616700+2  500.  744,2  -0,HL10*
-113262+6 560389+5 207400+2-605359-8-799999+1 594648+2  744. 3500,3  -0,HL10*
    2   3   1   8 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/64         LI20*
-143 99+6 619999+5 178454+2 358485-2-805340+6 561242+2  500. 1857,2  -0,LI20*
-132128+6 623619+5 239998+2 363215-7 363999+3 626331+2 1857, 4000,3  -0,LI20*
    1   6   1   3   2   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/64         BLI02*
-243289+6 898569+5 143733+2 116810-1-347280+6 752365+2  500. 1116,2  -0,BLI02*
-238818+6 864 14+5 345881+2-358559-7-159999+3 808523+2 1116, 4000,3  -0,BLI02*
    1   4   2  17 -0 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/85         BECL2*
-118599+6 437119+5 224615+2-327  4-2-856638+6 569 42+2  500.  679,2  -0,BECL2*
-117424+6 763160+5 290199+2 260770-7 229999+2 804464+2  679, 2000,3  -0,BECL2*
    1   4   2   9 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/70         BEF2*
-245399+6 661769+5 114165+2 790 67-2-123362+5 606974+2  500.  824,2  -0,BEF2*
-244274+6 676921+8 138453+2 708747-2-463265+6 631383+2  824, 2000,3  -0,BEF2*
    2  13   1   4   4   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/64         AL2BE04*
-544999+6 126637+6 350316+2 792725-2-110319+7 111986+3  500. 1700,2  -0,AL2BE04*
-544999+6 126470+6 395377+2 642652-2-675205+7 111931+3 1700. 3000,2  -0,AL2BE04*
    4   6   2   3   7   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/65         B4LI207*
-803599+6 240767+6 475582+2 264478-1-206819+7 208921+3  600. 1190,2  -0,B4LI207*
-792789+6 286874+6 101141+3 752653-2 266932+7 249982+3 1190. 3000,3  -0,B4LI207*
    6   5   2   3  10   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/65         B6LI201*
-111373+7 288689+6 816137+2 167955-1-245753+7 267222+3  500. 1200,2  -0,B6LI201*
-111373+7 280801+6 762502+2 160770-1 650757+7 263639+3 1200, 2000,2  -0,B6LI201*
    6   6   2   3  13   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/65         B6LI201*
-141356+7 362469+6 110869+3 144809-1-395675+7 337542+3  500. 1200,2  -0,B8LI201*
-141356+7 351143+6 110863+3 140149-1-319404+7 336953+3 1200. 2000,2  -0,B6LI204*
    2   8   4   1   4   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/66         B2H404*
-337 99+6 184720+6 372 62+2 201810-1-205638+7 160378+3  500. 1000,2  -0,B2H404*
-337 99+6 163461+6 603721+2 453690-2-958  9+7 151197+3 1000. 1500,2  -0,B2H404*
    1   6   2   3   3   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/66         CLI203*
-290639+6 164751+6 708807+1 361152-1 160613+7 142813+3  500.  993,2  -0,CLI203*
-281628+6 114711+6 443209+2-435856-6-671999+3 120879+3  993. 2000,3  -0,CLI203*
    1   4   3   9   1   3 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/66         BEF3LI*
-390239+6 989273+8 323771+2 356191-2-159677+7 979550+2  800. 1000,2  -0,BEF3LI*
-390239+6 964786+8 333464+2 303956-2-204379+7 977766+2 1000. 1500,2  -0,BEF3LI*
    1   4   4   9   2   3 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/66         BEF4LI2*
-538999+6 216191+6 221889+2 350920-1-365579+5 175626+3  500.  745,2  -0,BEF4LI2*
-531216+6 146  0+6 554999+2 166264-7 199999+2 157173+3  745. 2000,3  -0,BEF4LI2*
    2   5   3   4   6   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/66         B2BE306*
-741959+6 188896+6 709707+2 311327-2-628850+7 167660+3  500. 1700,2  -0,B2BE306*
-741959+6 188872+6 661646+2 460229-2 285754+6 167628+3 1700. 3000,2  -0,B2BE306*
    3   5   3   9   3   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/65         B3F303*
-585499+6 173715+6 378809+2 171852-1-189271+7 176816+3  500. 1000,2  -0,B3F303*
-586499+6 142182+6 695170+2-492905-2-114144+8 163112+3 1000. 1500,2  -0,B3F303*
   10   5  14   1 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  0/64         B10H14*
-169999+4 396491+6 646573+2 410265-1-559736+7 336853+3  500. 1000,3  -0,B10H14*
-169999+4 316156+6 174185+3-188850-1-352138+8 301924+3 1000. 1500,3  -0,B10H14*
    1   1   1   3 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/67         HLI*
-216599+5 660159+5 372 97+1 126 91-1-724691+5 470463+2  500.  962,2  -0,HLI*
-165729+5 402579+5 149  1+2-605359-7-749999+2 397139+2  962. 2000,3  -0,HLI*
    1   5   1   1   2   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/64         BH02*
-191869+6 766830+5 136306+2 930341-2-633 11+6 656373+2  500. 1000,2  -0,BH02*
-191869+6 589514+5 236362+2-182829-4-131683+7 576622+2 1000. 1500,2  -0,BH02*
    1   5   3   1   3   8 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/64         BH303*
-261469+6 129289+6 260431+2 141238-1-143978+7 112468+3  500. 1000,2  -0,BH303*
-261469+6 114403+6 422911+2 315866-2-672256+7 106 40+3 1000. 1500,2  -0,BH303*
    5   5   9   1 -0 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/65         B5H9*
 102399+5 199456+6 596858+2 114916-1-515761+7 191401+3  500. 1000,3  -0,B5H9*
 102399+5 181841+6 672378+2 318617-2-440404+7 183422+3 1000. 1500,3  -0,B5H9*
    1   5   4   1   1   3 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71 12/64         BH4LI*
-455219+5 739491+5 295147+2-405981-3-146142+7 782840+2  500. 1200,2  -0,BH4LI*
-455219+5 756746+5 276172+2 688528-3-965963+6 790200+2 1200. 2000,2  -0,BH4LI*
    1  13   4   1   1   3 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  3/64         ALH4LI*
-279999+5 775456+5 284104+2 884184-3-117868+7 835879+2  500. 1200,2  -0,ALH4LI*
-279999+5 773156+5 274386+2 116524-2-265712+6 834700+2 1200. 2000,2  -0,ALH4LI*

    2   4   4   8   1  14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/65         BE2048I*
-606 28+6 113477+6 433672+2 933631-3-264576+7 104271+3  600. 1700,2  -0,BE2048I*
-806 28+6 113916+6 402686+2 214879-2 164156+8 104439+3 1700. 3000,2  -0,BE2048I*
    2   3   3   8   1  14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/67         LI2038I*
-394239+6 109 11+6 308941+2 631625-2-897476+6 102884+3  500. 1474,2  -0,LI2038I*
-368440+6 102546+6 399999+2 638190-6 639999+2 104411+3 1474. 4000,3  -0,LI2038I*
    2   3   5   8   2  14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  6/67         LI2058I*
-612 69+6 164863+6 810626+2 744 57-2-227708+7 186683+3  500. 1307,2  -0,LI2058I*
-600639+6 155277+6 899996+2 104308-6 511999+3 161859+3 1307. 3000,3  -0,LI2059I*
    2  13   5   6   1  14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/67         AL2058I*
-618809+6 136481+6 407736+2 677726-2-127617+7 128286+3  800. 1700,2  -0,AL2058I*
-616809+6 136616+6 408 79+2 678654-2-141626+7 128302+3 1700. 3000,2  -0,AL2058I*
    6  13  13   8   2  14 -0 -0 -0 -0 -0 -0 -0 -0JANAF TAPE 7/71  9/67         AL60136*
-162982+7 342977+6 120598+3 725106-2-530661+7 336673+3  500. 1700,2  -0,AL60138*
-162982+7 342497+6 112 45+3 968664-2 768780+7 336487+3 1700. 3000,2  -0,AL60138*
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