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FOUR-D GLOBAL REFERENCE ATMOSPHERE USERS MANUAL AND PROGRAMMERS MANUAL

Part II

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This document was prepared based on the engineering design problems which have been identified or anticipated for the Space Shuttle program.

16. ABSTRACT

An empirical atmospheric model has been developed which generates values for pressure, density, temperature, and winds from surface levels to orbital altitudes. The output parameters consist of components for: (1) latitude, longitude, and altitude dependent monthly and annual means, (2) quasi-biennial oscillations, and (3) random perturbations to simulate partially the variability due to synoptic, diurnal, planetary wave, and gravity wave variations. Quasi-biennial and random variation perturbations are computed from parameters determined from various empirical studies and are added to the monthly mean values. This model has been developed as a computer program called PROFILE which can be used to generate altitude profiles of atmospheric parameters along any simulated trajectory through the atmosphere. The PROFILE program was developed for design applications in the Space Shuttle program. Other applications of the model are discussed, such as for global circulation and diffusion studies, and for generating profiles for comparison with other atmospheric measurement techniques, (e.g. satellite measured temperature profiles).

The results are given in two parts, viz: TMX-64871 , Four-D Global Reference Atmosphere, Technical Description, Part I and TMX-64872 , Four-D Global Reference Atmosphere Model Users Manual and Programmers Manual, Part II.

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PREFACE

This preface covers a two-part publication. NASA TMX-64871 , Four-D Global Reference Atmosphere, Technical Description and NASA TMX-64872 , Four-D Global Reference Atmosphere Model, Users Manual and Programmers Manual, Part II, both with publication date of September 1974.

The motivation for the development of a global reference atmospheric model is from recognized needs for engineering design, mission planning, performance analysis, and possibly operational usage for the Space Shuttle program.

The concept of a global reference atmospheric model has its origin as an extension of the Range Reference Atmospheric Model which is a model of the gas properties over a particular geographic location. Particular range reference atmospheric models are the Patrick Reference Atmosphere (Annual) which is valid for Cape Kennedy, Florida, Vandenberg AFB Reference Atmosphere (Annual) and Edward AFB Reference Atmosphere (Annual). To represent the dispersions in the gas properties, pressure, temperature, and density there are also the Hot and Cold Reference Atmospheres for these three sites. Range Reference Atmospheres have been developed for a number of U. S. National Missile Test Ranges under the auspices of the Range Commanders Council/ Meteorology Group (formerly the Inter-Range Instrumentation Group/Meteorological Working Group, IRIG/MWG).

The first development toward the present global reference atmosphere was a Four-Dimensional World-Wide Model valid for 0 - 25 km altitude. The four dimensions come from the three coordinates, latitude, longitude, and altitude, plus time, where time is with respect to monthly reference periods. The parameters modelled are gas properties and moisture. The monthly means and daily variation of these parameters are obtained for any latitude, longitude, altitude, and monthly reference period by a computer interpolation program. This four-dimensional world-wide model was developed for the design and performance analysis of earth viewing instrumentation used on earth orbiting satellites.

Man-made earth orbiting satellites created a need for and a means to develop atmospheric models at orbital altitudes. Models for these altitudes have a much different form than those at lower altitudes because of the strong solar influence which contributes to variation and the contrasting differences in the

basic measurements. Orbital altitude models express the gas properties as continuous variables with respect to time. The variables are given by a few simple, but complex equations, as a function of time with parameters for solar activity. The data for orbital models are derived from continuous sensors (satellites) which make many earth revolutions, over short periods up to many years covering all earth reference coordinates, whereas the data available for modelling at lower altitudes are derived from point measurements in time which are constrained to fixed earth coordinates of latitude and longitude, e.g., rawinsonde and meteorological rocketsonde measurements. Although difficult as it is to establish, a continuous atmospheric model from the earth's surface to and including orbital altitudes is required for a mission of the Space Shuttle. Layered models with respect to altitude and at discrete latitudes are not satisfactory for a Space Shuttle flight performance analysis. The Four-Dimensional Global Reference Atmosphere presented in this report is a first attempt to offer a means to represent the gas properties in a continuous manner over all altitudes for all earth coordinates (latitude and longitude) from the earth's surface up to orbital altitudes or from orbital altitudes down to the earth's surface.

The Four-D Global Reference Atmosphere Model (GRA) is in the form of a computer program which has several options for output data. The computer card input depends on the desired output option. The principal input parameters are height, latitude, longitude, solar activity parameters (geomagnetic index, F10.7 and 81 day mean 10.7 cm flux), date (month, day, and year or annual reference period) and Greenwich time. The computer used is the Univac 1108 with a core requirement of slightly under 32K words. All magnetic tapes are seven track. One program tape and one data tape are required for all altitudes above 30 km and from one to four data tapes for altitudes below 30 km altitude. Standard card punch is required if one of the optional card outputs is selected. The computer program is completely documented in a separate volume, entitled "Four-D Global Reference Atmosphere Model, Users Manual and Programmers Manual, Part II". Qualified requestors may receive the computer program, which includes the program magnetic tape and the required magnetic data tapes, and the documental manual by addressing their request to Chief, Aerospace Environment Division, ES41, Space Sciences Laboratory, NASA Marshall Space Flight Center, AL 35812.

A feature of the GRA is that representative wind fields may also be derived. This was done to assure consistency in the modelling process and for scientific interest in the general circulation pattern and for potential applications for long-term diffusion processes. With some innovations one can envision further adaptations and applications of the GRA for a general class of ascending and descending aerospace vehicles.

It is envisioned that as more familiarity with this Global Reference Atmosphere is gained, improvements and adaptations of various computer program options will be developed for specific problems. However, any near future revisions will not change the basic program.

The Four-D Global Reference Atmosphere Model should be used in its entirety where appropriate to include the monthly means and standard deviations of dispersions of the gas properties and the Monte Carlo generated profiles along the trajectory. For some analyses it may be sufficient to use only the means plus and minus 2.3263 standard deviations of the variables to obtain satisfactory engineering design or operational solutions. The means $\pm$ 2.3263 standard deviations give the 1st and 99th percentile values of the variables which is the 98th interpercentile range of the variables. In other cases, such as maximum point aerodynamic heating, or for some particular feature of the guidance and control system a number of Monte Carlo generated atmospheric profiles may be required to obtain design and performance limits.

O. E. Smith and W. W. Vaughan
September 1974

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A. USERS MANUAL

1. GENERAL PROGRAM CHARACTERISTICS

As outlined in Figure 1.1 of the technical write-up of the PROFILE program, the simulation of monthly mean parameters is handled by three different models governing three sections of altitudes with transition regions in between to ensure a smooth resultant profile. The 0-25 km height range is modeled by the 4-D section of PROFILE, based on the NASA 4-D model (Spiegler and Fowler, 1972). The 30-90 km section is simulated by a modified Groves (1971) model. Above 115 km the atmosphere is simulated entirely by the Jacchia (1970) model. Between 25 and 30 km the model interpolates between 4-D and modified Groves values, and between 90 and 115 km the program fairs between the modified Groves values and the Jacchia results. In addition to the three methods of determining mean atmospheric parameters, based on height region, there are also two kinds of perturbations added to the mean parameters: random perturbations, and quasi-biennial oscillations.

The PROFILE program is designed to produce atmospheric parameter values either along a linear path (to be called a profile) with automatically stepped constant height, latitude, and longitude increments, or along any set of connected positions (to be called a trajectory) which must be input individually into the program.

There are three general types of input to the PROFILE program: (1) A set of three cards, called the initial data, which contain the values of the program options, the initial position, the profile increments, and other information required before the calculations are begun, (2) A data tape

(SCIDAT) containing parameter values for the Groves (1971) model, the stationary perturbations (deviations from the Groves model, to produce longitude varying monthly means), and random and quasi-biennial perturbation parameter values, and (3) The 4-D data tapes with one data file for each month, containing profiles of monthly mean pressure, density, temperature, and their variances from the surface to 25 km, for the entire globe. If it is desired to compute atmospheric parameters along a trajectory instead of a linear profile, then a fourth type of data - the trajectory times and positions - must be input.

In terms of program function, the major elements of the PROFILE program are the main segment (PROFIL), the subroutine SCIMOD, which is a driver for all of the atmospheric evaluation subroutines, and SETUP, a subroutine used to read the SCIDAT data tape, and load the necessary starting conditions for execution. Figure 1 shows a simplified schematic of the main segment and illustrates the function of the SETUP and SCIMOD subroutines.

Output of the PROFILE program consists of monthly mean pressure, density, temperature, wind, and wind shear, total (mean plus perturbation) values of pressure, density, temperature, winds, perturbation values, and magnitudes.

Complete discussion of the input, output, and program operation characteristics for the PROFILE program are given in the following sections of the users manual.

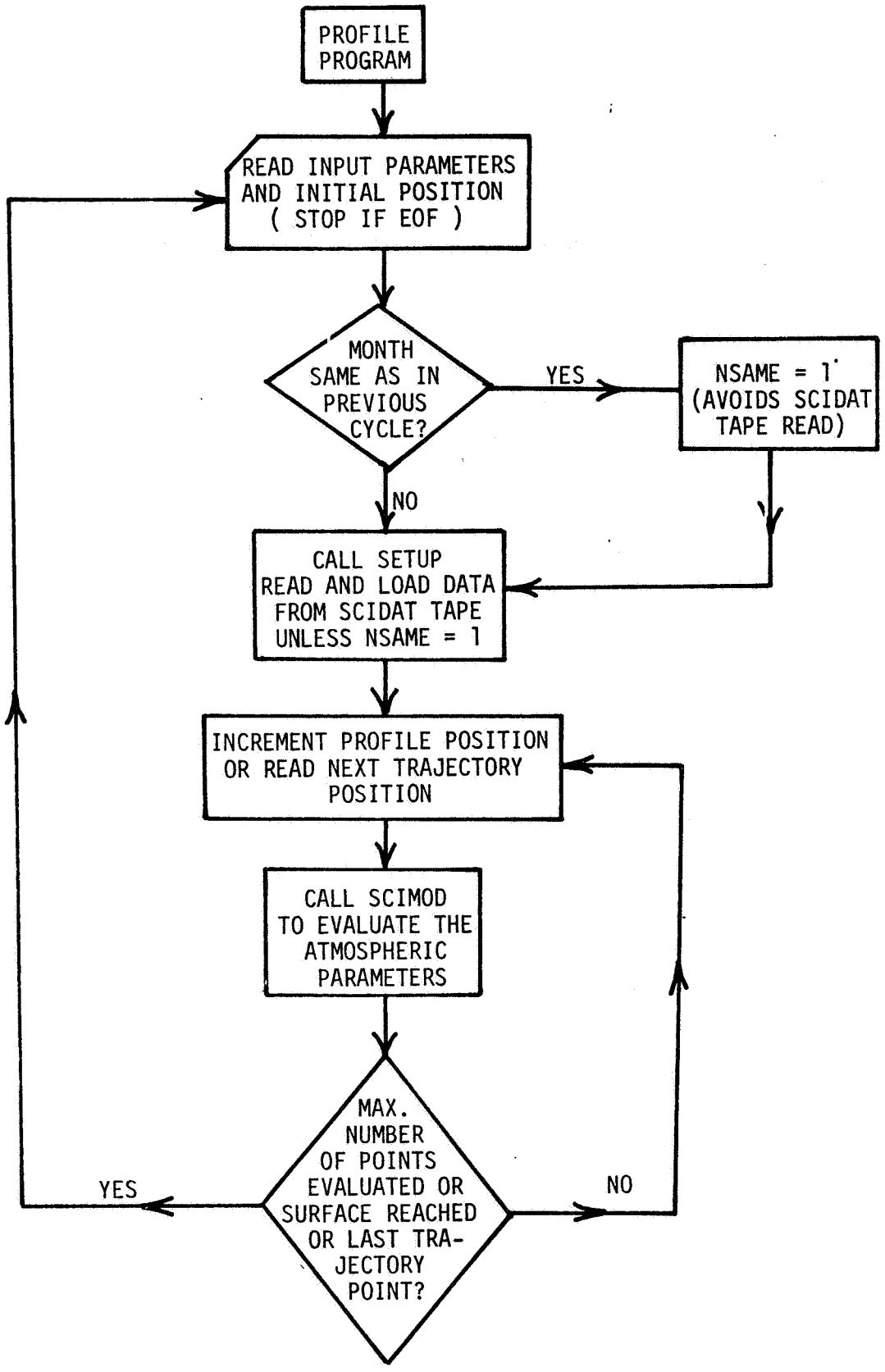


Figure 1: Simplified flow chart of the PROFILE program.

2. THE 4-D INPUT DATA TAPES (0-25 Km)

The description contained in this section was paraphrased from the 4-D program users manual (Fowler and Willard, 1972). For more information on the 4-D section of PROFILE, consult that document and Spiegler and Fowler (1972).

The world-wide meteorological data set developed for the 4-D model by Allied Research Associates is stored on three 7-track, 800 bpi binary tapes labelled WW1A-WW3A. Each tape contains four files of data where one file represents one month; WW1A contains months 1-4, WW2A contains months 5-8, and WW3A contains months 9-12. A 13th month containing the annual reference period has been added as a fourth tape.

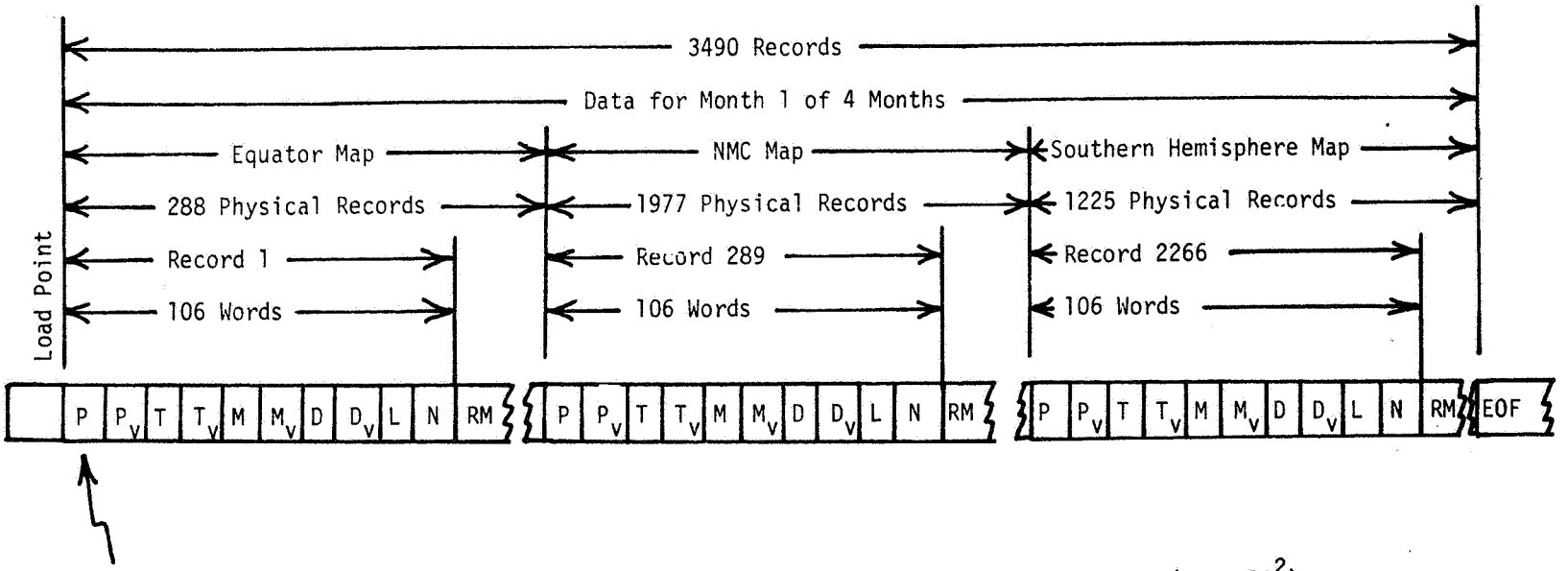
Within each file are 3490 records representing the values at individual grid points. These points are grouped into three grids: 288 points on the northern hemisphere equatorial (EQN) grid; 1977 points on the northern hemisphere (National Meteorological Center) grid; and 1225 points on the southern hemisphere (SH) grid. On the NMC grid, the data was computed at NMC points and stored in the order given by the NMC grid table shown in the SCIDAT data tape listing in Appendix A. On the other two grids, the data was given at 5^{o} latitude - longitude intersections westward from the Greenwich Meridian to 5^{o} east. The EQN grid covers the latitudes from 0^{o} to 15^{o} north with points occuring in the following order: 1-4 = Lon. 0, Lat. 0, 5, 10, 15; 5-8 = lon. 5W, Lat. 0, 5, 10, 15; ... 285-288 = Lon. 5^{o}E, Lat. 0, 5, 10, 15. The SH grid contains all data from 5^{o} south to the south pole as follows: 1 = South Pole, 2-18 = Lon. 0, Lat. -5 to -85; 19-35 =

Lon. 5^{O}W, Lat. -5 to -85; ... 1209 - 1225 = Lon. 5^{O}E, Lat. -5 to -85. It should be noted that the south pole is given only once, as the first point of the SH data set.

Each record consists of 106 36-bit words where the first 104 words contain the computed data for a point and the last two are identifiers. All data values are multiplied by 100 and converted to integer; they are then packed with two 18-bit values to a word. The data is arranged by level for each parameter; thus, the first 13 words contain the pressure means from the surface to 25 km and the next 13 words contain the pressure variances for the same levels. This pattern continues for the 26 levels of temperature means and variances, moisture means and variances, and density means and variances.

Word 105 contains the latitude and longitude of the point in question. These are integer values that have been multiplied by 10; each occupies 18 bits of the word. The latitude is always positive (since the southern hemisphere is identified by grid), and the longitude is always west.

The last word contains three 12 bit integer values. The left-most group of bits is the homogeneous moisture region in which the point lies, the center group is the point number, and the right-most group of bits is the month. It should be noted that the points are numbered within the grid that contains them, and not by their location on tape. Thus the point numbers run from 1-288, 1-1977, and 1-1225, not from 1-3490. Figure 2 shows the tape structure for one month.



This box represents 26 integer values of pressure in millibars x 10^2. Each value is packed sequentially as an 18 bit byte, starting with the surface and ending with the 25 km value.

Variances are the square of the standard deviations.

RM denotes end of record mark.

EOF Denotes end of file mark.

- P - Pressure (mb x 10^2)
- P_V - Pressure Variance (mb^2 x 10^2)
- T - Temperature (^oK x 10^2)
- T_V - Temperature Variance ($^oK^2$ x 10^2)
- M - Moisture (g/m^3 x 10^2)
- M_V - Moisture Variance (g^2/m^6 x 10^2)
- D - Density (g/m^3 x 10^2)
- D_V - Density Variance (g^2/m^6 x 10^2)
- L - Word 105 Containing Latitude and Longitude
- N - Word 106 Containing Homogeneous Region Number, MSF Point Number, and Month Number

Figure 2. Record structure on the 4-D data tapes

3. The "SCIDAT" DATA TAPE

This section describes in detail the data contained on the SCIDAT data tape. A listing of this tape, and a one page synopsis of the data contained on it are given in Appendix A.

NMC Grid Data

This data set gives the 4-D northern hemisphere point number and the dual index for the corresponding NMC location. The NMC grid locations form an octagonal array, centered on the North Pole. The points are at square grid locations on the polar projection used for the NMC grid. A conversion between the latitude and longitude (treated as polar coordinates on the flat NMC grid plane) and the NMC grid indices (treated as Cartesian coordinates on the projection plane) is accomplished by a polar to Cartesian coordinate transformation, via equations programmed into the 4-D model. The NMC grid data on the SCIDAT tape merely establishes the equivalence between the sequential 4-D NMC point number and the two-dimensional x-y NMC grid point location. The NMC grid data constitute the first file on the SCIDAT tape. An end of file marker appears on the tape at the end of the NMC grid data.

Groves Data

The Groves (1971) data for monthly mean pressure, density, and temperature are tabulated at 10 degree latitude intervals from 0 to 90^{o} for each month. The yearly average Groves data is coded as month 13. The southern hemisphere data is the same as the northern hemisphere data displaced by 6 months. Annual mean (month 13) data is the same for both northern and southern hemispheres.

The format of the Groves data is the same as in Groves (1971) original report, except that a prefix code P, D, or T has been added at the front of each record. Each record contains the code, the month, the height in km and the 0, 10, 20, ... 90^{o} latitude values of the parameter expressed as a three digit integer, with an exponent common to all of the values on the record appearing at the end of the record. Thus a value of 276 with an exponent at the end of the record of -6, would be the same as $276 \times 10^{-6} = 2.76 \times 10^{-4}$. Pressure data are in units of nt/m^2, density values are in kg/m^3, and temperatures are in ^{o}K.

Stationary Perturbations

The stationary perturbations are latitude-longitude dependent relative perturbations to be applied to the Groves values, considered to be the longitudinal mean value. Data for each of 12 months and for the annual reference period (month 13) are given for the northern hemisphere latitudes. Southern hemisphere data are the same as the northern hemisphere values displaced by 16 months.

Each record contains the code S, the month, the height in km, the west longitude, in degrees, and then 15 values of stationary perturbations in per mill (%/10). The first five of the values are for pressure perturbations at latitudes 10, 30, 50, 70, and 90. The next give values are for density, and the last five values are for temperature. The monthly mean value y_m for parameter y at any latitude and longitude can be computed from the Groves value G_y at the latitude and the stationary perturbation s_y (in per mill) at the latitude and longitude by the relation

$$y_m = G_y (1 + s_y/1000) \quad (1)$$

Note that the stationary perturbation values at 90^o latitude are always zero. However, there is a place for 90^o values on the data tape, so that if a systemmatic departure from Groves values is desired at the poles, a set of stationary perturbation data reflecting this condition could be developed and put on the tape.

The Groves data and stationary perturbation data constitute the second file on the SCIDAT tape. An end of file marker appears at the end of the stationary perturbation data.

The Random Perturbation Data

Random perturbation magnitudes (standard deviations) are latitude dependent only. Each code R record has the code, the month (1-13) and the height in km, followed by 15 values of random perturbation magnitude, five for pressure (in per mill, at latitudes 10, 30, 50, 70, and 90), five for density, and five for temperature. These data give the relative standard deviations σ_p/p , σ_ρ/ρ, and σ_T/T, for use in the random perturbation model.

The code RW data are similar, except that only ten wind values appear in each record (after the code, month, and height): five for eastward wind magnitude (in m/s at latitudes 10, 30, 50, 70, and 90) and five for northward wind magnitude.

The code R and RW data constitute the third file on the SCIDAT tape. An end-of-file mark appears on the tape at the end of the code RW data.

The Quasi-Biennial Oscillation (QBO) Data

The QBO data consists of height and latitude dependent amplitudes and

phases for quasi-biennial variations in pressure (QP), density (QD), temperature (QT), and eastward and northward wind components (QU and QV, respectively). The amplitude of the QBO thermodynamic parameters are in per mill (%/10). The amplitudes of the QBO wind components are in decimeters per second (0.1 m/s). The phases of all of the QBO parameters are measured in days after January 0, 1966 for the occurrence of the first maximum value. Since the period of the QBO variations is taken to be 870 days, the phases could vary from 0 to 870.

Each QBO data record contains the code, the height in km, the amplitude and phase for 10^{o} latitude, the amplitude and phase for 30^{o} latitude, etc. out to the amplitude and phase for 90^{o} latitude.

A final end of file mark appears at the end of the code QV data.

Appendix A gives a brief summary of the data on the SCIDAT tape and a complete listing of all the values appearing in the tape records.

4. THE INITIAL INPUT DATA

The initial input data consists of two free field (no set format with commas after each number) cards containing initial position data, program options, and other information required to begin computation, plus an optional third free field card to give initial random perturbation data if random perturbations are to be computed, plus an optional set of trajectory position data cards (followed by a backup card), if trajectory positions are to be read in rather than a linear profile generated automatically in the program. Appendix B gives a brief summary of the input characteristics, a summary of the data deck setup, and some sample input and output for the program. The following gives a more detailed description of each program input card.

Input Card Number 1

The first input card, read in by the main program segment PROFILE in free field format contains the following information. Designation R indicates real quantities, I denotes integer quantities.

1. Initial Height (R): The initial height in km for the beginning point of the profile or trajectory. This can be any non-negative real number. Atmospheric parameters are never evaluated at the first position, which is used only to establish the initial conditions. If the initial height is near the surface the program may not be able to compute atmospheric parameters at the first few heights. This happens when the surface at one or more adjacent 4-D grid points is higher than the surface at the initial position, so the interpolation between the 4-D grid positions can-

not be made. If the first height is below 30 km, care should be taken that subsequent positions do not go more than 15^{o} of latitude or longitude away from the initial position while the height remains below 30 km. For normal ascent and re-entry trajectories this restriction will not pose any problem.

2. Initial Latitude (R): The latitude of the initial position in degrees, with southern latitudes negative. If the initial latitude, or any subsequent latitude is greater than 90^{o} in absolute magnitude, then a transformation

$$\begin{aligned} lat &= (180^{o} - |lat|)(lat/|lat|) \\ lon &= lon + 180^{o} \end{aligned} \qquad (2)$$

is made.

3. Initial West Longitude (R): The west longitude of the initial position in degrees. Each longitude can be put in as negative or converted to 0 - 360^{o} west longitude. If negative (east) longitudes are input they are converted to the 0-360^{o} scale before being used by the program. At any time during the run if a longitude gets outside the 0-360^{o} range it is put back into that range by adding or subtracting 360^{o}, as necessary.

4. F10.7 (R): The solar 10.7 cm radio noise flux in units of 10^{-22} watts/m^{2} (the normal units for this parameter) at the time for which the atmospheric values are to be computed. This factor is used only in the Jacchia section, so a value of zero can be used on input if the height never goes above 90 km. A value of 230 for both design steady state conditions and for maximum conditions may be used, or consult the Aerospace Environment Division (AED) of Marshall Space Flight Center (MSFC) for monthly predictions.

5. Mean F10.7 (R): The 81 day mean solar 10.7 cm radio flux. This parameter is used in the Jacchia section to compute the nighttime minimum global

exospheric temperature (equation (14) in Jacchia, 1970). Use zero if the height does not go above 90 km. A value of 230 may be used for both design steady state or maximum conditions, or consult the AED or MSFC for monthly predictions.

6. AP (R): The geomagnetic index a_p, used to compute a geomagnetic correlation to the exospheric temperature, in equation (22) of Jacchia, (1970). Use zero if the height does not go above 90 km. A design steady state value of 20.3 and a maximum condition value of 400 may be used for a_p, or consult the AED at MSFC for monthly predictions.

7-9. Date (I): The date, for the starting time of the trajectory or profile evaluation in month/day/two digit year form, as three integer input values. The day of the month and the year have no direct effect on the program calculations, except in the case of the quasi-biennial oscillation terms. For the annual reference period, use month 13. The quasi-biennial terms are automatically set to zero if month 13 is used. The month is used to establish which Groves data, stationary perturbation data, and random data to load from the SCIDAT data tape into the working arrays. The program will work more efficiently if multiple trajectories or profiles are evaluated during one run operation and the months are the same. (This avoids repeated look-up of the Groves, stationary perturbation, and random data from the SCIDAT tape).

10-12. Greenwich Time (I): The Greenwich mean time for the starting position in hours, minutes, and seconds, as three integer values. Only the Jacchia section is directly affected by the time of day, so unless the height goes above 90 km, the starting time would serve merely as a reference parameter for the particular run being done. Greenwich time corresponding to a local time of 0900 hours should be used for design steady state conditions, and for maximum conditions the local time should be taken as 1400 hours.

13. Latitude Increment (R): If a linear profile is to be generated automatically this is the latitude increment (in degrees) between successive profile positions. The new latitude would be the old latitude plus the latitude increment. For a profile with decreasing latitude (going southward) the increment must be negative. Use zero if separate trajectory position input is to be read in. If a vertical profile (i.e. changing only height) is to be evaluated, then use zero latitude increment.

14. West Longitude Increment (R): If a linear profile is to be generated automatically this is the west longitude increment (in degrees) between successive profile positions. The new longitude will be the old longitude plus the longitude increment. For a profile progressing eastward use a negative increment. Use zero if separate trajectory position input is to be read in. If a vertical profile is to be evaluated, then use zero increment.

15. Height Increment (R): The height decrease in km between successive positions, for an automatically generated linear profile. The profiles normally are generated downward (descending height). (New height = old height - height increment). If an upward generated profile is desired the height increment should be negative. Downward generated profiles will be evaluated until the height is incremented to a negative value or until the height becomes less than the surface height h_s which is the highest surface height of the four 4-D grid points being interpolated between (or until the maximum number of positions (item 16, 1st card) is exceeded). If the height is above sea level (i.e. > 0) but below the surface height h_s, then upward generated profiles will continue incrementing but will not output atmospheric parameter values until the height exceeds the surface height h_s.

16. Maximum Number of Positions (I): The maximum number of profile positions to be generated automatically. This does not include the intital

position, for which no atmospheric parameters are evaluated. Use zero if trajectory positions are to be read in.

17. Time Increment (I): The time displacement (seconds) between successive automatically generated profile positions. This would normally be set to zero, but could be used as a counter to be printed out in the time position with the output. For trajectories the time for each position is read in with the position data (see trajectory input section below). The hours, minutes, and seconds parameters (read in as items 10-12, 1st card) are updated according to the new time generated by the time increment. However, only the elapsed time in seconds is printed out on the present output.

18. Trajectory Option (I): This option tells the program whether a trajectory or a linear profile is to be evaluated. A value of 0 means a linear profile is to be generated automatically from the parameters read on the first card. A value greater than zero means that trajectory position data cards must be read in to determine the positions at which atmospheric parameters are to be evaluated.

19. Punch Option (I): This option tells the program whether or not to punch the atmospheric parameter output (see the output descrition section). Punched output is convenient to use as card input to plotter programs. A value of 0 means no punch output. A value greater than 0 means to punch the output.

With normal numbers of decimal places and no unnecessary blank spaces, the above 19 items should fit onto one card. However, if they occupy more

than the 80 columns allowed on one card, they may be spread out onto two cards if the following rule of UNIVAC 1108 free field input are observed on the first of the two cards: (1) Do not put a comma after the last number appearing on the first card. (2) If the last number on the first card is an integer, it should be right justified to column 80. For input on other computers, consult your operations manual for characteristics of free field input.

Input Card Number 2

The second input card is read in by the subroutine SETUP and contains various unit numbers to be used and options controlling the random and quasi-biennial calculations. The unit numbers are the parameters used in read statements in the FORTRAN program to control which file is being read from. The unit numbers are required in the input in order to give maximum flexibility in choice of I/O devices for the program. All input items on card number 2 are integers.

1. Groves Input Unit: This is the unit number of the SCIDAT tape file. If the SCIDAT tape has been assigned by the control statements -

```
@ ASG, T    SCIDAT, T, U1961 N
@ USE    3, SCIDAT
```

where U 1961 is the reel number for tape SCIDAT, then the Groves input unit number should be 3 on this input card. The Groves and Stationary perturbation data must be read from the SCIDAT tape. Later options on this card allow the NMC grid data, the random perturbation data, and the quasi-biennial data each to be read from other files.

2. Random Input Unit: This is the unit number for the random perturbation standard deviations. If this unit number is the same as the Groves input unit number, then the random perturbations are read from the SCIDAT data tape. Otherwise the random data is read from the file for whatever the unit number is set to. For card input, the unit number should be set to 5. The SCIDAT tape is read with NTRAN, but if alternate random data are read in from a different file, the file must be FORTRAN readable with format

1X, A1, I2, I4, 3(1X, 5I4)

for the random pressure, density, and temperature data (see Appendix A and Section 3 for which values must go in each record). For the random wind data the FORTRAN readable format for the alternate data is

1X, A2, I2, I4, 2(1X, 5I4)

Both random pressure, density, and temperature data and random wind data must be read in from the same file, either both from SCIDAT, or both from the alternate FORTRAN readable file.

3. QBO Input Unit: If the QBO data parameters are to be read in from the SCIDAT data tape, this unit number is set the same as the Groves input unit. If alternate QBO parameters are to be read in the QBO unit number can be any FORTRAN readable file. Use Unit 5 for card input. The format for all of the alternate QBO input is

1X, A2, I3, 5(I4, I5)

(See Appendix A and Section 3 for which data values must go into each record).

All of the QBO pressure, density, temperature, and wind data must be read from the same file, either all from SCIDAT or all from the alternate QBO input file.

4. 4-D Input Unit: This is the unit number for the 4-D data tape. Any available unit number can be used. If the 4-D tape WW1A, containing the January data, has been assigned by the control statements

```
@ ASG, T   WW1A, T, U 2400 N
@ USE      4, WW1A
```

then the 4-D input unit number is 4.

5. Random Option: This option tells the program whether or not to compute random perturbations. If the value is 1 random perturbations are computed. If the value is 2 then random perturbations are not computed. If any values other than 1 or 2 are input the run is terminated with a message "ERRØR IN SETUP INPUT" and a dump of the parameters most recently read in.

6. QBO Option: This option tells the program whether or not to compute QBO perturbations. If the value is 1 QBO perturbations are computed. For 2 no QBO perturbations are computed, and for any other values the "ERRØR IN SETUP INPUT" and dump of most recent parameters read in is given.

7. First Random Number: This number is required as a starting parameter for the random number generating subroutine RAND. Any odd positive integer can be used. Use a value of 1 for a standard design application run. Provided all other input is the same a given value for the starting random number will always produce the same random perturbation output.

Therefore, to get a set of different perturbations along a given single trajectory, a set of different staring random numbers should be used. Note, however, that if any other parameters are changed (different spacing along the trajectory, different starting position, etc.) then the same starting random number will produce a different set of random perturbations.

8. NMC Read Option: This option tells the program whether to read the NMC grid data from the SCIDAT data tape (value 0 for the option) or from an input card file (any non-zero value for the option).

9. 4-D Scratch Unit: In order to save array space the 4-D profiles required to interpolate to the $5^{o} \times 5^{o}$ grid locations are read from the tapes to this scratch file rather than being put into arrays. The unit number for this scratch file can be any available unit. Normally the file is a temporary drum file, and, if so, does not have to be assigned (@ ASG) before execution of the program.

10. NMC Grid Point Scratch Unit: Also in order to save computer storage, the NMC grid point array read in from the SCIDAT tape (or from cards) is stored in a temporary scratch file (usually on drum). If the drum scratch file is used, it does not have to be assigned before execution of the program.

Input Card Number 3

This card is read by the SETUP subroutine and contains starting values for the random perturbation parameters at the initial position. If random perturbations are not to be computed (Random Option = 2), then this card should not be put in. All values on this free field format card are real.

For a normal design application the values on this card should all be zero, unless the run is to be a continuation of a previously run trajectory or profile segment, in which case the output random parameters of the last output position are input, and the last output position becomes the initial position of the new run.

1-3. Initial P, D, T: These are initial values of random relative pressure ($p'/\bar{p}$), density ($\rho'/\bar{\rho}$), and temperature ($T'/\bar{T}$) in percent. These are starting values for the initial position. Use zero for standard design applications.

4-6. Sigma P, D, T: These are initial values of relative standard deviations (in percent) for the random pressure ($\sigma_p/\bar{p}$), density ($\sigma_\rho/\bar{\rho}$), and temperature ($\sigma_T/\bar{T}$). Use zeros for standard design application runs. If zero values are input, the program looks up appropriate values for the initial height and latitude.

7-8. Initial U, V: Initial values of the random eastward and northward random wind components in m/s. Use zeros for standard design applications.

9-10. Sigma U, V: Initial values of the standard deviations (in m/s) for the eastward and northward random wind components. Use zeros for standard design application runs. If zero values are input, the program looks up the appropriate values for the initial height and latitude.

Trajectory Input

The free field trajectory position input and backup cards are put in only if a trajectory is to be evaluated, rather than a linear profile, generated automatically in the program from information on the first input

card. There is no limit to the number of trajectory positions which can be put in. The program continues evaluating the atmospheric parameters and looping back to read a new trajectory position until a position below the surface is reached (see Figure 1), or until the trajectory backup card is reached. Each free field trajectory card has the time (integer seconds), the height (kilometers), the latitude (degrees, southern latitude negative), and the west longitude (degrees, 0-360^{0} or east longitudes negative). Any east longitudes read in as negative values are converted to the 0-360^{0} system before being used by the program. The trajectory backup card has the same free field form as a regular trajectory card, except any negative value for height is used. The negative height terminates the loop which evaluates atmospheric parameters and reads a new trajectory card. If a trajectory height goes below the surface height h_s, then the remaining trajectory input cards are read and ignored. The surface height h_s is determined as the lowest height for which all four 4-D grid locations has non-zero data values required for interpolation to the trajectory position.

5. OUTPUT OF THE PROGRAM

The first few lines of print output are primarily a listing of the input parameters. Following a heading which describes each output value for the trajectory or profile evaluations, the position, time, monthly mean and total pressure, density, temperature, and winds are listed for each position. The thermal wind shear for the monthly mean winds, the percent deviation from the standard atmosphere (p, ρ, and T) and the perturbation data are also given for each position. The perturbation data consist of the stationary perturbations, the quasi-biennial values at the position and time, the quasi-biennial magnitudes, the random perturbation values, and the random perturbation standard deviations. Optional punch output for values at each position is also available to be used for card input to plotter programs, or for other purposes.

Heading Information

Primarily the heading information contains a listing of the input data values. However, there are some changes from the values input. If an east longitude is put in as a negative value, $-180^{o} < \text{lat} < 0^{o}$, then it is converted to a west longitude in the 0-360 range before the heading is listed. If zero values for the random pressure, density, temperature or wind standard deviations are input, then the program evaluates these from the data on the SCIDAT data tape, and lists the computed values on the heading. The Julian date is computed by the program from the input date and is also listed with the heading information. The Julian date is required by the

Jacchia and QBO sections of the program. If month 13 (annual reference period) is input, then the Julian date is set to zero. (The Jacchia section takes the exospheric temperature to be 1000^{o} K and the QBO section is bypassed if month 13 is input).

Position and Time Output

Positions and times as generated by the automatic linear profile features or as input by the trajectory input cards are listed on the output. The time is given in seconds. Within the program, the input time in hours, minutes, and seconds are updated in that form also. However, only a continuously increasing time in seconds is printed out. If time in hours, minutes, and seconds were desired, these variables could easily be printed out by adding them to the output list. All output west longitudes are converted to the 0-360 range before being printed out. If a latitude greater than 90^{o} in absolute magnitude is generated (or input) then a transformation

$$\begin{aligned} lat &= (180^{o} - |lat|)(lat/|lat|) \\ lon &= lon + 180^{o} \end{aligned} \qquad (3)$$

is made.

Monthly Mean (and Thermal Wind Shear) Data

The monthly mean values of pressure, density, and temperatures, consist of either: (1) values from the 4-D data tapes if the height is below 25 km, (2) the sum of Groves plus stationary perturbation values if the height is between 30 and 90 km, (3) an interpolation between 4-D at 25 km and Groves plus stationary perturbations at 30 km if the height is between 25 and 30 km, (4) Jacchia model values if the height is above 115 km, and (5) faired val-

ues between Groves and Jacchia if the height is between 90 and 115 km.

The percent deviations from the U.S. 1962 Standard Atmosphere are evaluated by using standard atmosphere values computed by the subroutine STDATM. The percent deviations are evaluated by the relations $100(T - T_s)/T_s$, $100(\rho - \rho_s)/\rho_s$, and $100(p - p_s)/p_s$, where the subscript s refers to the standard atmosphere values. This subroutine accurately reproduces the tabulated U.S. Standard Atmosphere 1962 values to within an accuracy of better than 0.2% above 90 km. The STDATM values are based on a model of parabolic segments for the height variation of the molecular height above 90 km. The subroutine reproduces the tabular values even more accurately in the height region below 90 km, where the molecular weight is constant. Since the U.S. 1962 Standard Atmosphere is not defined above 700 km, the percent deviations printed out for heights above 700 km are zero.

The thermal wind shear values are values of $\partial u/\partial z$ and $\partial v/\partial z$ for the monthly mean geostrophic wind. The wind values, computed from the geostropic wind equation, are determined by horizontal gradients of the monthly mean pressure. The thermal wind shear components, computed by the thermal wind equations, are determined by the horizontal gradients of the monthly mean temperature. Thus, a comparison of numerically differentiated geostrophic mean winds and the thermal wind shear serve as a check of the mean pressure and temperature fields (see Sections 7 and 10 of the technical disucssion portion of this report).

The Total (Mean Plus Perturbation) Data

The parameter values listed under the heading of "Mean Plus Perturbations" are the monthly mean values, as defined above, plus the random pertur-

bations, plus (if the height is between 15 and 90 km) the quasi-biennial perturbations. These mean-plus-perturbation values represent values which would be typical "instantaneous" values of the pressure, density, temperature or winds. The percent deviations from the U.S. Standard atmosphere are computed in the same way as for the percent deviations of the monthly mean values from the standard atmosphere.

Perturbation Values

The data under the "Perturbation Values" heading are the various perturbation values, magnitudes, and amplitudes. The stationary perturbations (denoted SP on the printout) are defined only if the height is between 30 and 90 km. The monthly mean y_m of parameter y should be the Groves value G_y, evaluated from the SCIDAT data tape, modified by the given stationary perturbation value s_y, in percent by the relation

$$y_m = G_y (1 + s_y/100) \qquad (4)$$

The data labeled "QBO" are the values of the QBO oscillation at the output time and position. The data labeled "MAG" gives the magnitude of the QBO oscillations at the output position and time. The QBO values should always be less than the magnitude values in absolute value. The data labeled "RAND" are the random perturbations evaluated at the output time and place. The data labeled "SIG" are the standard deviations of the random components at the output time and positions. According to the Gaussian distribution, on which the random perturbations are based, the perturbation values should be within the range $\pm \sigma$ 68% of the time and outside the range $\pm \sigma$ 32% of

the time. Similarly, the perturbation values should be within the range $\pm 2\sigma$ 95% of the time, and outside the range $\pm 2\sigma$ 5% of the time. The evaluation of the QBO and random perturbation output can be suppressed by the QBO and random options, if desired.

Punch Output

The punch output is available as an option, controlled by the input value of the punch option parameter. If punch output is desired, it comes out in the form of two cards for each position. The first, code "A", card contains the following information: (1) the time, in seconds, (2) the height in km, (3) the latitude in degrees, (4) the west longitude in degrees 0-360, (5-7) the mean monthly pressure, density, and temperature, (8-10) the percentage deviation of the mean monthly values of pressure, density, and temperature from the 1962 U.S. Standard Atmosphere, (11-12) the eastward and northward components of the monthly mean (geostrophic) wind, (13-14), the eastward and northward components of the mean wind shear. The format for the code "A" card is

I4, F5.1, 2F7.2, 2E8.3, F5.0, 3F5.1, 4F5.0, "A"

The second, code "B", card contains the following information: (1-4) the time, height, latitude, and longitude (same as on the code "A" card), (5-7) the total (monthly mean plus perturbation) values for pressure, density, and temperature, (8-10) the percent deviations of the total pressure, density, and temperature from the 1962 U.S. Standard Atmosphere, (11-12) the total (mean plus perturbation) values for the eastward and nortward wind

components. The format for the code "B" card is

I4, F5.1, 2F7.2, 2E8.3, F5.0, 3F5.1, 2F5.0, 10X, "B".

6. PROGRAM DIAGNOSTICS

There are several possible reasons which can cause the printing of diagnostic messages and termination of the run during the SETUP phase. If, during the setup procedure, the NMC grid point number data table does not contain the required 1977 values, a message

Diagnostic 1: "N RECØRDS WRITTEN BY GETNMC ØN SCRATCH FILE M"

is printed, and EXECUTION IS TERMINATED. This situation should only arise if the NMC grid point table is being read from cards, rather than the SCIDAT data tape. If during the reading of the SCIDAT data tape, any record is read which does not have the expected code character or characters (P, D, T, S, R, RW, QP, QD, QT, QU, or QV; see Appendix A), then the message results

Diagnostic 2: "ERRØR IN SETUP INPUT"

followed by a listing of the latest data values read in. This message is also produced if the random option and the quasi-biennial option do not have a value of either 1 or 2 (see Section 4). Any condition which results in this error message terminates the execution.

There are also general conditions which could result in diagnostic messages in the 4-D section: If during the reading of the 4-D data tape on the first access of the region below 30 Km, a parity error is encountered, a message

Diagnostic 3: "INPUT UNIT NØ. M IN ERRØR (-3) FØR RECØRD NØ N"

is printed - execution continues. Such an error will only be of consequence if the particular record read is required for interpolation. If an end of file is read, a messages is written

Diagnostic 4:

"* * * * * UNIT NØ. JT IN ERRØR IRC RECØRDS READ

IREAD(IRN, 3) = XXXX MP = XX MØNTH = XX IP = XXXX IPT(I, J) = XXXX IRN = XX

M STATUS L"

Where

JT = Unit on which 4-D data tape is mounted

IRC = Total number of records read thus far from 4-D tape

IREAD(IRN, 3) = Sequential point number selected by SELEC4

MP = Month word in last record read

MØNTH = Run month

IP = Point number word in last record read

IPT(I, J) = Point number required for profile J to be interpolated to Ith requested profile

IRN = Sequential point number required

M = Unit status (READ)

L = NTRAN status (-2 for end of file, -3 for parity, etc.)

and EXECUTIØN IS TERMINATED

If IRC > IREAD(IRN, 3), the diagnostic message 4 is written - L should be 106, and IRC and IREAD values should indicate this condition. EXECUTIØN IS TERMINATED.

If MP ≠ MØNTH, or IP ≠ IP(I, J) the diagnostic message 4 is printed, again with L = 106, and MP/MØNTH or IP/IP(I, J) indicating error. EXECUTIØN IS TERMINATED.

The writing of scratch file SCRCHI with data for subsequent unpacking and interpolation is also checked. If there is a write error, the diagnostic

4 is printed, with JT the scratch file unit number, M as WRITE and L as -3 or -4. EXECUTION IS TERMINATED.

These diagnostics can arise if a bad or wrong 4-D data tape is being accessed, or if there is a malfunction of the tape drive. In some cases a tape will, for example, indicate parity errors when being read from one tape drive, but not another.

If, during the course of evaluation of position in the 4-D height range, it is found that the position is outside the previously established 4-D grid, then a message results

Diagnostic 5: "PØSITIØN ØUTSIDE 4-D GRID"

The 4-D grid is either a polar grid between 75^{o} N or S of the pole, or a non-polar 16 point grid at 5^{o} x 5^{o} latitude spacing. If the position is less than 5^{o} (total latitude and longitude) outside the 4-D grid (i.e. $|\text{latitude}| < 70^{o}$ for the polar grid, or $(\Delta\text{lat}^2 + \Delta\text{lon}^2)^{1/2} < 5^{o}$ for the non-polar grid), then the atmospheric parameters are evaulated by extrapolation or setting them equal to the nearest grid point. If the position is more than 5^{o} outside the 4-D grid, then no evaluation is made and printed out, however execution does continue to cycle to subsequent positions, in hopes of finding valid positions for evaluation.

A diagnostic message

Diagnostic 6: "CØRRELATIØN CØEFFICIENT ERRØR"

indicates that the correlation parameter $E^2 < 0$, as computed by equation (B10) from Appendix B of the technical description section of this report. If this occurs, E is set to zero and execution continues. The numbers listed

following diagnostic 6 are values of various correlation parameters. Consult a listing of subroutine PERTRB for their meaning.

B. PROGRAMMERS MANUAL

1. DESCRIPTION OF SUBROUTINES

The following is a brief description of each of the PROFILE program subroutines, in alphabetical order:

CORR: Evaluates the correlation between density and temperature from a set of linear segments approximating the curve from NASA-TM X-64589. These values are used as default values if the correlation value computed directly from the variances on the 4-D data tape has a magnitude greater than 1.

DXHLVL: Evaluates the horizontal and vertical correlation scales from equations plotted in Figure 8.3 of the technical description section of this report.

FAIR: Fairs between the Groves and Jacchia values in the 90 to 115 km height range. (See equation 5.8, technical description section)

GEN4D: Generates the polar ($|\text{latitude}| > 75^{o}$) or non-polar (16 5^{o} x 5^{o} points) grid of pressure, density, temperature and variance profiles. See Figure 3 for a flow chart of this subroutine.

GETNMC: Reads the NMC grid point values from the SCIDAT data tape or from cards and loads them onto a scratch file. This subroutine is essentially unchanged from the subroutine of the same name in the original 4-D program.

GRID4D: After array of 4-D grid lat-lons has been evaluated, this subroutine looks up the data from the 4-D data tapes and interpolates to determine profiles of pressure, density, temperature, and variance at the 4-D grid locations. Profiles to be interpolated to 4-D grid locations are loaded onto a scratch file from the tapes before the interpolation is done.

GTERP: Uses linear latitude interpolation and linear temperature and

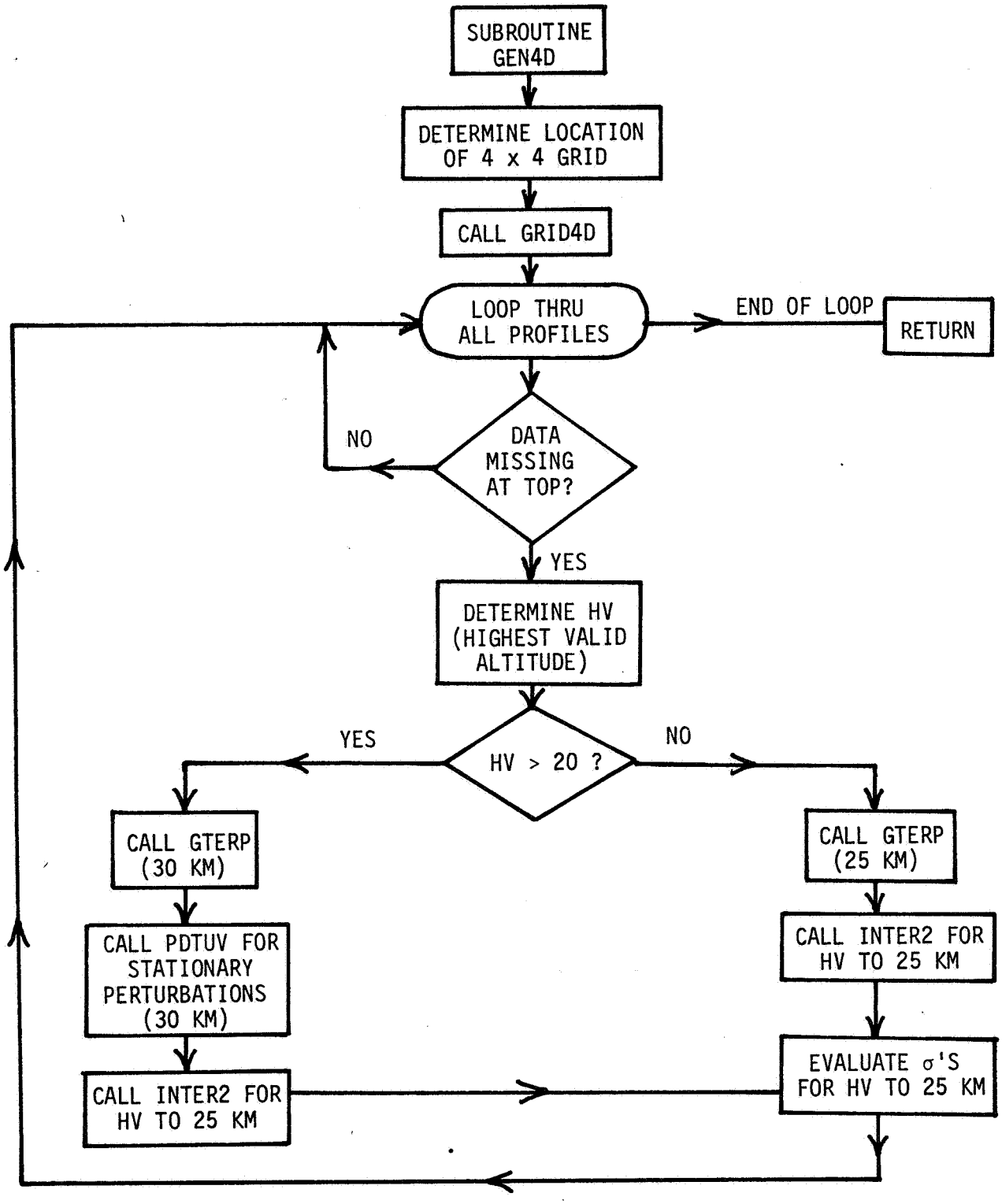


Figure 3: Simplified flow chart of the GEN4D subroutine.

linear logarithm of density interpolation on height to evaluate Groves data to a given latitude and height. See Section 5 of the technical description section.

INTERW: Two variable linear interpolation between known value U1 and V1 at Z1 and U2 and V2 at Z2 to determine U and V at Z, where Z is between Z1 and Z2.

INTERZ: Three variable interpolation, linear on temperature, and gas constant ($R = p/\rho T$), and linear on the logarithm of pressure, with pressure computed from perfect gas law and interpolated temperature and density, and gas constant. See Section 5 of the technical description section.

INTER2: Three variable interpolation, linear on all three variables.

INTER4: Interpolates between the pressure, density, and temperature profiles at the 4-D grid locations. This subroutine calls subroutine INTLL to do the latitude interpolation.

INTLL: One variable interpolation between values in an array of latitude and longitude locations by equation (5.6) of the technical description section.

INTRP4: The subroutine for the latitude-longitude interpolation of values from the 4-D data tapes into the 4-D grid array. This is a modification of the INTERP subroutine of the original 4-D program.

INTRUV: Evaluates the standard deviations of the random wind components at given height and latitude by calling INTERW subroutine.

JAC: Calculates the molecular weight, density, and temperature for the Jacchia model.

JACCH: Main subroutine of the Jacchia section, serves as a driver for JAC and the other Jacchia section subroutines. JACCHIA also evaluates the seasonal and latitudinal variations in the lower thermosphere.

NORMAL: Computes two independent random numbers selected from a Gaussian distribution with mean zero and unit standard deviation.

PDTUV: Interpolates the stationary perturbations on latitude and longitude at a given height. This subroutine is similar to INTLL.

PERTRB: Evaluates the pressure, density, temperature and wind component random perturbations by the correlated random perturbation model discussed in Section 8 of the technical description section of the report.

PROFIL: The main segment of the PROFILE program The main segment serves as a driver for the SETUP and SCIMOD subroutines. See Figure 1 in the users manual section.

QBOGEN: Computes the QBO perturbation values and their amplitudes and phases. The amplitudes and phases of the QBO pressure, density, temperature, and wind perturbations are interpolated from the amplitude and phase data from the SCIDAT data tape, by calling the INTERZ and INTERW subroutines.

RAND: Produces a random number selected from a uniform distribution between 0 and 1. This is required as input to the subroutine NORMAL.

RIG: Computes the acceleration of gravity and the radius from the center of the Earth for a position at a given latitude and height.

RTERP: Computes the standard deviations of the random pressure, density, and temperature perturbations by calling surboutine INTERZ.

RTRAN: This subroutine contains several NTRAN read sections with multiple entry points coming from subroutine SETUP. The NTRAN read statements are for reading the SCIDAT data tape.

SCIMOD: The heart of the PROFILE program. This subroutine branches on height to evaluate the atmospheric parameters by the Jacchia,

the modified Groves, or the 4-D methods. The QBO and random perturbations are also evaluated and the output is printed (and optionally also punched) by the SCIMOD subroutine. See Figure 4 for a flow chart of the SCMOD subroutine and Figure 1, in the users manual section, for a flow chart showning how SCIMOD fits into the overall PROFILE program.

SELEC4: Selects the 4-D data needed for interpolation. This subroutine is a modification of the INPUT subroutine of the original 4-D program.

SETUP: This subroutine reads in the NMC grid points with the GETNMC subroutine and reads and loads the data from the required month on the SCIDAT data tapes into arrays. See Figure 5 for a flow chart of the SETUP subroutine, and Figure 1 for a flow chart showing how SETUP fits into the overall PROFILE program.

SORT4: Sorts the 4-D locations for sequential tape reading from the 4-D data tapes. This subroutine is a modification of the SORT subroutine from the original 4-D program.

STDATM: Evaluates the 1962 U.S. Standard Atmosphere values of pressure, density, and temperature, at any given height up to 700 km.

TINF: This subroutine computes the exospheric temperature for the Jacchia model.

TME: This subroutine calculates the variables necessary for input into the subroutine TINF in the Jacchia model.

If the PROFILE program is mapped without segmenting the program, it requires slightly less than 32 K core storage. In order to take up less core storage (e.g. to make room for further program additions), the program can be mapped in segmented form. An efficient segmentation of the program can be accomplished by subdividing the program into a primary segment, a setup segment, a Jacchia segment, and a 4-D segment. The primary segment should con-

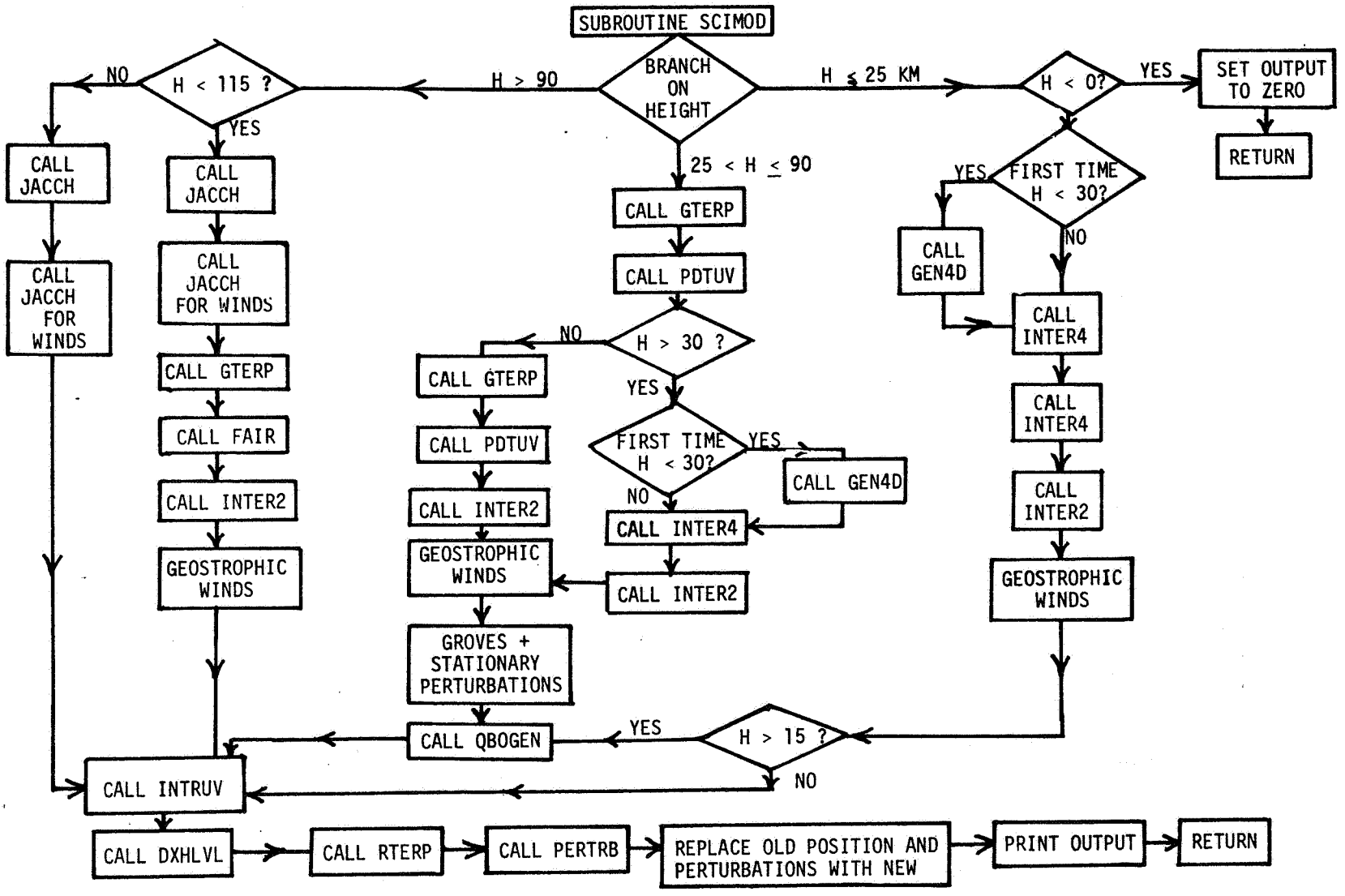


Figure 4: An abbreviated flow chart of the SCIMOD subroutine.

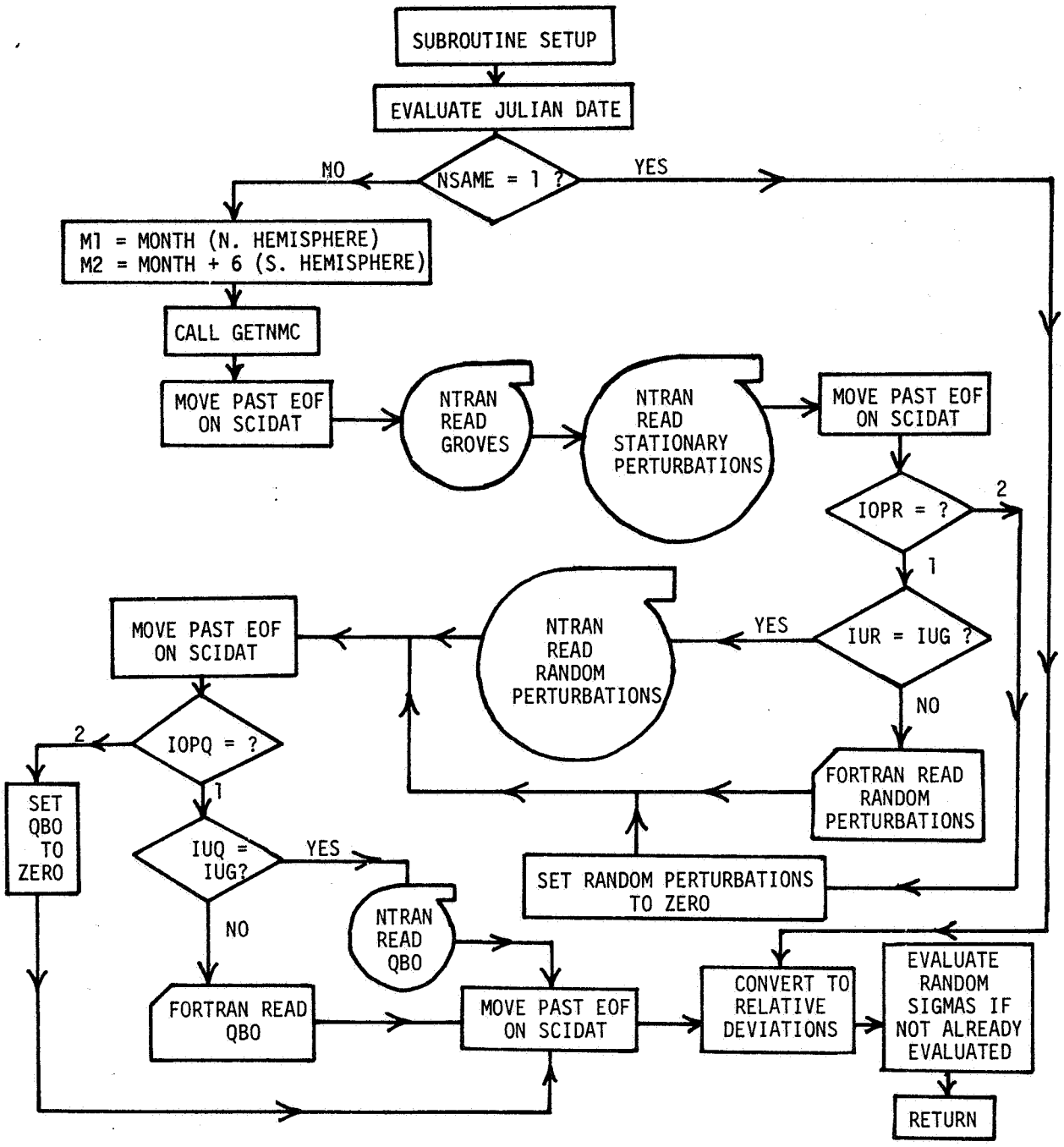


Figure 5: Abbreviated flow chart of the SETUP Subroutine.

tain CORR, DXHLVL, GTERP, INTERW, INTERZ, INTER2, INTRUV, NORMAL, PDTUV, PERTRB, PROFIL, QBOGEN, RAND, RIG, RTERP, SCIMOD, and STDATM. The setup segment should contain: GETNMC, RTRAN, and SETUP. The Jacchia segment should contain: FAIR, JAC, JACCH, TINF, and TME. The 4-D segment should contain: GEN4D, GRID4D, INTER4, INTLL, INTRP4, SELEC4, and SORT4. The following MAP statement for file PROFILE, to create absolute element ABS will accomplish the mapping of the program with these segments setup as described:

```
@MAP, IS      , PRØFILE. ABS
  IN PROFILE. CORR, . DXHLVL, . GTERP, . INTERW, . INTERZ
  IN PROFILE. INTER2, . INTRUV, . NORMAL, . PDTUV, . PERTRB
  IN PROFILE. PROFIL, . QBOGEN, . RAND, . RIG, . RTERP
  IN PROFILE. SCIMOD, . STDATM
  NOT TPF$
  SEG SETUP*
  IN PROFILE. GETNMC, . RTRAN, . SETUP
  NOT TPF$
  SEG JACCH*, SETUP
  IN PROFILE. FAIR, . JAC, . JACCH,   . TINF, . TME
  NOT TPF$
  SEG SEG4D*, SETUP
  IN PROFILE. GEN4D, . GRID4D, . INTER4, . INTLL, . INTRP4
  IN PROFILE. SELEC4, . SORT4
  NOT TPF$
  END
```

This segmented map saves approximately 4 K in core storage, but does not significantly affect run time, since the segments being overlayed (the set-up, Jacchia, and 4-D segments) only have to be loaded in once during any given trajectory or profile evaluation.

Some characteristics of some of the subroutines in each of these segments are described more fully in the following sections.

2. THE PRIMARY SECTION

This section consists of the main program segment PROFIL, the SCIMOD subroutine, the subroutines for evaluating Groves values, the stationary perturbations, the QBO and random perturbations, and general interpolation subroutines. With the exception of PROFIL and SCIMOD the parts of this section were adequately described in the previous section.

Many of the subroutines transfer their input and output via COMMON statements. This procedure saves much in core storage space. The discussion in this and subsequent sections describes the input and output of some of the subroutines, both by argument lists and via COMMON statements.

Main Segment PROFIL

This program serves as a driver for the SETUP and SCIMOD subroutines (see Figure 1 in the users manual section). It reads one card, the first input card, in free field format. This card contains:

1.	The initial height	H1
2.	The initial latitude (degrees)	PHI1
3.	The initial west longitude (degrees)	THET1
4.	The F10.7 solar flux	F10
5.	The 81 day mean F10.7 solar flux	F10B
6.	The a_p geomagnetic indix	AP
7-9.	The date month/date/2 digit year	MN/IDA/IYR
10-12.	The Greenwich time hours: minutes: seconds	IMRO; MINO; ISECO
13-15.	The latitude, longitude, and height increments	DPHI, DTHET, DH
16.	The maximum number of profile positions	NMAX
17.	The time increment between profile positions	INCT
18.	The trajectory option	IOPT
19.	The punch option	IOPP

The trajectory input cards (if used) are also read by PROFIL, after control has returned from SETUP, which reads the second and third initial data input cards. See Section 4 of the users manual section and Appendix B for further description of the card input.

The COMMON "IOTEMP" transfers data from the card input in PROFIL to the other subroutines called by PROFIL (SETUP, SCIMOD, and RIG).

Subroutine SCIMOD

This program is the primary subroutine of the PROFILE program. It serves as a driver for all of the various sections of the atmospheric evaluation. See Figure 4 for a flow chart of this subroutine.

The input to SCIMOD, transfered by COMMON statements IOTEMP and PDTCOM, is:

1.	Acceleration of gravity (m/sec^2)	G
2.	Earth radius to height H (km)	RI
3.	Height (km)	H
4.	Latitude (Radians)	PHIR
5.	Longitude (radians)	THETR
6.	F10.7 solar flux	F10
7.	Mean F10.7 solar flux	F10B
8.	Geomagnetic index a_p	AP
9-11.	Date	MN/IDA/IYR
12-14.	Time	IHR: MIN: ISEC
15.	Previous height (km)	H1
16.	Previous latitude (radians)	PHI1R
17.	Previous longitude (radians)	THET1R
18-20.	Previous random pressure, density, and temperature perturbations (%)	RP1, RD1, RT1
21-23.	Previous random pressure, density, and temperature standard deviations (%)	SP1, SD1, ST1

24-25.	Previous random winds (m/s)	RU1, RV1
26-27.	Previous standard deviation of random winds (m/s)	SU1, SV1

The COMMON "PDTCOM" contains data transferred into SCIMOD from SETUP. The COMMON "IOTEMP" transfers data in from PROFIL. The COMMON "C4" transfers data out to the 4-D section of the program. The COMMON "COMPER" transfers data out to the random perturbation subroutines.

The present SCIDAT data tape has the random wind component standard deviation arrays (UR and VR) equal. In order to save space in core, these arrays were equivalenced in SCIMOD. If a subsequent SCIDAT tape is generated with different random wind standard deviation components, then the equivalence statement

```
EQUIVALENCE (UR (1, 1), VR (1, 1)
```

should be removed and the array VR (25, 10) added to the COMMON list "PDTCOM". Similar corrections are also required in subroutine SETUP.

The SCIMOD subroutine prints and (optionally) punches the output described in the users manual section and in Appendix B. It also transfers output to other subroutines via the above-mentioned COMMON lists. The SCIMOD subroutine updates the profile or trajectory positions by setting the current position equal to the previous position before exit. The previous position information then stays in the COMMON list until the next call to SCIMOD. The previous random perturbations are handled in similar fashion.

3. THE SETUP SECTION

The function of the setup section of the program is to load the initial data and the data from the SCIDAT tape. See Figure 1 for a flow chart illustrating how the SETUP subroutine fits into the overall program and Figure 4 for a flow chart of the SETUP subroutine.

The SETUP subroutine reads the second and third cards of input. The second card contains

1.	Groves input unit	IUG
2.	Random input unit	IUR
3.	QBO input unit	IUQ
4.	4-D input unit	IU4
5.	Random option	IOPR
6.	QBO option	IOPQ
7.	First random number	NR1
8.	NMC read option	NMCOP
9.	4-D scratch unit	IOTEM1
10.	NMC grid point scratch unit	IOTEM2

The third card (optional, read only if IOPR = 1) contains:

1-3.	Initial random perturbations in pressure, density, and temperature (%)	RP1, RD1, RT1
4-6.	Initial standard deviations for random pressure, density, and temperature (%)	SP1, SD1, ST1
7-8.	Initial random wind perturbation (m/s)	RU1, RV1
9-10.	Initial standard deviations for random winds (m/s)	SU1, SV1

The COMMON list "PDTCOM" transfers the arrays, loaded with the appropraite data from the SCIDAT data tape, to the other subroutines. This COMMON list contains the following arrays:

1-3.	Groves pressure, density, and temperature	PG, DG, TG

4-6.	Stationary perturbations in pressure, density,	PSP, DSP, TSP
7-11.	Amplitudes of QBO pressure, density, and temperature	PAQ, DAQ, TAQ, UAQ, VAQ
12-16.	Phases of QBO pressure, density, and temperature, and winds	PDQ, DDQ, TDQ, UDQ, VDQ
17.21.	Standard deviations for the random pressure, density, temperature and winds (UR = VR equivalence)	PR, DR, TR, UR, VR

The COMMON list "COTRAN" is used to transfer data to SETUP from the NTRAN read subroutine RTRAN, which has multiple entry points for various different types of data from the SCIDAT data tape.

4. THE JACCHIA SECTION

The subroutine JACCH calculates the pressure, density, and temperature at a point in space for heights above 90 km for a particular time.

The inputs to JACCHIA are:

1.	height in km	H
2.	latitude in radians	PHIR
3.	West longitude in degrees (0 to 360 degrees)	THET
4.	solar radio noise flux F10.7 (10^{-22} watts/m^2)	F10
5.	81 - day average solar flux F10.7	F10B
6.	geomagnetic index a_p	AP
7.	month	MN
8.	day of month	IDA
9.	year	IYR
10.	hour of day in universal time	IHR
11.	minute of hour in universal time	MIN
12.	mean Julian day	XMJD

The outputs are:

1.	pressure in units of nt/m^2	PH
2.	density in units of kg/m^3	DH
3.	temperature in Kelvin degrees	TH

The theory and methods used in JACCH for calculating the pressure, density, and temperature are given in Jacchia, (1970). A brief explanation will be given below.

The subroutine JACCH consists of four sections: the main routine and three imbedded subroutines. All sections have numerous comments to explain each part of the program.

Main Routine (JACCH)

The main routine acts as the calling routine and, also, calculates the seasonal - latitudinal variations in the lower thermosphere.

The seasonal - latitudinal density variations are given by equation (2.1) of the technical description section.

The equations for the molecular weight and the relative temperature were given as equations (2.2) and (2.3) of the technical description section.

After the density, temperature, and molecular weight are calculated, the pressure is calculated from the ideal gas law:

$$P = \frac{\rho RT}{M}$$

where ρ is the density, R is the universal gas constant, T is the temperature, and M is the molecular weight.

An option is included in the main routine whereby the yearly mean values of the density, pressure, and temperature may be calculated directly. If the value of the month input variable is thirteen, (MN = 13), the exosphere temperature is immediately set equal to 1000^{o} K (which is the recommended design value for annual mean conditions) and the yearly mean density, pressure, and temperature values are calculated. Note that the 1962 U.S. Standard Atmosphere has an exospheric temperature of approximately 1500^{o} K and is thus considerably different from the 1000^{o} K results of the annual mean in the PROFILE program.

Subroutine TME

This subroutine calculates variables necessary for input into the subroutine TINF. The input variables are:

1.	month (month = 13 denotes annual mean and bypasses this subroutine)	MN
2.	day of month	IDA
3.	year	IYR

4.	hour of day in universal time	IHR
5.	minute of day in universal time	MIN
6.	mean Julian day	XMJD
7.	latitude in radians	XLAT
8.	longitude in degrees (input: 0 to 360 degrees turning westward; output: -180 to +180 degrees)	XLONG

The output variables are:

1.	solar declination angle in radians	SDA
2.	solar hour angle in radians	SHA
3.	day number from January 1	DD
4.	day number divided by tropical year (365.2422 days)	DY

Subroutine TINF

This subroutine calculates the exospheric temperature. The input variables are:

1.	solar radio noise flux (10^{-22} watts/m^2)	F10
2.	81 - day average F10	F10B
3.	geomagnetic latitude in radians	XLAT
4.	solar declination angle	SDA
5.	solar hour angle	SHA
6.	day number divided by tropical year	DY
7.	diurnal factor equal to 0.31	R

The output is the exospheric temperature, TE. Factors included in the calculation of the exospheric temperature are solar activity variations, diurnal variations, variations with the geomagnetic activity, and semi-annual variations.

Subroutine JAC

This subroutine calculates the molecular weight, density, and temperature without the seasonal - latitudinal variations. The input variables are:

1. height in km — Z
2. exospheric temperature — T

The output variables are:

1. temperature — TZ
2. molecular weight — EM
3. density — DENS

5. THE 4-D SECTION

GRID4D and subroutines SØRT4, INTRP4 and SELEC4 are basically the MAIN PRØGRAM, SØRT, INTERP and INPUT as documented in the 4-D users reference manual and subsequent updates.

Some changes have been made.

Statement numbers have been ordered in GRID4D and SØRT4.

In GRID4D, NTRAN MØVE statements are used to select the appropriate file for a given month on the 4-D data tape mounted on UNIT IT.

If a parity error is encountered in reading IT, a message

"INPUT UNIT NO. IT IN ERRØR FØR RECØRD NØ IRC"

is printed - execution continues. Such an error will only be of consequence if the particular record read in error is required for interpolation.

Grid point profiles for subsequent interpolation are tagged and filed on a dynamically assigned scratch UNIT SCRCH1 (IØTEM1 in calling program), instead of occupying core as in the 4-D model.

Any error in the handling of the 4-D data tape or UNIT SCRCH1 (IØTEM1 in calling program) by GRID4D which results in a transfer to

STATEMENT NO. 30

is fatal, and results in the printing of an error message and termination of execution (see user's manual).

Slight changes have been made to the logic of SØRT4 in the interests of efficiency.

SELEC4 is concerned only with the selection of the record numbers of the appropriate interpolation profiles.

GETNMC has been added to file the NMC grid point data, read either from cards of the SCIDAT data tape on UNIT IUG, on a dynamically assigned scratch file SCRCH2 (IØTEM2 in calling program), instead of occupying 1977 words of core as in the 4-D model. If other than 1977 records are filed, an error message

"N RECØRDS WRITTEN BY GETNMC ON SCRATCH FILE M"

is printed and execution terminated.

INTRP4 uses a modified latitude - longitude interpolation scheme in the mixed NMC - equatorial, equatorial and southern hemisphere regions.

The dimensions of some variables have been altered in keeping with the maximum number of profiles to be used in interpolation (16 istead of 25 as in the 4-D model), and to provide the index word for each record on SCRCH1 (IN (107) instead of (106)).

All references to, and subroutines associated with, the determination of the coefficients of the best fit polynomials to the selected profiles, as performed in the original 4-D model, have been deleted. All vertical interpolations required are performed by SCIMØD.

APPENDIX A

LISTING OF THE DATA TAPE "SCIDAT" FOR THE PROFILE PROGRAM

The tape contains the following data, identified by code characters at the beginning of each record. Month 13 refers to annual mean values. For code P, D, T, S, R, and RW data, southern latitude are given by northern hemisphere data displaced six months. Annual mean data and the QBO parameters are the same for both southern and northern hemispheres. For a more complete discussion of the input data, see Section 2 of the Users Manual.

Code	Data	Description
None	NMC Grid Data	Same as NMC Grid Required by NASA version 4-D program. Data consists of sequential point number followed by the two corresponding NMC grid indices. There are five points per record on the tape.
P	Groves Pressure (nt/m^2)	Month, height, values at latitudes 0, 10, 20, ... 90 exponent. Same format as in Groves report.
D	Groves Density (kg/m^3)	
T	Groves Temperature (^oK)	
S	Stationary Perturbations in monthly means (per mill)	Month, height, longitude, Δp at north latitude, 10, 30, 50, 70, 90, $\Delta\rho$ same, ΔT same.
R	Random pressure, density, and temperature perturbation magnitudes (per mill)	Month, height, Δp at north latitude 10, 30, 50, 70, 90, $\Delta\rho$ same, ΔT same
RW	Random magnitudes wind perturbation (m/s)	Month, height, Δu at north latitude 10, 30, 50, 70, 90, Δv same

Code	Data	Description
QP	QBO pressure parameters - amplitude (per mill) and phase (days after Jan. 0, 1966 when 1st maximum occurs)	Height, amplitude and phase at 10^{o} latitude, amplitude and phase at 30^{o}, ... , amplitude and phase at 90^{o}.
QD	QBO density parameters (as in QP)	
QT	QBO temperature parameters	
QU	QBO eastward wind parameters - amplitude (0.1 m/s) and phase (days after Jan. 0, '66)	
QV	QBO northward wind parameters - (as in QU)	

The tape consists of four NTRAN readable files with an NTRAN end of file after each file. The first file contains the NMC grid data, the second contains the Groves and stationary perturbation data, the third contains the random perturbation data, and the fourth contains the QBO data. The number of words per NTRAN record is 15 for the NMC grid data. Each record contains NMC grid x-y coordinates for 5 points. The total number of NMC grid points is 1977. The NMC grid data file contains a total of 395 records, with the last record containing points 1976 and 1977 and zeros in the remaining words. There are 14 words per record for the Groves data (including the code word), 19 for the stationary perturbations, 18 for the code R data, 13 for the code RW data, and 12 for the quasi-biennial data. The Groves data contains 702 records, the stationary perturbation data contains 1248 records, the code R random data contains 260 records, the code RW random winds data contain 325 records, and the QBO data contain 80 records.

Following is a listing of the data contained on the SCIDAT tape.

NMC GRID DATA,()

1	15	1	2	16	1	3	17	1	4	18	1	5	19	1
6	20	1	7	21	1	8	22	1	9	23	1	10	24	1
11	25	1	12	26	1	13	27	1	14	28	1	15	29	1
16	30	1	17	31	1	18	32	1	19	33	1	20	14	2
21	15	2	22	16	2	23	17	2	24	18	2	25	19	2
26	20	2	27	21	2	28	22	2	29	23	2	30	24	2
31	25	2	32	26	2	33	27	2	34	28	2	35	29	2
36	30	2	37	31	2	38	32	2	39	33	2	40	34	2
41	13	3	42	14	3	43	15	3	44	16	3	45	17	3
46	18	3	47	19	3	48	20	3	49	21	3	50	22	3
51	23	3	52	24	3	53	25	3	54	26	3	55	27	3
56	28	3	57	29	3	58	30	3	59	31	3	60	32	3
61	33	3	62	34	3	63	35	3	64	12	4	65	13	4
66	14	4	67	15	4	68	16	4	69	17	4	70	18	4
71	19	4	72	20	4	73	21	4	74	22	4	75	23	4
76	24	4	77	25	4	78	26	4	79	27	4	80	28	4
81	29	4	82	30	4	83	31	4	84	32	4	85	33	4
86	34	4	87	35	4	88	36	4	89	11	5	90	12	5
91	13	5	92	14	5	93	15	5	94	16	5	95	17	5
96	18	5	97	19	5	98	20	5	99	21	5	100	22	5
101	23	5	102	24	5	103	25	5	104	26	5	105	27	5
106	28	5	107	29	5	108	30	5	109	31	5	110	32	5
111	33	5	112	34	5	113	35	5	114	36	5	115	37	5
116	10	6	117	11	6	118	12	6	119	13	6	120	14	6
121	15	6	122	16	6	123	17	6	124	18	6	125	19	6
126	20	6	127	21	6	128	22	6	129	23	6	130	24	6
131	25	6	132	26	6	133	27	6	134	28	6	135	29	6
136	30	6	137	31	6	138	32	6	139	33	6	140	34	6
141	35	6	142	36	6	143	37	6	144	38	6	145	9	7
146	10	7	147	11	7	148	12	7	149	13	7	150	14	7
151	15	7	152	16	7	153	17	7	154	18	7	155	19	7
156	20	7	157	21	7	158	22	7	159	23	7	160	24	7
161	25	7	162	26	7	163	27	7	164	28	7	165	29	7
166	30	7	167	31	7	168	32	7	169	33	7	170	34	7
171	35	7	172	36	7	173	37	7	174	38	7	175	39	7
176	8	8	177	9	8	178	10	8	179	11	8	180	12	8
181	13	8	182	14	8	183	15	8	184	16	8	185	17	8
186	18	8	187	19	8	188	20	8	189	21	8	190	22	8
191	23	8	192	24	8	193	25	8	194	26	8	195	27	8
196	28	8	197	29	8	198	30	8	199	31	8	200	32	8
201	33	8	202	34	8	203	35	8	204	36	8	205	37	8
206	38	8	207	39	8	208	40	8	209	7	9	210	8	9
211	9	9	212	10	9	213	11	9	214	12	9	215	13	9
216	14	9	217	15	9	218	16	9	219	17	9	220	18	9
221	19	9	222	20	9	223	21	9	224	22	9	225	23	9
226	24	9	227	25	9	228	26	9	229	27	9	230	28	9
231	29	9	232	30	9	233	31	9	234	32	9	235	33	9
236	34	9	237	35	9	238	36	9	239	37	9	240	38	9
241	39	9	242	40	9	243	41	9	244	6	10	245	7	10
246	8	10	247	9	10	248	10	10	249	11	10	250	12	10
251	13	10	252	14	10	253	15	10	254	16	10	255	17	10
256	18	10	257	19	10	258	20	10	259	21	10	260	22	10
261	23	10	262	24	10	263	25	10	264	26	10	265	27	10

266	28	10	267	29	10	268	30	10	269	31	10	270	32	10
271	33	10	272	34	10	273	35	10	274	36	10	275	37	10
276	38	10	277	39	10	278	40	10	279	41	10	280	42	10
281	5	11	282	6	11	283	7	11	284	8	11	285	9	11
286	10	11	287	11	11	288	12	11	289	13	11	290	14	11
291	15	11	292	16	11	293	17	11	294	18	11	295	19	11
296	20	11	297	21	11	298	22	11	299	23	11	300	24	11
301	25	11	302	26	11	303	27	11	304	28	11	305	29	11
306	30	11	307	31	11	308	32	11	309	33	11	310	34	11
311	35	11	312	36	11	313	37	11	314	38	11	315	39	11
316	40	11	317	41	11	318	42	11	319	43	11	320	4	12
321	5	12	322	6	12	323	7	12	324	8	12	325	9	12
326	10	12	327	11	12	328	12	12	329	13	12	330	14	12
331	15	12	332	16	12	333	17	12	334	18	12	335	19	12
336	20	12	337	21	12	338	22	12	339	23	12	340	24	12
341	25	12	342	26	12	343	27	12	344	28	12	345	29	12
346	30	12	347	31	12	348	32	12	349	33	12	350	34	12
351	35	12	352	36	12	353	37	12	354	38	12	355	39	12
356	40	12	357	41	12	358	42	12	359	43	12	360	44	12
361	3	13	362	4	13	363	5	13	364	6	13	365	7	13
366	8	13	367	9	13	368	10	13	369	11	13	370	12	13
371	13	13	372	14	13	373	15	13	374	16	13	375	17	13
376	18	13	377	19	13	378	20	13	379	21	13	380	22	13
381	23	13	382	24	13	383	25	13	384	26	13	385	27	13
386	28	13	387	29	13	388	30	13	389	31	13	390	32	13
391	33	13	392	34	13	393	35	13	394	36	13	395	37	13
396	38	13	397	39	13	398	40	13	399	41	13	400	42	13
401	43	13	402	44	13	403	45	13	404	2	14	405	3	14
406	4	14	407	5	14	408	6	14	409	7	14	410	8	14
411	9	14	412	10	14	413	11	14	414	12	14	415	13	14
416	14	14	417	15	14	418	16	14	419	17	14	420	18	14
421	19	14	422	20	14	423	21	14	424	22	14	425	23	14
426	24	14	427	25	14	428	26	14	429	27	14	430	28	14
431	29	14	432	30	14	433	31	14	434	32	14	435	33	14
436	34	14	437	35	14	438	36	14	439	37	14	440	38	14
441	39	14	442	40	14	443	41	14	444	42	14	445	43	14
446	44	14	447	45	14	448	46	14	449	1	15	450	2	15
451	3	15	452	4	15	453	5	15	454	6	15	455	7	15
456	8	15	457	9	15	458	10	15	459	11	15	460	12	15
461	13	15	462	14	15	463	15	15	464	16	15	465	17	15
466	18	15	467	19	15	468	20	15	469	21	15	470	22	15
471	23	15	472	24	15	473	25	15	474	26	15	475	27	15
476	28	15	477	29	15	478	30	15	479	31	15	480	32	15
481	33	15	482	34	15	483	35	15	484	36	15	485	37	15
486	38	15	487	39	15	488	40	15	489	41	15	490	42	15
491	43	15	492	44	15	493	45	15	494	46	15	495	47	15
496	1	16	497	2	16	498	3	16	499	4	16	500	5	16
501	6	16	502	7	16	503	8	16	504	9	16	505	10	16
506	11	16	507	12	16	508	13	16	509	14	16	510	15	16
511	16	16	512	17	16	513	18	16	514	19	16	515	20	16
516	21	16	517	22	16	518	23	16	519	24	16	520	25	16
521	26	16	522	27	16	523	28	16	524	29	16	525	30	16
526	31	16	527	32	16	528	33	16	529	34	16	530	35	16
531	36	16	532	37	16	533	38	16	534	39	16	535	40	16
536	41	16	537	42	16	538	43	16	539	44	16	540	45	16
541	46	16	542	47	16	543	1	17	544	2	17	545	3	17
546	4	17	547	5	17	548	6	17	549	7	17	550	8	17

551	9	17	552	10	17	553	11	17	554	12	17	555	13	17
556	14	17	557	15	17	558	16	17	559	17	17	560	18	17
561	19	17	562	20	17	563	21	17	564	22	17	565	23	17
566	24	17	567	25	17	568	26	17	569	27	17	570	28	17
571	29	17	572	30	17	573	31	17	574	32	17	575	33	17
576	34	17	577	35	17	578	36	17	579	37	17	580	38	17
581	39	17	582	40	17	583	41	17	584	42	17	585	43	17
586	44	17	587	45	17	588	46	17	589	47	17	590	1	18
591	2	18	592	3	18	593	4	18	594	5	18	595	6	18
596	7	18	597	8	18	598	9	18	599	10	18	600	11	18
601	12	18	602	13	18	603	14	18	604	15	18	605	16	18
606	17	18	607	18	18	608	19	18	609	20	18	610	21	18
611	22	18	612	23	18	613	24	18	614	25	18	615	26	18
616	27	18	617	28	18	618	29	18	619	30	18	620	31	18
621	32	18	622	33	18	623	34	18	624	35	18	625	36	18
626	37	18	627	38	18	628	39	18	629	40	18	630	41	18
631	42	18	632	43	18	633	44	18	634	45	18	635	46	18
636	47	18	637	1	19	638	2	19	639	3	19	640	4	19
641	5	19	642	6	19	643	7	19	644	8	19	645	9	19
646	10	19	647	11	19	648	12	19	649	13	19	650	14	19
651	15	19	652	16	19	653	17	19	654	18	19	655	19	19
656	20	19	657	21	19	658	22	19	659	23	19	660	24	19
661	25	19	662	26	19	663	27	19	664	28	19	665	29	19
666	30	19	667	31	19	668	32	19	669	33	19	670	34	19
671	35	19	672	36	19	673	37	19	674	38	19	675	39	19
676	40	19	677	41	19	678	42	19	679	43	19	680	44	19
681	45	19	682	46	19	683	47	19	684	1	20	685	2	20
686	3	20	687	4	20	688	5	20	689	6	20	690	7	20
691	8	20	692	9	20	693	10	20	694	11	20	695	12	20
696	13	20	697	14	20	698	15	20	699	16	20	700	17	20
701	18	20	702	19	20	703	20	20	704	21	20	705	22	20
706	23	20	707	24	20	708	25	20	709	26	20	710	27	20
711	28	20	712	29	20	713	30	20	714	31	20	715	32	20
716	33	20	717	34	20	718	35	20	719	36	20	720	37	20
721	38	20	722	39	20	723	40	20	724	41	20	725	42	20
726	43	20	727	44	20	728	45	20	729	46	20	730	47	20
731	1	21	732	2	21	733	3	21	734	4	21	735	5	21
736	6	21	737	7	21	738	8	21	739	9	21	740	10	21
741	11	21	742	12	21	743	13	21	744	14	21	745	15	21
746	16	21	747	17	21	748	18	21	749	19	21	750	20	21
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1911	33	48	1912	34	48	1913	35	48	1914	36	48	1915	13	49
1916	14	49	1917	15	49	1918	16	49	1919	17	49	1920	18	49
1921	19	49	1922	20	49	1923	21	49	1924	22	49	1925	23	49
1926	24	49	1927	25	49	1928	26	49	1929	27	49	1930	28	49
1931	29	49	1932	30	49	1933	31	49	1934	32	49	1935	33	49
1936	34	49	1937	35	49	1938	14	50	1939	15	50	1940	16	50
1941	17	50	1942	18	50	1943	19	50	1944	20	50	1945	21	50
1946	22	50	1947	23	50	1948	24	50	1949	25	50	1950	26	50
1951	27	50	1952	28	50	1953	29	50	1954	30	50	1955	31	50
1956	32	50	1957	33	50	1958	34	50	1959	15	51	1960	16	51
1961	17	51	1962	18	51	1963	19	51	1964	20	51	1965	21	51
1966	22	51	1967	23	51	1968	24	51	1969	25	51	1970	26	51
1971	27	51	1972	28	51	1973	29	51	1974	30	51	1975	31	51

1976 32 51 1977 33 51 0 0 0 0 0 0 0 0 0

----END OF FILE WRITTEN----

GROVES MODEL DATA,(D,P,T)

P	1	25	250	247	244	239	237	241	244	240	238	237	1
P	1	30	118	117	114	112	111	112	111	105	101	100	1
P	1	35	582	576	562	546	529	527	509	472	450	442	0
P	1	40	299	295	286	275	261	254	237	216	203	199	0
P	1	45	157	155	152	146	136	127	116	103	95	93	0
P	1	50	842	832	816	778	720	659	587	515	472	457	-1
P	1	55	454	449	442	420	383	345	306	266	242	234	-1
P	1	60	241	237	232	217	198	177	155	134	121	117	-1
P	1	65	122	119	117	110	100	89	79	67	60	57	-1
P	1	70	577	561	549	519	481	435	382	317	278	265	-2
P	1	75	255	249	243	236	222	207	183	148	127	120	-2
P	1	80	110	108	105	102	100	95	84	67	57	53	-2
P	1	85	471	463	446	440	437	429	384	305	258	242	-3
P	1	90	197	194	187	184	190	191	174	138	116	109	-3
P	1	95	803	791	767	778	833	873	813	646	546	512	-4
P	1	100	350	345	338	345	379	401	376	301	256	241	-4
P	1	105	168	164	160	163	177	190	181	145	123	116	-4
P	1	110	898	889	856	843	899	939	887	701	589	552	-5
P	2	25	250	246	242	239	239	243	241	231	225	223	1
P	2	30	118	116	114	112	111	112	111	105	101	100	1
P	2	35	581	572	560	543	531	523	517	485	466	459	0
P	2	40	298	293	286	274	264	255	246	227	216	212	0
P	2	45	157	156	152	144	137	130	122	110	103	100	0
P	2	50	848	839	820	773	734	683	625	546	499	483	-1
P	2	55	458	455	443	413	390	359	325	279	251	242	-1
P	2	60	243	238	231	215	202	185	165	140	125	120	-1
P	2	65	122	119	114	106	100	92	83	69	61	58	-1
P	2	70	577	551	534	504	482	450	397	321	275	260	-2
P	2	75	256	245	240	229	223	211	188	147	122	114	-2
P	2	80	111	106	105	102	101	97	86	66	54	50	-2
P	2	85	469	448	451	439	440	434	393	295	236	217	-3
P	2	90	200	188	188	187	191	192	175	133	108	99	-3
P	2	95	855	802	797	784	814	843	792	600	485	446	-4
P	2	100	395	364	362	357	366	377	359	278	229	213	-4
P	2	105	199	182	178	171	174	179	174	135	112	104	-4
P	2	110	113	101	96	91	91	93	90	71	60	56	-4
P	3	25	251	246	244	240	240	243	238	225	217	215	1
P	3	30	118	117	115	113	112	112	110	105	102	101	1
P	3	35	582	575	566	552	533	529	521	501	489	485	0
P	3	40	299	297	290	279	267	262	255	242	234	232	0
P	3	45	159	158	154	146	139	135	130	121	116	114	0
P	3	50	860	859	833	781	741	718	675	616	581	569	-1
P	3	55	465	461	446	416	392	380	354	319	298	291	-1
P	3	60	244	241	231	214	203	196	181	162	151	147	-1
P	3	65	121	117	113	106	101	98	90	79	72	70	-1
P	3	70	569	547	528	503	487	475	434	372	335	322	-2
P	3	75	255	240	237	231	225	223	205	171	151	144	-2
P	3	80	110	105	105	103	102	102	94	76	65	62	-2
P	3	85	476	444	450	446	438	444	420	339	290	274	-3
P	3	90	206	191	191	188	187	191	182	146	124	117	-3
P	3	95	903	811	802	789	785	804	783	645	562	535	-4
P	3	100	419	374	362	354	354	365	355	298	264	252	-4

P	3	105	213	183	175	169	167	174	177	153	139	134	-4
P	3	110	122	104	96	89	88	94	98	86	79	76	-4
P	4	25	251	250	246	244	241	241	240	239	238	238	1
P	4	30	119	119	117	116	114	114	113	111	110	109	1
P	4	35	590	588	583	570	554	553	545	522	508	504	0
P	4	40	305	306	300	291	282	282	273	254	243	239	0
P	4	45	163	162	159	153	148	149	142	130	123	120	0
P	4	50	886	883	861	825	801	804	761	686	641	626	-1
P	4	55	478	473	462	439	427	430	407	363	337	328	-1
P	4	60	250	247	240	229	223	225	210	186	175	170	-1
P	4	65	123	121	119	114	111	112	106	93	85	83	-1
P	4	70	575	568	565	551	539	546	511	446	410	398	-2
P	4	75	253	250	257	253	250	253	240	209	190	184	-2
P	4	80	110	109	113	114	112	114	108	93	84	81	-2
P	4	85	479	471	494	493	478	475	458	392	352	339	-3
P	4	90	212	206	213	212	198	192	184	158	142	137	-3
P	4	95	920	880	900	873	813	769	754	656	600	581	-4
P	4	100	416	386	386	380	359	348	341	305	283	276	-4
P	4	105	202	182	178	172	165	167	176	164	157	154	-4
P	4	110	112	98	93	89	86	92	102	99	97	97	-4
P	5	25	251	254	250	249	247	246	249	254	257	258	1
P	5	30	120	120	120	118	117	117	118	120	121	122	1
P	5	35	595	598	595	584	576	577	581	586	589	590	0
P	5	40	309	311	307	299	298	300	299	292	288	286	0
P	5	45	164	165	163	159	158	160	159	155	153	152	0
P	5	50	889	896	882	859	861	880	869	832	810	802	-1
P	5	55	480	481	475	463	464	474	470	456	448	445	-1
P	5	60	253	254	248	242	244	250	248	239	234	232	-1
P	5	65	126	127	125	122	122	126	125	123	122	121	-1
P	5	70	582	597	600	587	591	607	608	596	589	586	-2
P	5	75	254	263	271	268	267	276	280	283	285	285	-2
P	5	80	111	115	118	115	115	118	121	121	121	121	-2
P	5	85	489	496	505	485	464	459	472	477	480	481	-3
P	5	90	213	214	215	199	181	169	170	170	170	170	-3
P	5	95	887	899	901	819	700	619	622	649	665	671	-4
P	5	100	379	379	382	351	308	276	280	292	299	302	-4
P	5	105	172	172	175	163	145	135	145	162	172	176	-4
P	5	110	91	88	89	84	78	79	89	100	107	109	-4
P	6	25	251	253	253	253	256	258	260	265	268	269	1
P	6	30	119	120	121	121	122	123	125	126	130	130	1
P	6	35	592	597	597	599	602	611	627	642	651	654	0
P	6	40	306	308	306	308	311	318	326	330	332	333	0
P	6	45	161	163	162	163	166	171	176	176	179	180	0
P	6	50	869	881	878	886	905	935	965	974	979	981	-1
P	6	55	468	474	474	477	487	508	528	537	542	544	-1
P	6	60	248	251	249	251	258	271	282	288	292	293	-1
P	6	65	125	127	126	125	128	137	144	150	154	155	-1
P	6	70	585	599	592	593	607	652	695	731	753	760	-2
P	6	75	255	265	264	262	265	286	313	335	348	353	-2
P	6	80	112	114	114	111	110	117	128	136	141	142	-2
P	6	85	486	487	479	456	423	423	453	483	501	507	-3
P	6	90	208	206	201	183	156	141	145	152	156	158	-3
P	6	95	853	852	833	737	577	480	489	526	548	556	-4
P	6	100	360	362	361	327	260	214	216	230	238	241	-4
P	6	105	162	164	167	156	127	108	112	124	131	134	-4
P	6	110	840	837	867	836	719	640	689	771	820	837	-5
P	7	25	250	252	256	259	263	265	269	274	277	278	1

P	7	30	118	119	122	123	125	128	130	133	135	135	1
P	7	35	582	591	600	605	622	640	653	662	667	669	0
P	7	40	299	301	305	309	318	331	340	345	348	349	0
P	7	45	157	158	161	163	169	177	184	185	186	186	0
P	7	50	84	85	87	88	91	96	101	102	103	103	0
P	7	55	454	457	466	470	492	521	551	564	572	574	-1
P	7	60	241	242	245	246	257	275	295	307	314	317	-1
P	7	65	122	123	123	122	128	139	152	159	163	165	-1
P	7	70	577	578	573	562	595	654	730	779	808	818	-2
P	7	75	255	256	253	245	257	284	322	348	364	369	-2
P	7	80	110	110	109	104	104	111	126	137	144	146	-2
P	7	85	471	471	460	423	395	393	425	452	468	474	-3
P	7	90	197	198	191	170	145	131	131	135	137	138	-3
P	7	95	803	812	793	688	569	479	458	456	455	454	-4
P	7	100	350	357	354	317	262	218	198	191	187	185	-4
P	7	105	168	170	168	153	132	110	101	98	96	96	-4
P	7	110	898	903	895	835	725	626	576	559	549	545	-5
P	8	25	250	253	257	260	264	265	270	276	280	281	1
P	8	30	118	120	122	123	126	128	130	132	133	134	1
P	8	35	581	592	595	606	623	640	648	650	651	652	0
P	8	40	298	301	303	307	319	330	335	332	330	330	0
P	8	45	157	158	158	161	169	175	178	177	176	176	0
P	8	50	848	844	852	863	907	946	971	963	958	957	-1
P	8	55	458	457	454	462	485	509	526	525	524	524	-1
P	8	60	243	240	240	241	252	266	280	281	282	282	-1
P	8	65	122	123	121	120	124	132	141	145	147	148	-1
P	8	70	577	584	579	563	571	615	676	709	729	735	-2
P	8	75	256	268	261	251	250	268	295	316	329	333	-2
P	8	80	111	116	116	109	104	106	115	125	131	133	-2
P	8	85	469	506	501	459	408	390	397	430	450	456	-3
P	8	90	200	214	214	189	158	140	134	138	140	141	-3
P	8	95	855	931	902	796	660	567	504	489	480	477	-4
P	8	100	395	421	412	359	301	255	216	199	189	185	-4
P	8	105	199	213	199	171	145	122	102	91	84	82	-4
P	8	110	113	117	109	90	75	63	52	45	41	39	-4
P	9	25	251	253	254	257	259	260	260	262	263	264	1
P	9	30	118	120	121	122	124	124	124	124	124	124	1
P	9	35	582	589	596	597	607	613	610	599	592	590	0
P	9	40	299	301	303	302	307	313	310	301	296	294	0
P	9	45	159	159	160	158	162	165	163	157	153	152	0
P	9	50	860	858	858	845	865	883	875	840	819	812	-1
P	9	55	465	464	461	451	461	471	467	450	440	436	-1
P	9	60	244	245	242	234	235	241	243	237	233	232	-1
P	9	65	121	124	125	118	115	117	121	120	119	119	-1
P	9	70	569	600	606	560	528	537	573	582	587	589	-2
P	9	75	255	275	283	255	233	234	252	262	268	270	-2
P	9	80	110	122	126	112	98	96	103	110	114	116	-2
P	9	85	476	527	550	477	405	378	399	430	449	455	-3
P	9	90	206	230	236	200	166	150	153	164	171	173	-3
P	9	95	90	101	104	87	72	63	62	64	65	66	-3
P	9	100	419	480	487	404	328	280	265	261	259	258	-4
P	9	105	213	246	247	199	158	131	119	110	105	103	-4
P	9	110	122	141	138	107	82	66	56	48	43	42	-4
P	10	25	251	250	251	253	254	254	250	243	239	237	1
P	10	30	119	119	119	120	119	118	116	113	111	111	1
P	10	35	590	588	585	583	578	564	556	539	529	525	0
P	10	40	305	302	298	295	289	281	274	264	258	256	0

P	10	45	163	161	157	153	150	145	140	135	132	131	0
P	10	50	886	869	850	824	801	767	740	708	689	682	-1
P	10	55	478	468	457	439	426	403	389	374	365	362	-1
P	10	60	250	246	240	228	217	204	199	191	186	185	-1
P	10	65	123	123	122	113	106	99	99	95	93	92	-1
P	10	70	575	586	594	549	487	454	466	452	444	441	-2
P	10	75	253	265	274	248	217	202	213	207	203	202	-2
P	10	80	110	117	122	110	94	87	93	92	91	91	-2
P	10	85	479	515	533	471	402	371	398	400	401	402	-3
P	10	90	212	228	233	202	172	158	169	170	171	171	-3
P	10	95	92	99	102	88	75	69	74	74	74	74	-3
P	10	100	416	462	480	413	343	310	325	316	311	309	-4
P	10	105	202	230	242	207	172	151	150	139	132	130	-4
P	10	110	112	130	137	116	93	78	72	61	54	52	-4
P	11	25	251	250	248	247	246	245	244	239	236	235	1
P	11	30	120	119	118	116	115	113	111	109	108	107	1
P	11	35	595	589	578	562	546	529	518	511	507	505	0
P	11	40	309	303	294	283	270	255	247	244	242	242	0
P	11	45	164	161	155	148	139	129	123	122	121	121	0
P	11	50	889	869	838	792	736	666	633	632	631	631	-1
P	11	55	480	470	452	425	388	346	330	333	335	335	-1
P	11	60	253	248	239	221	200	177	168	169	170	170	-1
P	11	65	126	124	120	110	98	87	84	84	84	84	-1
P	11	70	582	576	571	525	464	413	404	396	391	390	-2
P	11	75	254	255	256	237	210	191	190	184	180	179	-2
P	11	80	111	112	113	104	93	86	87	84	82	82	-2
P	11	85	489	495	492	448	402	381	393	387	383	382	-3
P	11	90	213	216	212	192	175	169	178	176	175	174	-3
P	11	95	887	899	888	826	774	772	819	811	806	805	-4
P	11	100	379	395	405	384	365	364	386	372	364	361	-4
P	11	105	172	184	195	192	183	180	184	174	168	166	-4
P	11	110	91	100	109	106	99	93	91	81	75	73	-4
P	12	25	251	247	245	241	239	241	242	240	239	238	1
P	12	30	119	118	116	113	111	112	110	107	105	105	1
P	12	35	592	584	565	552	530	524	506	486	474	470	0
P	12	40	306	301	289	279	263	252	237	227	221	219	0
P	12	45	161	159	152	147	136	125	116	110	106	105	0
P	12	50	869	854	827	788	723	645	586	563	549	545	-1
P	12	55	468	460	442	422	382	336	303	294	289	287	-1
P	12	60	248	243	234	221	198	172	154	150	148	147	-1
P	12	65	125	122	117	111	99	86	78	75	73	73	-1
P	12	70	585	568	556	533	477	420	381	357	343	338	-2
P	12	75	255	250	245	239	220	199	183	167	157	154	-2
P	12	80	112	109	108	105	99	91	85	77	72	71	-2
P	12	85	486	477	459	449	433	411	388	353	332	325	-3
P	12	90	208	204	199	194	191	185	179	162	152	148	-3
P	12	95	853	833	807	822	849	867	841	764	718	702	-4
P	12	100	360	353	353	368	393	412	405	361	335	326	-4
P	12	105	162	161	161	173	188	201	195	172	158	154	-4
P	12	110	840	850	872	912	962	992	947	816	737	711	-5
P	13	25	251	250	249	248	249	250	251	249	248	248	1
P	13	30	119	119	118	118	117	118	118	116	115	115	1
P	13	35	588	588	583	576	570	570	567	555	550	549	0
P	13	40	303	302	298	292	288	286	282	273	271	271	0
P	13	45	161	160	157	154	151	149	145	139	138	138	0
P	13	50	865	861	848	824	808	792	769	734	730	729	-1
P	13	55	466	464	456	440	430	420	408	389	388	389	-1

P	13	60	246	244	239	229	223	218	212	202	201	201	-1
P	13	65	123	122	120	115	111	109	106	102	100	99	-1
P	13	70	576	576	570	545	525	518	513	489	462	453	-2
P	13	75	256	258	258	247	237	236	236	224	202	195	-2
P	13	80	111	112	113	108	103	102	103	98	88	85	-2
P	13	85	482	486	488	460	433	425	428	405	375	365	-3
P	13	90	206	208	207	193	178	173	174	164	152	147	-3
P	13	95	877	882	877	814	752	724	723	678	626	608	-4
P	13	100	384	386	385	359	334	322	321	300	276	268	-4
P	13	105	182	182	181	169	158	153	154	143	132	128	-4
P	13	110	960	959	943	873	811	792	801	748	690	669	-5
D	1	25	400	393	392	381	377	382	395	403	408	409	-4
D	1	30	178	175	173	171	171	176	179	176	174	174	-4
D	1	35	820	815	805	800	791	812	813	772	747	739	-5
D	1	40	404	400	386	374	367	371	361	338	324	320	-5
D	1	45	207	203	196	189	180	177	168	153	144	141	-5
D	1	50	108	107	104	100	94	89	81	72	67	65	-5
D	1	55	585	581	575	554	511	467	420	367	335	325	-6
D	1	60	327	325	320	302	277	248	218	192	176	171	-6
D	1	65	182	179	174	164	146	131	115	100	91	88	-6
D	1	70	952	926	906	837	755	661	581	497	447	430	-7
D	1	75	444	431	421	403	365	330	289	241	212	203	-7
D	1	80	195	190	187	180	171	157	137	110	94	88	-7
D	1	85	850	832	809	791	760	722	634	503	424	398	-8
D	1	90	370	365	349	339	333	320	283	225	190	179	-8
D	1	95	148	146	139	138	141	143	131	103	86	81	-8
D	1	100	580	574	560	571	622	645	593	474	403	379	-9
D	1	105	242	236	234	244	271	294	278	224	192	181	-9
D	1	110	108	106	104	107	119	128	124	101	87	83	-9
D	2	25	400	393	386	379	382	391	387	377	371	369	-4
D	2	30	178	174	172	171	173	178	175	168	164	162	-4
D	2	35	823	813	799	791	790	799	804	765	742	734	-5
D	2	40	403	393	386	375	368	366	366	348	337	334	-5
D	2	45	205	201	195	187	181	176	173	162	155	153	-5
D	2	50	108	106	104	99	95	90	85	77	72	71	-5
D	2	55	591	592	580	545	521	483	446	390	356	345	-6
D	2	60	334	332	325	303	284	261	235	203	184	177	-6
D	2	65	182	181	174	161	149	136	122	105	95	91	-6
D	2	70	943	914	873	809	760	694	612	516	458	439	-7
D	2	75	444	425	408	382	364	338	300	243	209	197	-7
D	2	80	198	189	185	177	171	160	141	111	93	87	-7
D	2	85	845	812	817	785	766	738	654	494	398	366	-8
D	2	90	360	343	347	342	341	331	295	222	178	164	-8
D	2	95	147	140	139	137	142	145	133	99	79	72	-8
D	2	100	610	571	574	574	598	619	578	439	356	328	-9
D	2	105	264	246	249	247	257	266	254	195	160	148	-9
D	2	110	125	114	114	113	116	118	114	89	74	69	-9
D	3	25	399	387	388	380	381	390	381	354	338	332	-4
D	3	30	178	175	174	172	174	177	173	162	155	153	-4
D	3	35	827	811	805	802	787	795	785	755	737	731	-5
D	3	40	400	397	390	382	371	368	365	356	351	349	-5
D	3	45	204	202	198	191	183	180	177	170	166	164	-5
D	3	50	109	109	106	101	96	94	90	84	80	79	-5
D	3	55	605	604	591	555	524	509	479	439	415	407	-6
D	3	60	340	343	331	305	288	276	258	233	218	213	-6
D	3	65	185	182	174	161	150	145	134	121	113	111	-6
D	3	70	931	912	863	800	760	735	668	594	550	535	-7

D	3	75	440	417	400	384	368	358	325	282	256	248	-7
D	3	80	195	186	183	177	174	172	155	129	113	108	-7
D	3	85	841	793	803	796	778	776	724	589	508	481	-8
D	3	90	361	345	350	345	340	346	323	255	214	201	-8
D	3	95	153	140	142	139	138	141	136	108	91	86	-8
D	3	100	644	591	583	574	578	589	559	451	386	365	-9
D	3	105	279	249	247	248	247	251	241	200	175	167	-9
D	3	110	131	117	114	110	110	112	111	94	84	80	-9
D	4	25	398	394	386	383	379	378	375	376	377	377	-4
D	4	30	178	178	174	174	173	173	173	174	175	175	-4
D	4	35	829	823	822	814	798	793	802	793	788	786	-5
D	4	40	406	406	402	396	384	381	377	364	356	354	-5
D	4	45	208	208	205	198	192	192	187	175	168	165	-5
D	4	50	112	112	110	106	103	103	98	89	84	82	-5
D	4	55	623	622	610	582	563	565	541	485	451	440	-6
D	4	60	352	350	340	323	311	314	294	264	246	240	-6
D	4	65	189	186	179	168	164	165	155	139	129	126	-6
D	4	70	958	942	903	864	838	846	788	697	642	624	-7
D	4	75	440	435	435	416	409	412	389	341	312	303	-7
D	4	80	193	190	196	196	195	200	186	162	148	143	-7
D	4	85	826	821	864	872	871	889	853	730	656	632	-8
D	4	90	368	364	382	388	373	374	353	301	270	259	-8
D	4	95	159	157	163	159	147	139	135	115	103	99	-8
D	4	100	673	648	669	654	603	560	522	445	399	383	-9
D	4	105	282	265	269	265	253	234	223	192	173	167	-9
D	4	110	126	116	115	114	108	107	106	95	88	86	-9
D	5	25	396	400	391	389	384	381	385	398	406	408	-4
D	5	30	178	180	177	177	177	177	176	178	181	183	183	-4
D	5	35	829	832	835	830	816	811	823	857	877	884	-5
D	5	40	411	414	411	402	396	395	399	399	399	399	-5
D	5	45	212	212	209	204	202	201	201	200	199	199	-5
D	5	50	113	114	112	109	109	110	109	104	101	100	-5
D	5	55	621	628	624	608	605	616	606	586	574	570	-6
D	5	60	350	351	344	334	338	344	341	324	314	310	-6
D	5	65	193	191	184	180	179	184	183	176	175	174	-6
D	5	70	984	985	958	930	935	957	945	906	883	875	-7
D	5	75	444	458	465	457	456	469	466	467	468	468	-7
D	5	80	191	200	208	207	211	221	225	224	223	223	-7
D	5	85	838	872	897	894	903	941	978	990	997	1000	-8
D	5	90	384	383	390	375	366	365	372	365	361	359	-8
D	5	95	163	166	166	151	131	119	119	122	124	124	-8
D	5	100	663	670	665	602	510	439	424	422	421	420	-9
D	5	105	262	266	270	246	210	178	173	178	181	182	-9
D	5	110	111	112	115	107	94	85	85	86	90	90	-9
D	6	25	397	400	395	392	396	399	397	403	407	408	-4
D	6	30	177	178	180	181	182	183	183	187	189	190	-4
D	6	35	828	835	845	848	848	851	870	897	913	919	-5
D	6	40	411	413	412	414	413	416	426	436	442	444	-5
D	6	45	210	211	209	209	210	215	219	223	225	226	-5
D	6	50	111	112	111	112	114	117	119	120	121	121	-5
D	6	55	606	617	619	622	631	649	669	673	675	676	-6
D	6	60	339	341	343	347	356	368	379	380	381	381	-6
D	6	65	187	189	188	188	193	202	209	213	215	216	-6
D	6	70	98	99	97	97	100	106	110	113	115	115	-6
D	6	75	447	463	458	461	474	511	547	580	600	606	-7
D	6	80	193	202	204	204	211	232	257	275	286	289	-7
D	6	85	85	87	87	86	87	94	104	113	118	120	-7

D	6	90	384	380	372	355	335	333	350	365	374	377	-8
D	6	95	160	158	152	134	109	96	99	105	109	110	-8
D	6	100	636	633	616	535	412	330	328	345	355	359	-9
D	6	105	252	256	252	224	171	136	132	140	145	146	-9
D	6	110	106	109	113	104	83	67	66	69	71	71	-9
D	7	25	400	399	401	402	408	407	407	413	417	418	-4
D	7	30	178	179	182	185	186	187	190	194	196	197	-4
D	7	35	820	840	856	863	881	891	903	919	929	932	-5
D	7	40	404	410	415	419	428	437	444	452	457	458	-5
D	7	45	207	208	209	211	217	226	230	231	232	232	-5
D	7	50	108	109	111	112	116	121	125	125	125	125	-5
D	7	55	585	591	609	615	641	672	695	700	703	704	-6
D	7	60	327	328	338	343	357	374	393	400	404	406	-6
D	7	65	182	183	186	188	195	207	219	225	229	230	-6
D	7	70	95	95	95	95	100	108	117	122	125	126	-6
D	7	75	444	446	440	434	468	524	587	625	648	655	-7
D	7	80	195	196	195	191	203	231	265	291	307	312	-7
D	7	85	85	85	84	80	82	89	103	113	119	121	-7
D	7	90	370	370	358	329	302	297	314	332	343	346	-8
D	7	95	148	148	142	122	102	90	91	94	96	96	-8
D	7	100	580	591	581	500	399	333	310	305	302	301	-9
D	7	105	242	247	245	215	178	143	130	125	122	121	-9
D	7	110	108	112	113	103	86	70	62	58	56	55	-9
D	8	25	400	403	406	406	408	403	411	423	430	433	-4
D	8	30	178	179	184	185	188	188	192	196	198	199	-4
D	8	35	823	845	853	872	862	895	907	924	934	938	-5
D	8	40	403	410	417	420	429	440	445	445	445	445	-5
D	8	45	205	208	206	210	219	225	227	225	224	223	-5
D	8	50	108	108	110	111	117	120	122	120	119	118	-5
D	8	55	591	593	594	609	642	666	673	665	660	659	-6
D	8	60	334	326	330	336	353	370	379	373	369	368	-6
D	8	65	182	182	179	182	192	201	208	207	206	206	-6
D	8	70	94	93	93	92	96	102	110	112	113	114	-6
D	8	75	444	455	440	431	445	488	542	568	584	589	-7
D	8	80	198	203	202	194	197	216	244	261	271	275	-7
D	8	85	85	90	89	85	82	84	91	101	107	109	-7
D	8	90	360	384	390	351	305	287	293	321	338	343	-8
D	8	95	147	161	158	139	114	101	96	99	101	101	-8
D	8	100	610	658	659	583	479	408	360	349	342	340	-9
D	8	105	264	287	281	252	214	182	154	142	135	132	-9
D	8	110	125	133	129	112	96	81	68	62	58	57	-9
D	9	25	399	400	399	400	401	403	401	407	411	412	-4
D	9	30	178	180	181	185	185	185	186	188	189	190	-4
D	9	35	827	841	854	863	873	872	871	873	874	875	-5
D	9	40	400	406	412	415	418	424	422	416	412	411	-5
D	9	45	204	206	208	208	211	214	212	205	201	199	-5
D	9	50	109	109	110	109	112	114	113	108	105	104	-5
D	9	55	605	600	606	600	620	631	616	587	570	564	-6
D	9	60	340	336	328	326	340	347	339	323	313	310	-6
D	9	65	185	181	179	175	178	183	182	175	171	169	-6
D	9	70	931	945	939	895	880	903	932	922	916	914	-7
D	9	75	440	460	468	432	409	419	451	454	456	456	-7
D	9	80	195	212	217	196	180	184	200	209	214	216	-7
D	9	85	841	922	967	865	762	744	809	865	899	910	-8
D	9	90	361	403	417	361	302	282	300	329	346	352	-8
D	9	95	153	169	174	147	122	111	113	123	129	131	-8
D	9	100	644	721	741	633	526	464	459	479	491	495	-9

D	9	105	279	318	332	280	233	202	196	197	198	198	-9
D	9	110	131	151	154	127	104	88	83	80	78	78	-9
D	10	25	398	394	391	395	400	402	395	382	374	372	-4
D	10	30	178	178	179	181	182	184	180	175	172	171	-4
D	10	35	829	832	839	843	845	836	827	810	800	796	-5
D	10	40	406	405	404	408	402	393	390	378	371	368	-5
D	10	45	208	206	204	202	199	193	189	183	179	178	-5
D	10	50	112	110	108	106	104	101	97	93	91	90	-5
D	10	55	623	611	598	584	574	550	529	505	491	486	-6
D	10	60	352	341	329	321	313	297	282	271	264	262	-6
D	10	65	189	184	177	167	164	155	149	142	138	136	-6
D	10	70	958	945	928	873	808	754	745	719	703	698	-7
D	10	75	440	448	455	418	372	349	358	345	337	335	-7
D	10	80	193	202	211	192	167	155	164	157	153	151	-7
D	10	85	826	883	928	842	722	669	714	706	701	700	-8
D	10	90	368	396	409	361	303	277	298	302	304	305	-8
D	10	95	159	169	170	147	128	119	128	130	131	132	-8
D	10	100	673	719	731	631	534	502	546	553	557	559	-9
D	10	105	282	310	322	276	237	220	239	241	242	243	-9
D	10	110	126	142	150	132	110	100	104	101	99	99	-9
D	11	25	396	394	389	391	391	392	393	387	383	382	-4
D	11	30	178	177	177	178	178	179	178	173	170	169	-4
D	11	35	829	831	828	823	816	815	805	792	784	782	-5
D	11	40	411	416	399	389	382	372	367	361	357	356	-5
D	11	45	212	208	201	194	185	178	173	169	167	166	-5
D	11	50	113	111	107	102	96	90	85	84	83	83	-5
D	11	55	621	609	585	560	522	473	451	453	454	455	-6
D	11	60	350	343	329	309	286	253	239	241	242	243	-6
D	11	65	193	188	179	165	149	132	124	127	129	129	-6
D	11	70	984	960	926	846	749	654	625	627	628	629	-7
D	11	75	444	439	436	401	354	313	303	299	297	296	-7
D	11	80	191	192	197	183	160	144	144	137	133	131	-7
D	11	85	838	849	861	796	703	654	655	633	620	615	-8
D	11	90	384	390	386	345	304	283	294	288	284	283	-8
D	11	95	163	162	156	141	128	124	131	132	133	133	-8
D	11	100	663	668	651	593	555	559	606	602	600	599	-9
D	11	105	262	270	272	260	252	259	282	281	280	280	-9
D	11	110	111	116	125	123	119	121	129	125	123	122	-9
D	12	25	397	390	385	384	384	380	390	399	404	406	-4
D	12	30	177	175	177	172	172	177	178	176	175	174	-4
D	12	35	828	821	809	801	789	811	805	776	759	753	-5
D	12	40	411	405	392	381	369	372	362	348	340	337	-5
D	12	45	210	207	196	191	180	176	166	158	153	152	-5
D	12	50	111	109	105	101	95	87	80	76	74	73	-5
D	12	55	606	598	576	555	510	458	418	400	389	386	-6
D	12	60	339	332	321	305	279	242	218	214	212	211	-6
D	12	65	187	185	175	164	146	126	113	111	110	109	-6
D	12	70	980	951	918	859	749	642	575	555	543	539	-7
D	12	75	447	435	422	409	361	318	287	269	258	255	-7
D	12	80	193	189	189	184	169	150	138	125	117	115	-7
D	12	85	851	831	808	794	749	691	634	574	538	526	-8
D	12	90	384	378	366	347	327	302	286	260	244	239	-8
D	12	95	160	156	149	145	141	136	131	120	113	111	-8
D	12	100	636	617	605	609	627	633	619	563	529	518	-9
D	12	105	252	244	239	256	281	305	302	272	254	248	-9
D	12	110	106	103	106	114	126	137	137	124	116	114	-9
D	13	25	398	396	392	390	391	392	393	394	396	397	-4

D	13	30	178	178	178	178	179	180	181	180	179	178	-4
D	13	35	828	830	831	831	829	834	838	831	820	816	-5
D	13	40	406	406	403	399	395	396	396	389	387	386	-5
D	13	45	208	207	203	200	197	197	194	188	187	187	-5
D	13	50	110	110	108	106	104	100	100	96	94	94	-5
D	13	55	604	603	597	581	571	559	541	515	514	514	-6
D	13	60	339	336	331	320	314	305	294	281	283	284	-6
D	13	65	186	184	179	172	167	162	157	150	151	151	-6
D	13	70	956	946	921	878	846	824	803	768	776	779	-7
D	13	75	446	445	439	420	404	399	395	377	357	350	-7
D	13	80	195	197	198	191	185	184	185	175	150	142	-7
D	13	85	848	858	868	835	802	802	810	767	711	693	-8
D	13	90	373	377	378	356	333	326	329	311	288	281	-8
D	13	95	158	159	157	145	133	128	129	122	113	110	-8
D	13	100	649	652	648	600	551	528	523	491	453	440	-9
D	13	105	269	271	272	256	239	229	227	210	193	187	-9
D	13	110	118	119	120	114	107	103	103	96	89	86	-9
T	1	25	218	219	217	219	219	220	215	207	204	203	0
T	1	30	231	232	230	229	225	222	216	208	205	204	0
T	1	35	247	246	243	238	233	226	218	213	209	208	0
T	1	40	258	257	258	256	248	238	229	222	214	211	0
T	1	45	265	266	269	268	263	251	242	236	223	219	0
T	1	50	271	272	274	272	268	259	254	250	249	249	0
T	1	55	270	269	268	264	261	257	254	252	254	255	0
T	1	60	257	254	252	251	249	249	248	244	244	244	0
T	1	65	234	232	233	234	237	238	239	232	228	227	0
T	1	70	211	211	211	216	222	229	229	222	200	190	0
T	1	75	200	201	201	204	212	219	220	214	194	187	0
T	1	80	197	198	196	198	204	211	213	211	211	211	0
T	1	85	193	194	192	194	200	207	211	211	211	211	0
T	1	90	185	185	186	189	199	208	214	214	214	214	0
T	1	95	187	187	190	195	203	210	214	216	217	218	0
T	1	100	204	203	204	204	206	210	214	215	216	216	0
T	1	105	231	232	228	222	217	215	217	215	214	213	0
T	1	110	273	276	271	259	248	240	235	229	225	224	0
T	2	25	218	218	218	219	218	217	217	214	200	195	0
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T	2	40	258	259	258	254	250	243	234	227	205	198	0
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T	2	55	270	268	266	264	261	259	254	249	248	248	0
T	2	60	253	250	247	247	247	247	245	240	234	232	0
T	2	65	233	228	228	230	234	237	235	228	212	207	0
T	2	70	213	210	213	217	221	226	226	217	195	188	0
T	2	75	201	201	205	209	213	217	218	211	193	187	0
T	2	80	195	195	199	201	205	211	213	207	210	211	0
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T	2	90	193	191	189	190	195	202	207	208	209	209	0
T	2	95	200	197	197	197	197	200	206	209	211	211	0
T	2	100	219	215	213	210	207	206	210	214	216	217	0
T	2	105	251	246	237	230	225	225	228	230	231	232	0
T	2	110	296	290	278	266	258	259	261	261	261	261	0
T	3	25	219	221	219	220	219	217	218	221	198	190	0
T	3	30	231	232	231	230	224	221	222	226	210	205	0
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T	3	45	271	272	271	266	264	262	255	247	254	256	0
T	3	50	275	274	273	269	268	267	261	255	269	274	0
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T	3	60	250	245	243	245	246	248	245	241	232	229	0
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T	3	95	204	199	195	195	196	197	199	205	209	210	0
T	3	100	220	214	210	208	207	209	215	223	228	229	0
T	3	105	255	245	236	227	226	231	245	256	263	265	0
T	3	110	306	291	275	265	263	274	291	303	310	313	0
T	4	25	220	221	222	222	222	222	223	221	211	208	0
T	4	30	233	233	235	232	229	229	228	226	222	222	0
T	4	35	248	249	247	244	242	243	237	229	239	242	0
T	4	40	262	262	260	256	256	258	252	243	255	259	0
T	4	45	273	272	271	269	269	270	266	259	275	280	0
T	4	50	275	274	273	271	272	272	271	267	281	286	0
T	4	55	267	265	264	263	263	265	262	261	264	265	0
T	4	60	248	246	246	247	249	249	249	247	244	243	0
T	4	65	227	227	231	235	236	237	237	234	227	225	0
T	4	70	209	210	218	222	224	225	226	224	209	204	0
T	4	75	200	200	206	212	213	214	215	213	202	198	0
T	4	80	199	199	201	203	201	199	202	200	207	209	0
T	4	85	202	200	199	197	191	186	187	187	187	187	0
T	4	90	200	197	194	190	185	179	181	183	184	185	0
T	4	95	199	193	190	189	191	191	193	197	199	200	0
T	4	100	209	201	195	196	201	210	221	232	239	241	0
T	4	105	239	229	220	216	218	237	263	285	298	303	0
T	4	110	293	278	264	256	262	284	317	344	360	366	0
T	5	25	221	221	223	223	224	225	225	223	238	243	0
T	5	30	234	233	235	233	231	232	232	231	248	254	0
T	5	35	250	250	248	245	246	248	246	236	254	259	0
T	5	40	262	262	260	259	262	264	261	255	264	267	0
T	5	45	270	271	271	271	273	277	275	270	270	270	0
T	5	50	274	274	275	275	276	278	278	278	279	279	0
T	5	55	269	267	265	265	267	268	270	271	273	274	0
T	5	60	252	252	251	252	251	253	254	257	262	264	0
T	5	65	227	231	236	237	237	237	238	241	242	242	0
T	5	70	206	211	218	220	220	221	224	229	223	221	0
T	5	75	199	200	203	204	204	205	209	211	207	206	0
T	5	80	202	199	197	194	190	186	188	188	196	199	0
T	5	85	203	198	196	189	179	170	168	168	168	168	0
T	5	90	193	194	192	185	172	161	159	162	164	164	0
T	5	95	187	187	187	187	184	180	180	184	186	187	0
T	5	100	193	191	194	197	204	212	223	234	241	243	0
T	5	105	219	215	216	220	230	253	279	302	316	320	0
T	5	110	269	259	255	259	274	304	343	373	391	397	0
T	6	25	220	220	223	225	225	225	228	229	239	242	0
T	6	30	234	234	234	234	233	234	238	239	246	248	0
T	6	35	249	249	246	246	247	250	251	249	258	261	0
T	6	40	259	260	259	259	262	266	266	264	269	271	0
T	6	45	268	269	270	272	275	277	279	278	281	282	0
T	6	50	272	273	275	275	276	279	282	283	286	287	0
T	6	55	269	268	267	267	269	273	275	278	280	281	0

T	6	60	255	256	253	252	252	256	259	264	267	268	0
T	6	65	232	234	233	232	232	236	240	245	247	248	0
T	6	70	208	211	213	213	212	214	220	225	220	218	0
T	6	75	199	199	201	198	195	195	199	201	204	205	0
T	6	80	201	196	194	190	181	175	173	173	185	189	0
T	6	85	199	195	192	184	170	156	151	149	148	147	0
T	6	90	189	189	188	179	162	147	144	145	146	146	0
T	6	95	184	186	189	189	182	173	171	173	174	175	0
T	6	100	191	193	198	206	213	219	222	226	228	229	0
T	6	105	215	214	221	232	247	265	282	295	303	305	0
T	6	110	261	253	253	264	285	313	343	366	380	384	0
T	7	25	218	220	222	224	224	227	230	231	239	242	0
T	7	30	231	233	233	232	235	238	239	238	248	251	0
T	7	35	247	245	244	244	246	250	252	251	259	262	0
T	7	40	258	256	256	257	259	264	267	266	269	270	0
T	7	45	265	265	268	268	271	274	278	279	283	284	0
T	7	50	271	271	273	272	274	276	281	285	293	296	0
T	7	55	270	269	267	266	267	270	276	281	283	284	0
T	7	60	257	257	253	250	251	256	262	267	267	267	0
T	7	65	234	234	230	226	229	234	241	246	244	243	0
T	7	70	211	211	209	207	207	211	217	222	214	211	0
T	7	75	200	200	200	197	191	189	191	194	196	197	0
T	7	80	197	196	195	189	178	168	165	164	182	188	0
T	7	85	193	194	191	183	167	153	144	140	138	137	0
T	7	90	185	186	186	179	167	153	145	141	139	138	0
T	7	95	187	189	193	195	192	184	174	168	164	163	0
T	7	100	204	204	206	214	222	221	216	212	210	209	0
T	7	105	231	229	229	237	246	255	258	260	261	262	0
T	7	110	273	265	260	265	276	293	306	314	319	320	0
T	8	25	218	219	221	223	225	229	229	227	239	243	0
T	8	30	231	233	230	232	234	238	237	234	247	251	0
T	8	35	246	244	243	242	246	249	249	245	259	264	0
T	8	40	258	255	253	254	259	261	262	260	270	273	0
T	8	45	268	265	267	267	269	271	274	274	285	289	0
T	8	50	273	272	271	271	271	274	277	279	289	292	0
T	8	55	270	268	266	264	263	266	272	275	276	276	0
T	8	60	253	257	254	250	248	250	257	263	260	259	0
T	8	65	233	236	235	230	225	229	237	245	240	238	0
T	8	70	213	218	217	212	208	210	215	221	212	209	0
T	8	75	201	205	207	203	196	191	190	194	197	198	0
T	8	80	195	199	201	196	183	172	165	167	192	200	0
T	8	85	193	196	196	188	174	161	151	148	146	146	0
T	8	90	193	194	191	187	180	170	159	150	145	143	0
T	8	95	200	199	197	197	199	194	181	170	163	161	0
T	8	100	219	216	211	208	212	211	203	193	187	185	0
T	8	105	251	247	236	226	225	224	220	213	209	207	0
T	8	110	296	291	276	263	256	254	250	241	236	234	0
T	9	25	219	220	222	224	225	225	226	224	229	231	0
T	9	30	231	232	233	231	233	234	233	229	237	240	0
T	9	35	245	244	243	241	242	245	244	239	248	251	0
T	9	40	260	258	256	254	256	257	256	252	260	263	0
T	9	45	271	269	268	265	267	268	268	266	272	274	0
T	9	50	275	273	272	270	270	271	271	272	278	280	0
T	9	55	268	269	265	262	259	260	264	267	263	262	0
T	9	60	250	254	257	250	241	242	250	256	245	241	0
T	9	65	229	238	242	234	224	223	232	240	229	225	0
T	9	70	213	221	225	218	209	207	214	220	204	199	0

T	9	75	202	208	211	206	198	194	195	201	191	188	0
T	9	80	197	200	202	198	190	182	180	184	211	220	0
T	9	85	197	199	198	192	185	177	172	173	174	174	0
T	9	90	198	199	197	193	191	185	177	173	171	170	0
T	9	95	204	207	206	205	203	196	188	179	174	172	0
T	9	100	220	225	222	216	211	204	195	184	177	175	0
T	9	105	255	257	248	236	226	216	202	187	178	175	0
T	9	110	306	307	294	278	261	244	223	198	183	178	0
T	10	25	220	221	223	223	221	220	220	221	213	210	0
T	10	30	233	233	232	230	228	224	225	225	216	213	0
T	10	35	248	246	243	241	238	235	234	232	225	223	0
T	10	40	262	260	257	252	251	249	245	244	237	235	0
T	10	45	273	271	269	265	263	261	259	257	253	252	0
T	10	50	275	274	273	271	269	265	265	265	261	260	0
T	10	55	267	267	266	262	258	255	256	258	250	247	0
T	10	60	248	251	254	247	241	240	246	246	231	226	0
T	10	65	227	233	240	236	224	222	231	233	214	208	0
T	10	70	209	216	223	219	210	210	218	219	198	191	0
T	10	75	200	206	210	207	203	202	207	209	200	197	0
T	10	80	199	202	202	200	197	196	198	203	223	230	0
T	10	85	202	203	200	195	194	193	194	197	199	199	0
T	10	90	200	200	198	195	197	198	197	196	195	195	0
T	10	95	199	200	206	205	202	201	199	195	190	192	0
T	10	100	209	217	222	221	217	209	210	193	183	179	0
T	10	105	239	247	250	249	241	228	209	192	182	178	0
T	10	110	293	301	299	290	276	256	227	199	182	177	0
T	11	25	221	221	222	220	219	210	216	215	201	196	0
T	11	30	234	234	232	220	220	220	210	220	207	200	0
T	11	35	250	247	243	238	233	226	224	225	215	212	0
T	11	40	262	260	257	253	246	209	205	205	224	220	0
T	11	45	270	270	269	266	261	252	248	251	209	205	0
T	11	50	274	274	273	271	266	258	250	260	250	250	0
T	11	55	269	269	269	264	259	255	255	256	255	255	0
T	11	60	252	252	253	249	244	240	245	244	206	200	0
T	11	65	227	229	234	233	229	230	235	231	226	224	0
T	11	70	206	209	215	216	216	220	225	220	210	207	0
T	11	75	199	202	205	206	206	212	218	215	196	190	0
T	11	80	202	203	201	199	201	207	211	214	222	225	0
T	11	85	203	203	199	196	199	203	209	213	215	216	0
T	11	90	193	192	191	194	200	207	211	212	213	210	0
T	11	95	187	191	196	202	208	214	215	212	210	210	0
T	11	100	193	200	210	219	222	220	215	209	205	204	0
T	11	105	219	227	239	245	241	231	217	206	199	197	0
T	11	110	269	282	286	284	272	253	231	212	201	197	0
T	12	25	220	221	222	219	217	221	216	210	206	205	0
T	12	30	234	234	229	229	224	221	216	211	208	207	0
T	12	35	249	248	243	240	234	225	219	218	215	214	0
T	12	40	259	259	257	255	248	236	228	227	220	218	0
T	12	45	268	267	270	268	263	248	242	243	234	231	0
T	12	50	272	272	273	271	266	257	254	258	255	254	0
T	12	55	269	268	267	265	261	255	253	256	258	259	0
T	12	60	255	255	254	252	248	247	247	245	247	248	0
T	12	65	232	230	233	236	235	238	240	233	238	240	0
T	12	70	208	208	211	216	222	228	201	224	206	200	0
T	12	75	199	200	202	204	212	218	222	217	198	192	0
T	12	80	201	201	198	198	204	211	214	214	219	221	0
T	12	85	199	200	198	197	201	207	213	214	215	215	0

T	12	90	189	188	189	194	203	213	217	217	217	217	0
T	12	95	184	184	187	196	207	219	222	219	217	217	0
T	12	100	191	193	197	204	212	220	221	217	215	214	0
T	12	105	215	220	225	225	222	219	215	211	209	208	0
T	12	110	261	270	271	263	250	238	227	216	209	207	0
T	13	25	219	220	221	222	221	222	222	220	218	217	0
T	13	30	232	233	232	231	229	228	227	225	224	224	0
T	13	35	247	247	244	241	240	238	236	233	234	234	0
T	13	40	260	259	257	255	254	252	248	244	244	244	0
T	13	45	269	269	269	268	267	264	261	258	257	257	0
T	13	50	273	273	273	272	270	268	267	267	270	271	0
T	13	55	269	268	266	264	262	262	262	263	263	263	0
T	13	60	252	252	251	249	247	248	251	251	247	246	0
T	13	65	230	231	233	233	231	233	237	236	230	228	0
T	13	70	210	212	215	216	216	219	223	222	207	203	0
T	13	75	200	202	205	205	205	206	209	208	198	194	0
T	13	80	198	199	199	197	195	194	194	194	206	210	0
T	13	85	198	197	196	192	188	185	184	184	184	184	0
T	13	90	193	192	191	189	187	185	184	183	183	183	0
T	13	95	193	193	194	196	197	197	195	194	193	193	0
T	13	100	206	206	207	209	211	213	214	213	212	212	0
T	13	105	235	234	232	230	230	233	236	236	239	239	0
T	13	110	283	280	273	268	265	268	271	271	271	271	0

STATIONARY PERTURBATIONS,(S)

S	1	30	10	-2	-11	-34	-43	0	3	-3	-13	-3	0	-2	-6	-16	-41	0
S	1	30	40	-2	-11	-43	-75	0	3	-8	-13	-23	0	-2	-1	-34	-51	0
S	1	30	70	-10	-11	-79	-75	0	-30	-14	-37	-43	0	19	3	-43	-36	0
S	1	30	100	-2	-20	-16	-32	0	-2	-14	15	-10	0	2	-10	-34	-17	0
S	1	30	130	-2	14	47	77	0	3	25	50	56	0	-2	-10	-7	21	0
S	1	30	160	-2	14	93	153	0	9	14	85	102	0	-11	-1	11	49	0
S	1	30	190	23	31	93	131	0	20	19	50	63	0	-2	12	43	63	0
S	1	30	220	6	14	47	66	0	9	14	-13	10	0	-6	3	61	59	0
S	1	30	250	-10	-3	-7	-21	0	-13	-14	-48	-36	0	-2	8	38	25	0
S	1	30	280	6	6	-34	-64	0	-2	3	-37	-56	0	6	-1	2	-8	0
S	1	30	310	-2	-11	-34	-64	0	-8	-14	-19	-36	0	6	3	-7	-27	0
S	1	30	340	-2	-11	-34	-53	0	9	-8	-19	-23	0	-6	-1	-16	-36	0
S	1	40	10	-17	2	-2	48	0	-16	-14	-8	69	0	1	16	5	-23	0
S	1	40	40	1	17	-2	33	0	2	-1	-3	31	0	1	20	0	-2	0
S	1	40	70	12	31	-21	-324	0	13	20	-38	-351	0	-3	12	17	41	0
S	1	40	100	15	-12	-75	-24	0	21	-19	-115	-51	0	-7	4	46	28	0
S	1	40	130	5	-45	-52	10	0	2	-48	-43	-32	0	5	4	-12	41	0
S	1	40	160	8	-5	37	62	0	5	-4	50	47	0	1	-4	-12	11	0
S	1	40	190	12	6	80	90	0	8	20	106	105	0	1	-15	-25	-10	0
S	1	40	220	15	2	37	62	0	16	20	56	69	0	-3	-19	-20	-10	0
S	1	40	250	8	-12	18	29	0	10	2	29	31	0	-3	-12	-12	-6	0
S	1	40	280	-17	13	-9	-10	0	-16	30	-3	6	0	1	-15	-4	-19	0
S	1	40	310	-17	6	-6	-5	0	-22	9	-6	22	0	5	-4	0	-27	0
S	1	40	340	-24	-2	-6	29	0	-24	-14	-24	54	0	1	12	17	-23	0
S	1	52	10	11	40	62	17	0	7	37	70	41	0	5	2	-8	-22	0
S	1	52	40	21	73	68	7	0	15	65	73	6	0	5	9	-5	2	0
S	1	52	70	31	72	64	4	0	26	63	51	-18	0	5	9	11	22	0
S	1	52	100	6	16	3	7	0	9	25	-5	-11	0	-3	-10	7	18	0
S	1	52	130	-10	-21	3	32	0	3	-8	8	9	0	-14	-13	-5	22	0
S	1	52	160	-14	-3	40	42	0	-14	-15	20	32	0	1	13	11	10	0
S	1	52	190	-5	-14	-10	32	0	1	-18	-14	11	0	-6	5	3	22	0
S	1	52	220	-7	-52	-38	17	0	-1	-47	-47	2	0	-6	-6	11	14	0

S	1	52	250	-14	-45	-36	-39	0	-11	-39	-44	-34	0	-3	-6	7	-6	0
S	1	52	280	-19	-40	-40	-51	0	-23	-39	-35	-30	0	5	-2	-5	-22	0
S	1	52	310	-7	-29	-49	-54	0	-11	-28	-32	-23	0	5	-2	-16	-30	0
S	1	52	340	5	2	-67	-16	0	-1	3	-54	15	0	5	2	-12	-30	0
S	1	60	10	17	43	53	-5	0	12	40	50	7	0	4	4	-2	-13	0
S	1	60	40	26	82	65	10	0	22	76	68	7	0	4	4	-2	0	0
S	1	60	70	36	77	77	25	0	32	76	68	13	0	4	4	6	8	0
S	1	60	100	3	8	11	25	0	6	12	5	13	0	0	-4	2	8	0
S	1	60	130	-21	-31	-1	48	0	-15	-23	0	44	0	-8	-8	-2	8	0
S	1	60	160	-16	8	47	48	0	-11	2	42	49	0	0	4	6	4	0
S	1	60	190	-11	-11	-7	48	0	-8	-12	-8	44	0	-4	0	2	8	0
S	1	60	220	-11	-56	-31	33	0	-8	-54	-33	23	0	-4	-4	2	8	0
S	1	60	250	-16	-51	-31	-43	0	-15	-47	-33	-45	0	0	-4	6	0	0
S	1	60	280	-16	-41	-43	-66	0	-18	-40	-42	-60	0	0	0	-2	-5	0
S	1	60	310	-2	-31	-61	-81	0	-4	-30	-54	-65	0	4	0	-10	-13	0
S	1	60	340	12	3	-79	-43	0	6	2	-71	-29	0	4	0	-6	-13	0
S	1	68	10	18	45	51	-13	0	13	47	53	-13	0	-1	1	-5	-3	0
S	1	68	40	29	83	60	6	0	32	87	65	3	0	-1	-3	-5	-3	0
S	1	68	70	39	83	79	29	0	42	87	78	33	0	-1	-3	-5	-3	0
S	1	68	100	2	4	12	25	0	4	7	16	33	0	-1	-3	-1	-3	0
S	1	68	130	-26	-36	-4	55	0	-24	-32	4	63	0	-1	1	-1	-7	0
S	1	68	160	-14	11	51	48	0	-15	7	53	48	0	-1	1	-1	-7	0
S	1	68	190	-14	-10	-4	51	0	-15	-12	-8	63	0	-1	1	-1	-7	0
S	1	68	220	-14	-57	-28	32	0	-15	-62	-33	33	0	-1	1	3	-3	0
S	1	68	250	-17	-52	-25	-39	0	-15	-52	-33	-43	0	-1	1	3	6	0
S	1	68	280	-14	-40	-45	-67	0	-15	-42	-45	-73	0	3	1	3	11	0
S	1	68	310	-2	-30	-67	-81	0	-6	-32	-60	-89	0	3	1	3	11	0
S	1	68	340	12	1	-78	-46	0	13	-2	-82	-58	0	3	1	8	6	0
S	1	76	10	18	40	39	-9	0	18	48	51	-17	0	-6	-7	-6	5	0
S	1	76	40	28	71	51	6	0	32	89	59	7	0	-6	-17	-11	1	0
S	1	76	70	37	71	69	21	0	41	89	82	32	0	-6	-17	-15	-8	0
S	1	76	100	-1	4	9	21	0	4	2	13	27	0	-1	-2	-2	-3	0
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S13	30	40	1	-4	-17	-32	0	0	-4	-6	-13	0	0	1	-11	-17	0
S13	30	70	0	-2	-20	-26	0	-1	-4	-10	-17	0	2	2	-9	-8	0
S13	30	100	1	-5	-7	-2	0	-1	-5	0	-1	0	2	0	-5	-1	0
S13	30	130	-1	0	10	37	0	-2	0	13	33	0	2	1	-1	5	0
S13	30	160	-2	2	27	55	0	-2	0	22	40	0	1	2	4	15	0
S13	30	190	2	7	31	53	0	1	4	22	26	0	3	3	10	25	0
S13	30	220	-5	2	24	29	0	-5	5	6	6	0	0	-2	18	22	0
S13	30	250	0	3	5	-4	0	0	7	-12	-13	0	0	-1	18	11	0
S13	30	280	11	11	-9	-25	0	11	10	-12	-25	0	0	0	3	2	0
S13	30	310	-2	0	-8	-28	0	0	3	-5	-17	0	-1	-2	-3	-10	0
S13	30	340	0	-4	-13	-25	0	4	-4	-3	-7	0	-2	0	-9	-18	0
S13	40	10	-3	2	-4	-25	0	-6	-4	-9	-19	0	3	7	5	-6	0
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S13	52	10	11	25	13	-21	0	10	22	13	-19	0	1	2	1	0	0
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S13	60	280	-21	-32	-37	-33	0	-20	-30	-36	-33	0	0	0	0	0	0
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S13 84  220  -8 -17  -3  14  0    -10 -22  -4  17  0      2   6   2  -2  0
S13 84  250 -15 -22 -17  -4  0    -18 -27 -21  -8  0      4   7   5   3  0
S13 84  280 -12 -21 -23 -18  0    -17 -27 -28 -24  0      4   7   5   5  0
S13 84  310  -9 -19 -14 -18  0    -12 -24 -16 -22  0      2   6   4   5  0
S13 84  340   4   0  -8 -16  0      5   0 -11 -21  0      0   0   3   3  0
S13 90   10   7  13   8 -15  0      8  17   7 -13  0      0  -3   0  -1  0
S13 90   40   9  15  11  -9  0     11  21  11  -7  0     -1  -3   0  -1  0
S13 90   70   8  18  11  -3  0     10  23  13  -2  0     -2  -3   0   0  0
S13 90  100   5  16   6   2  0      6  19   7   3  0      0  -1   0   0  0
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S13 90  160   1   2  12  25  0      2   1  12  23  0      0   0   0   2  0
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S13 90  310  -7 -13 -12 -16  0     -7 -16 -12 -15  0      1   3   0   0  0
S13 90  340   4   0  -7 -15  0      4   0  -7 -14  0      0   0   1  -1  0

---END OF FILE WRITTEN----

*RANDOM PERTURBATIONS, (R)*
R 1  25   33  46  45  72  82   21  34  34  47  51   26  31  31  56  65
R 1  30   29  45  44  76  87   23  42  42  64  71   27  35  34  67  78
R 1  35   22  32  32  64  74   24  41  41  81  94   28  37  37  73  85
R 1  40   16  27  27  56  65   26  47  47  96 113   28  39  39  76  89
R 1  45   16  32  32  69  81   28  56  56 115 135   28  39  39  74  85
R 1  50   17  40  41  90 107   29  66  66 136 159   28  40  40  65  74
R 1  55   17  47  47 108 128   31  74  74 151 176   26  39  39  58  65
R 1  60   18  54  65 115 132   32  81  81 158 184   29  38  20  58  70
R 1  65   25  61  61 119 138   34  85  85 162 187   35  43  43  73  83
R 1  70   32  63  63 126 148   35  87  87 164 189   44  57  57  69  74
R 1  75   34  58  58 109 128   37  86  86 157 180   51  73  73  85  89
R 1  80   41  70  70 107 122   39  88  88 146 166   56  86  85 102 108
R 1  85   48  68  67  98 110   41  84  85 141 160   69  96  96 115 121
R 1  90   74  69  69  95 108   43  80  80 141 161  100 102 103 118 123
R 1 100  144 144 144 144 144  154 154 154 154 154   75  75  75  75  75
R 1 120  196 196 196 196 196   79  79  79  79  79  211 211 211 211 211
R 1 140  136 136 136 136 136   72  72  72  72  72  146 146 146 146 146
R 1 160  101 101 101 101 101   65  65  65  65  65  105 105 105 105 105
R 1 180   80  80  80  80  80   58  58  58  58  58   81  81  81  81  81
R 1 200   69  69  69  69  69   52  52  52  52  52   69  69  69  69  69
R 2  25   33  46  46  73  82   21  34  34  47  51   26  31  31  57  65
R 2  30   29  45  44  76  86   23  42  42  64  71   27  35  34  66  76
R 2  35   22  32  32  63  74   24  41  41  81  94   28  37  37  73  85
R 2  40   16  27  27  56  65   26  47  47  96 113   28  38  38  76  88
R 2  45   16  32  32  68  80   27  56  56 115 134   28  39  39  73  85
R 2  50   17  40  40  83  98   29  66  66 129 149   28  40  40  66  74
R 2  55   17  47  48  98 114   31  74  74 140 162   26  39  38  58  65
R 2  60   18  54  54 103 120   32  81  81 146 168   30  38  38  59  65
R 2  65   26  61  61 108 124   34  85  85 149 171   36  43  44  72  82
R 2  70   32  63  63 116 135   35  87  87 153 175   44  57  57  69  73
R 2  75   34  58  58 106 124   37  86  86 153 176   51  73  72  87  91
R 2  80   41  70  70 108 122   39  88  88 146 166   55  86  85 103 109
R 2  85   48  67  68  98 110   41  85  84 141 160   69  96  97 114 120
R 2  90   74  68  68  95 108   43  80  80 141 161  100 102 101 118 124
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R	2	100	144	144	144	144	144	154	154	154	154	154	75	75	75	75	75
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R	2	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R	2	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
R	2	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
R	2	200	69	69	69	69	69	52	52	52	52	52	69	69	69	69	69
R	3	25	34	45	45	58	63	21	41	41	46	47	27	19	19	37	43
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R	3	40	16	27	27	48	56	26	44	44	79	90	28	26	27	47	54
R	3	45	16	30	31	55	63	27	50	50	88	101	27	31	30	49	55
R	3	50	17	35	35	64	74	29	57	57	96	109	28	34	34	46	50
R	3	55	17	42	43	75	86	31	65	65	103	116	26	33	32	38	40
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R	3	65	25	59	59	94	106	34	76	76	116	129	35	29	29	35	37
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R	3	80	40	59	59	94	108	39	78	78	124	139	55	68	68	61	58
R	3	85	48	62	62	84	95	41	78	78	123	137	69	88	87	92	94
R	3	90	74	72	71	90	98	43	79	79	122	136	100	107	107	129	137
R	3	100	144	144	144	144	144	154	154	154	154	154	75	75	75	75	75
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R	3	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R	3	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
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R	4	30	29	37	37	56	63	23	38	38	53	59	27	22	21	42	48
R	4	35	21	30	30	46	51	24	39	39	61	68	27	23	24	44	51
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R	4	55	18	42	43	63	70	31	65	65	91	99	27	33	32	38	40
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R	4	100	144	144	144	144	144	154	154	154	154	154	75	75	75	75	75
R	4	120	196	196	196	196	196	79	79	79	79	79	211	211	211	211	211
R	4	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R	4	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
R	4	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
R	4	200	69	69	69	69	69	52	52	52	52	52	69	69	69	69	69
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R	5	55	21	43	42	50	52	37	65	65	76	80	26	32	33	38	40
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R	5	65	28	58	58	65	67	40	76	76	86	89	35	30	30	35	36
R	5	70	34	60	60	75	79	42	79	79	95	101	44	36	36	37	38
R	5	75	35	53	53	77	86	44	79	79	104	113	52	54	54	45	42

R	5	80	41	59	59	84	94	45	78	78	112	123	55	68	69	61	58
R	5	85	47	62	62	78	86	47	78	78	113	125	69	87	88	93	95
R	5	90	71	72	71	88	94	49	79	79	113	125	100	107	107	129	136
R	5	100	144	144	144	144	144	154	154	154	154	154	75	75	75	75	75
R	5	120	196	196	196	196	196	79	79	79	79	79	211	211	211	211	211
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R	5	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
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R	6	35	24	27	26	36	39	31	35	35	48	52	27	27	26	27	27
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R	6	75	35	53	53	63	71	44	75	75	91	97	52	73	73	50	43
R	6	80	41	60	60	75	84	45	72	72	102	112	55	76	77	64	59
R	6	85	47	61	61	74	83	47	73	73	108	120	69	87	87	78	75
R	6	90	72	63	62	74	80	49	79	79	109	119	100	92	91	93	93
R	6	100	144	144	144	144	144	154	154	154	154	154	75	75	75	75	75
R	6	120	196	196	196	196	196	79	79	79	79	79	211	211	211	211	211
R	6	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R	6	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
R	6	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
R	6	200	69	69	69	69	69	52	52	52	52	52	69	69	69	69	69
R	7	25	37	41	41	44	45	27	33	33	37	39	26	25	24	24	24
R	7	30	33	35	35	42	44	29	33	33	42	45	27	26	25	26	26
R	7	35	24	27	26	36	39	31	35	35	48	52	28	27	26	27	27
R	7	40	19	23	23	33	37	32	39	39	52	56	28	27	27	28	28
R	7	45	19	29	29	35	37	34	48	48	55	58	28	28	28	29	30
R	7	50	20	34	34	35	36	35	54	54	55	55	28	30	30	29	28
R	7	55	21	34	34	35	35	37	56	56	54	54	26	35	35	29	27
R	7	60	22	33	33	36	38	39	57	57	57	56	30	40	41	30	26
R	7	65	28	43	43	48	51	40	63	63	67	68	35	51	51	33	27
R	7	70	34	53	52	59	64	42	70	70	79	81	44	63	62	40	32
R	7	75	35	53	53	64	71	44	75	75	91	97	52	74	73	50	42
R	7	80	41	60	60	75	84	45	72	72	102	112	55	77	77	63	58
R	7	85	48	61	61	74	83	47	73	72	108	120	69	88	88	77	73
R	7	90	72	63	62	74	79	49	79	79	109	119	101	92	92	92	92
R	7	100	144	144	144	144	144	154	154	154	154	154	75	75	75	75	75
R	7	120	196	196	196	196	196	79	79	79	79	79	211	211	211	211	211
R	7	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R	7	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
R	7	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
R	7	200	69	69	69	69	69	52	52	52	52	52	69	69	69	69	69
R	8	25	37	44	44	47	48	27	37	37	41	42	26	25	24	24	24
R	8	30	33	37	36	47	50	29	36	36	48	52	27	26	25	26	27
R	8	35	24	28	28	40	44	31	37	37	52	57	28	27	27	27	27
R	8	40	19	25	25	40	45	32	42	42	59	65	28	27	27	29	29
R	8	45	19	30	30	47	53	34	49	49	68	75	28	28	28	29	29
R	8	50	20	35	35	52	58	35	55	55	74	80	28	30	31	29	29
R	8	55	21	38	37	56	62	37	60	60	76	82	26	34	35	28	26
R	8	60	22	38	38	57	65	38	64	64	79	84	30	40	40	29	26

R 8	65	28	47	47	65	74	40	70	70	86	91	34	51	51	33	27
R 8	70	34	55	55	74	83	42	75	75	96	103	44	62	62	40	32
R 8	75	35	54	54	75	87	44	77	77	104	113	53	74	74	50	42
R 8	80	41	61	61	83	95	45	75	75	112	124	55	77	77	63	59
R 8	85	48	61	61	78	89	47	75	75	113	126	70	88	87	76	72
R 8	90	71	63	63	76	83	49	79	79	113	125	100	93	93	92	92
R 8	100	144	144	144	144	144	154	154	150	150	150	75	75	75	75	75
R 8	120	196	196	196	196	196	79	79	79	79	79	211	211	211	211	211
R 8	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R 8	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
R 8	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
R 8	200	69	69	69	69	69	52	52	52	52	52	69	69	69	69	69
R 9	25	33	45	45	57	61	21	41	41	44	45	26	20	20	36	42
R 9	30	29	37	37	56	63	23	38	38	54	59	27	22	22	41	48
R 9	35	22	30	30	46	52	24	39	39	61	68	28	23	23	46	54
R 9	40	16	27	27	41	46	26	44	44	70	79	28	28	27	50	57
R 9	45	16	30	30	47	52	27	50	50	79	89	28	31	31	51	58
R 9	50	17	35	35	55	62	29	57	57	86	95	28	33	33	45	49
R 9	55	17	41	41	65	73	31	65	65	91	99	26	35	36	35	34
R 9	60	18	49	49	68	75	32	72	72	93	101	29	32	31	34	34
R 9	65	25	60	60	79	86	34	76	76	100	107	35	26	27	32	34
R 9	70	32	59	59	86	95	36	79	79	108	117	44	40	40	38	37
R 9	75	35	54	54	88	99	37	79	79	115	127	52	47	45	43	42
R 9	80	40	61	61	89	102	39	78	78	118	131	55	72	74	60	55
R 9	85	48	59	59	81	91	41	78	78	118	132	69	81	82	86	88
R 9	90	73	65	65	83	90	43	79	79	118	131	99	96	96	112	117
R 9	100	144	144	144	144	144	154	154	154	154	154	75	75	75	75	75
R 9	120	196	196	196	196	196	79	79	79	79	79	211	211	211	211	211
R 9	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R 9	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
R 9	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
R 9	200	69	69	69	69	69	52	52	52	52	52	69	69	69	69	69
R10	25	34	45	45	58	62	21	41	41	46	47	27	20	20	36	41
R10	30	29	37	37	60	68	23	38	38	58	65	27	21	22	42	49
R10	35	22	30	30	51	58	24	39	39	68	78	28	23	22	46	53
R10	40	16	27	27	48	55	26	44	44	79	90	28	28	27	50	57
R10	45	16	30	30	54	62	27	50	50	88	101	28	31	30	51	58
R10	50	17	35	35	65	74	29	57	57	96	109	28	33	33	45	49
R10	55	17	41	41	77	90	31	65	65	103	116	26	35	35	35	35
R10	60	18	48	49	85	97	32	71	71	110	123	30	32	31	34	35
R10	65	25	60	60	95	106	34	76	76	116	129	35	26	27	33	35
R10	70	32	59	59	98	112	35	79	79	121	134	44	40	41	38	37
R10	75	35	54	54	96	110	37	79	79	123	136	52	47	46	43	42
R10	80	41	61	61	94	109	39	78	78	124	139	56	73	73	60	55
R10	85	49	59	59	84	95	41	78	78	123	137	69	81	81	86	88
R10	90	74	65	64	84	93	43	79	79	122	136	100	97	96	112	118
R10	100	144	144	144	144	144	154	154	154	154	154	75	75	75	75	75
R10	120	196	196	196	196	196	79	79	79	79	79	211	211	211	211	211
R10	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R10	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
R10	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
R10	200	69	69	69	69	69	52	52	52	52	52	69	69	69	69	69
R11	25	34	39	39	58	65	21	34	34	46	51	27	20	20	36	41
R11	30	29	40	40	62	70	23	42	42	62	69	27	21	22	41	47
R11	35	21	31	31	56	64	24	41	41	75	86	28	23	23	47	55
R11	40	16	29	29	55	64	26	47	47	88	101	28	28	29	50	57
R11	45	16	35	35	64	74	28	56	56	100	114	28	31	31	52	58

R11	50	17	43	43	76	87	29	66	66	109	123	28	33	33	45	49
R11	55	17	49	49	89	103	31	74	74	116	130	26	35	35	35	35
R11	60	18	57	57	94	107	32	81	81	121	134	30	32	32	34	35
R11	65	25	68	68	102	113	34	85	85	123	136	36	26	27	32	34
R11	70	32	66	66	106	120	35	87	87	129	143	44	41	40	38	37
R11	75	36	60	60	102	117	37	86	86	130	145	53	47	46	43	42
R11	80	41	66	66	98	111	39	88	88	128	142	55	73	73	61	56
R11	85	49	61	61	88	99	41	84	84	128	142	69	81	81	86	87
R11	90	75	64	65	88	98	43	80	80	129	146	101	95	97	112	117
R11	100	144	144	144	144	144	154	154	154	154	154	75	75	75	75	75
R11	120	196	196	196	196	196	79	79	79	79	79	211	211	211	211	211
R11	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R11	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
R11	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
R11	200	69	69	69	69	69	52	52	52	52	52	69	69	69	69	69
R12	25	34	46	45	72	81	21	34	34	47	51	27	31	31	56	64
R12	30	29	45	44	75	86	23	42	42	64	71	27	35	34	66	76
R12	35	21	32	32	63	74	24	41	41	81	94	27	37	37	73	84
R12	40	16	27	27	56	65	26	47	47	96	113	28	38	39	76	88
R12	45	16	32	32	64	74	28	56	56	109	127	28	39	39	73	85
R12	50	17	41	40	76	88	29	66	66	120	138	28	40	40	66	74
R12	55	17	47	47	88	101	31	74	74	129	148	26	39	39	58	65
R12	60	18	54	54	93	107	32	81	81	135	153	29	38	38	57	64
R12	65	25	61	61	98	111	34	85	85	138	156	35	44	43	73	82
R12	70	32	63	63	108	123	36	87	87	143	162	44	57	57	70	74
R12	75	34	58	58	98	113	37	86	86	144	163	52	73	74	86	90
R12	80	41	70	70	103	115	39	88	88	139	157	56	86	85	103	109
R12	85	48	68	67	94	105	41	85	84	136	150	68	97	96	114	120
R12	90	75	68	69	92	103	43	80	80	135	154	101	102	102	119	124
R12	100	144	144	144	144	144	154	154	154	154	154	75	75	75	75	75
R12	120	196	196	196	196	196	79	79	79	79	79	211	211	211	211	211
R12	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R12	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
R12	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
R12	200	69	69	69	69	69	52	52	52	52	52	69	69	69	69	69
R13	25	36	53	57	87	105	25	43	44	63	81	26	25	29	51	103
R13	30	32	52	64	107	130	27	49	46	78	97	27	27	40	62	110
R13	35	26	49	82	130	154	29	50	57	97	120	28	30	50	71	117
R13	40	23	51	107	166	191	31	60	80	127	149	29	31	51	79	121
R13	45	24	54	131	205	237	33	67	108	166	192	29	33	49	78	116
R13	50	27	60	150	239	275	36	74	134	210	239	28	34	44	66	81
R13	55	26	64	165	266	307	39	80	155	240	275	26	35	42	57	63
R13	60	28	71	178	293	339	42	86	175	268	303	33	36	39	55	73
R13	65	35	78	185	314	372	40	95	193	299	340	38	40	45	53	80
R13	70	44	79	178	331	401	45	99	206	334	385	47	53	61	50	70
R13	75	52	72	154	319	404	50	99	203	362	431	53	66	82	69	66
R13	80	59	76	124	270	362	56	94	189	369	457	56	79	111	117	96
R13	85	70	76	99	173	268	60	90	149	315	411	71	91	138	170	177
R13	90	96	86	147	128	196	65	90	128	199	287	103	103	153	186	195
R13	100	178	162	252	238	246	172	169	261	246	270	91	83	79	103	127
R13	120	196	196	196	196	196	79	79	79	79	79	211	211	211	211	211
R13	140	136	136	136	136	136	72	72	72	72	72	146	146	146	146	146
R13	160	101	101	101	101	101	65	65	65	65	65	105	105	105	105	105
R13	180	80	80	80	80	80	58	58	58	58	58	81	81	81	81	81
R13	200	69	69	69	69	69	52	52	52	52	52	69	69	69	69	69

RANDOM WINDS, (RW)

Rw	1	0	3	7	5	5	39	3	7	5	5	39
Rw	1	5	2	16	9	3	33	2	16	9	3	33
Rw	1	10	10	35	14	3	17	10	35	14	3	17
Rw	1	15	11	33	14	9	6	11	33	14	9	6
Rw	1	20	2	16	11	14	17	2	16	11	14	17
Rw	1	25	8	8	12	21	33	8	8	12	21	33
Rw	1	30	8	18	17	23	35	8	18	17	23	35
Rw	1	35	11	23	19	40	69	11	23	19	40	69
Rw	1	40	12	28	27	32	51	12	28	27	32	51
Rw	1	45	16	28	36	41	72	16	28	36	41	72
Rw	1	50	25	32	44	14	5	25	32	44	14	5
Rw	1	55	17	30	54	18	3	17	30	54	18	3
Rw	1	60	19	34	38	18	6	19	34	38	18	6
Rw	1	65	9	24	27	21	7	9	24	27	21	7
Rw	1	70	16	19	19	16	20	16	19	19	16	20
Rw	1	75	23	22	16	35	29	23	22	16	35	29
Rw	1	80	20	12	22	67	82	20	12	22	67	82
Rw	1	85	31	22	21	50	54	31	22	21	50	54
Rw	1	90	37	2	21	52	54	37	2	21	52	54
Rw	1	100	21	5	24	53	53	21	5	24	53	53
Rw	1	120	72	24	52	52	52	72	24	52	52	52
Rw	1	140	69	69	69	69	69	69	69	69	69	69
Rw	1	160	87	87	87	87	87	87	87	87	87	87
Rw	1	180	87	87	87	87	87	87	87	87	87	87
Rw	1	200	87	87	87	87	87	87	87	87	87	87
Rw	2	0	3	8	3	3	9	3	8	3	3	9
Rw	2	5	2	18	5	2	8	2	18	5	2	8
Rw	2	10	9	39	8	2	4	9	39	8	2	4
Rw	2	15	10	37	8	6	1	10	37	8	6	1
Rw	2	20	2	18	6	9	4	2	18	6	9	4
Rw	2	25	7	9	7	13	8	7	9	7	13	8
Rw	2	30	7	15	9	17	12	7	15	9	17	12
Rw	2	35	10	21	17	13	6	10	21	17	13	6
Rw	2	40	15	24	30	6	9	15	24	30	6	9
Rw	2	45	13	26	39	8	4	13	26	39	8	4
Rw	2	50	24	29	53	13	16	24	29	53	13	16
Rw	2	55	18	25	42	8	17	18	25	42	8	17
Rw	2	60	16	33	32	21	5	16	33	32	21	5
Rw	2	65	16	31	22	19	8	16	31	22	19	8
Rw	2	70	20	33	5	9	19	20	33	5	9	19
Rw	2	75	27	40	5	35	30	27	40	5	35	30
Rw	2	80	22	24	9	60	90	22	24	9	60	90
Rw	2	85	30	21	7	40	58	30	21	7	40	58
Rw	2	90	4	31	2	47	56	4	31	2	47	56
Rw	2	100	12	44	9	53	53	12	44	9	53	53
Rw	2	120	50	3	52	52	52	50	3	52	52	52
Rw	2	140	69	69	69	69	69	69	69	69	69	69
Rw	2	160	87	87	87	87	87	87	87	87	87	87
Rw	2	180	87	87	87	87	87	87	87	87	87	87
Rw	2	200	87	87	87	87	87	87	87	87	87	87
Rw	3	0	2	7	3	3	9	2	7	3	3	9
Rw	3	5	2	16	6	2	8	2	16	6	2	8
Rw	3	10	8	35	9	2	4	8	35	9	2	4
Rw	3	15	8	33	9	5	1	8	33	9	5	1
Rw	3	20	2	16	7	8	4	2	16	7	8	4
Rw	3	25	6	8	8	12	8	6	8	8	12	8
Rw	3	30	7	11	12	10	5	7	11	12	10	5

Rw	3	35	10	18	14	13	10	10	18	14	13	10
Rw	3	40	11	14	21	10	2	11	14	21	10	2
Rw	3	45	12	23	27	19	11	12	23	27	19	11
Rw	3	50	15	22	34	26	26	15	22	34	26	26
Rw	3	55	14	19	30	25	26	14	19	30	25	26
Rw	3	60	15	25	24	21	37	15	25	24	21	37
Rw	3	65	23	30	47	14	7	23	30	47	14	7
Rw	3	70	24	15	40	10	20	24	15	40	10	20
Rw	3	75	30	20	25	35	29	30	20	25	35	29
Rw	3	80	23	47	11	32	82	23	47	11	32	82
Rw	3	85	28	15	7	48	54	28	15	7	48	54
Rw	3	90	39	20	4	51	54	39	20	4	51	54
Rw	3	100	27	21	29	53	53	27	21	29	53	53
Rw	3	120	31	40	52	52	52	31	40	52	52	52
Rw	3	140	69	69	69	69	69	69	69	69	69	69
Rw	3	160	87	87	87	87	87	87	87	87	87	87
Rw	3	180	87	87	87	87	87	87	87	87	87	87
Rw	3	200	87	87	87	87	87	87	87	87	87	87
Rw	4	0	2	4	11	9	5	2	4	11	9	5
Rw	4	5	1	8	17	8	4	1	8	17	8	4
Rw	4	10	4	17	26	8	3	4	17	26	8	3
Rw	4	15	4	15	19	7	2	4	15	19	7	2
Rw	4	20	3	9	7	5	3	3	9	7	5	3
Rw	4	25	5	7	9	9	5	5	7	9	9	5
Rw	4	30	9	10	14	14	13	9	10	14	14	13
Rw	4	35	10	12	11	13	8	10	12	11	13	8
Rw	4	40	11	15	11	12	5	11	15	11	12	5
Rw	4	45	12	13	15	5	5	12	13	15	5	5
Rw	4	50	15	14	14	13	2	15	14	14	13	2
Rw	4	55	14	11	18	10	13	14	11	18	10	13
Rw	4	60	17	18	16	14	15	17	18	16	14	15
Rw	4	65	18	19	4	8	6	18	19	4	8	6
Rw	4	70	4	27	7	11	22	4	27	7	11	22
Rw	4	75	27	19	5	34	28	27	19	5	34	28
Rw	4	80	14	22	13	4	75	14	22	13	4	75
Rw	4	85	38	26	7	55	51	38	26	7	55	51
Rw	4	90	20	24	6	54	53	20	24	6	54	53
Rw	4	100	58	25	4	53	53	58	25	4	53	53
Rw	4	120	22	71	52	52	52	22	71	52	52	52
Rw	4	140	69	69	69	69	69	69	69	69	69	69
Rw	4	160	87	87	87	87	87	87	87	87	87	87
Rw	4	180	87	87	87	87	87	87	87	87	87	87
Rw	4	200	87	87	87	87	87	87	87	87	87	87
Rw	5	0	1	1	12	13	6	1	1	12	13	6
Rw	5	5	1	1	18	13	6	1	1	18	13	6
Rw	5	10	1	3	27	13	6	1	3	27	13	6
Rw	5	15	1	1	18	8	6	1	1	18	8	6
Rw	5	20	4	3	3	3	6	4	3	3	3	6
Rw	5	25	5	5	6	8	12	5	5	6	8	12
Rw	5	30	9	6	9	8	11	9	6	9	8	11
Rw	5	35	9	6	11	6	13	9	6	11	6	13
Rw	5	40	9	15	11	4	16	9	15	11	4	16
Rw	5	45	8	13	12	9	10	8	13	12	9	10
Rw	5	50	11	18	16	20	15	11	18	16	20	15
Rw	5	55	14	13	20	21	6	14	13	20	21	6
Rw	5	60	9	13	6	11	15	9	13	6	11	15
Rw	5	65	12	11	10	9	5	12	11	10	9	5

Rw	5	70	7	22	6	20	23	7	22	6	20	23
Rw	5	75	21	38	10	10	27	21	38	10	10	27
Rw	5	80	11	15	2	24	67	11	15	2	24	67
Rw	5	85	42	10	4	29	47	42	10	4	29	47
Rw	5	90	24	8	7	41	51	24	8	7	41	51
Rw	5	100	41	36	1	53	53	41	36	1	53	53
Rw	5	120	16	20	52	52	52	16	20	52	52	52
Rw	5	140	69	69	69	69	69	69	69	69	69	69
Rw	5	160	87	87	87	87	87	87	87	87	87	87
Rw	5	180	87	87	87	87	87	87	87	87	87	87
Rw	5	200	87	87	87	87	87	87	87	87	87	87
Rw	6	0	1	1	4	5	2	1	1	4	5	2
Rw	6	5	1	1	6	5	2	1	1	6	5	2
Rw	6	10	1	2	9	5	2	1	2	9	5	2
Rw	6	15	1	1	6	3	2	1	1	6	3	2
Rw	6	20	6	2	1	1	2	6	2	1	1	2
Rw	6	25	7	4	2	3	4	7	4	2	3	4
Rw	6	30	8	5	3	4	5	8	5	3	4	5
Rw	6	35	9	5	3	5	6	9	5	3	5	6
Rw	6	40	6	5	2	6	9	6	5	2	6	9
Rw	6	45	7	6	3	8	12	7	6	3	8	12
Rw	6	50	11	8	5	9	18	11	8	5	9	18
Rw	6	55	16	8	2	9	16	16	8	2	9	16
Rw	6	60	12	10	5	11	15	12	10	5	11	15
Rw	6	65	9	11	10	9	4	9	11	10	9	4
Rw	6	70	11	10	16	20	24	11	10	16	20	24
Rw	6	75	14	26	9	14	26	14	26	9	14	26
Rw	6	80	7	32	13	19	59	7	32	13	19	59
Rw	6	85	47	28	1	10	43	47	28	1	10	43
Rw	6	90	28	23	17	34	49	28	23	17	34	49
Rw	6	100	24	28	15	53	53	24	28	15	53	53
Rw	6	120	9	44	52	52	52	9	44	52	52	52
Rw	6	140	69	69	69	69	69	69	69	69	69	69
Rw	6	160	87	87	87	87	87	87	87	87	87	87
Rw	6	180	87	87	87	87	87	87	87	87	87	87
Rw	6	200	87	87	87	87	87	87	87	87	87	87
Rw	7	0	1	1	4	5	1	1	1	4	5	1
Rw	7	5	1	1	6	5	1	1	1	6	5	1
Rw	7	10	1	2	9	5	1	1	2	9	5	1
Rw	7	15	1	1	6	3	1	1	1	6	3	1
Rw	7	20	4	2	1	1	1	4	2	1	1	1
Rw	7	25	5	4	2	3	2	5	4	2	3	2
Rw	7	30	5	5	3	4	4	5	5	3	4	4
Rw	7	35	6	6	2	3	3	6	6	2	3	3
Rw	7	40	11	7	3	3	4	11	7	3	3	4
Rw	7	45	8	7	6	6	9	8	7	6	6	9
Rw	7	50	12	7	21	5	6	12	7	21	5	6
Rw	7	55	17	9	39	10	14	17	9	39	10	14
Rw	7	60	20	13	7	8	21	20	13	7	8	21
Rw	7	65	5	21	20	8	3	5	21	20	8	3
Rw	7	70	14	22	14	20	25	14	22	14	20	25
Rw	7	75	8	33	14	18	25	8	33	14	18	25
Rw	7	80	4	3	22	14	52	4	3	22	14	52
Rw	7	85	51	25	20	2	40	51	25	20	2	40
Rw	7	90	32	13	30	27	47	32	13	30	27	47
Rw	7	100	32	13	31	53	53	32	13	31	53	53
Rw	7	120	41	67	52	52	52	41	67	52	52	52

Rw	7	140	69	69	69	69	69	69	69	69	69	69
Rw	7	160	87	87	87	87	87	87	87	87	87	87
Rw	7	180	87	87	87	87	87	87	87	87	87	87
Rw	7	200	87	87	87	87	87	87	87	87	87	87
Rw	8	0	2	1	4	3	5	2	1	4	3	5
Rw	8	5	2	1	6	3	5	2	1	6	3	5
Rw	8	10	2	2	9	3	5	2	2	9	3	5
Rw	8	15	2	1	6	2	5	2	1	6	2	5
Rw	8	20	6	2	1	1	5	6	2	1	1	5
Rw	8	25	8	3	2	2	9	8	3	2	2	9
Rw	8	30	11	4	3	2	3	11	4	3	2	3
Rw	8	35	8	5	4	2	6	8	5	4	2	6
Rw	8	40	13	5	4	4	19	13	5	4	4	19
Rw	8	45	10	8	3	2	7	10	8	3	2	7
Rw	8	50	16	8	10	6	6	16	8	10	6	6
Rw	8	55	16	10	8	6	5	16	10	8	6	5
Rw	8	60	22	16	6	12	12	22	16	6	12	12
Rw	8	65	27	25	15	8	2	27	25	15	8	2
Rw	8	70	14	16	12	20	26	14	16	12	20	26
Rw	8	75	13	40	18	22	24	13	40	18	22	24
Rw	8	80	4	24	31	33	44	4	24	31	33	44
Rw	8	85	40	21	38	30	36	40	21	38	30	36
Rw	8	90	20	8	43	41	45	20	8	43	41	45
Rw	8	100	100	19	47	53	53	100	19	47	53	53
Rw	8	120	90	24	52	52	52	90	24	52	52	52
Rw	8	140	69	69	69	69	69	69	69	69	69	69
Rw	8	160	87	87	87	87	87	87	87	87	87	87
Rw	8	180	87	87	87	87	87	87	87	87	87	87
Rw	8	200	87	87	87	87	87	87	87	87	87	87
Rw	9	0	1	1	6	5	2	1	1	6	5	2
Rw	9	5	1	1	9	5	2	1	1	9	5	2
Rw	9	10	1	2	14	5	2	1	2	14	5	2
Rw	9	15	1	1	9	3	2	1	1	9	3	2
Rw	9	20	5	2	2	1	2	5	2	2	1	2
Rw	9	25	6	3	3	3	3	6	3	3	3	3
Rw	9	30	8	5	4	4	3	8	5	4	4	3
Rw	9	35	13	6	3	4	3	13	6	3	4	3
Rw	9	40	7	6	3	5	5	7	6	3	5	5
Rw	9	45	9	7	11	5	5	9	7	11	5	5
Rw	9	50	15	9	16	6	7	15	9	16	6	7
Rw	9	55	13	10	17	8	5	13	10	17	8	5
Rw	9	60	13	14	4	13	18	13	14	4	13	18
Rw	9	65	5	13	7	14	3	5	13	7	14	3
Rw	9	70	13	16	25	24	25	13	16	25	24	25
Rw	9	75	17	15	11	26	25	17	15	11	26	25
Rw	9	80	3	19	50	49	52	3	19	50	49	52
Rw	9	85	28	20	39	44	40	28	20	39	44	40
Rw	9	90	22	18	40	48	47	22	18	40	48	47
Rw	9	100	71	28	45	53	53	71	28	45	53	53
Rw	9	120	64	51	52	52	52	64	51	52	52	52
Rw	9	140	69	69	69	69	69	69	69	69	69	69
Rw	9	160	87	87	87	87	87	87	87	87	87	87
Rw	9	180	87	87	87	87	87	87	87	87	87	87
Rw	9	200	87	87	87	87	87	87	87	87	87	87
Rw	10	0	2	2	5	6	10	2	2	5	6	10
Rw	10	5	2	4	8	6	4	2	4	8	6	4
Rw	10	10	5	8	12	6	3	5	8	12	6	3

Rw10	15	5	7	9	5	2	5	7	9	5	2
Rw10	20	4	4	3	3	3	4	4	3	3	3
Rw10	25	6	3	4	6	5	6	3	4	6	5
Rw10	30	7	4	8	7	3	7	4	8	7	3
Rw10	35	10	4	7	11	16	10	4	7	11	16
Rw10	40	12	6	10	11	16	12	6	10	11	16
Rw10	45	11	7	11	28	57	11	7	11	28	57
Rw10	50	21	12	14	27	8	21	12	14	27	8
Rw10	55	17	14	7	28	7	17	14	7	28	7
Rw10	60	18	19	5	26	3	18	19	5	26	3
Rw10	65	28	18	14	19	4	28	18	14	19	4
Rw10	70	13	16	19	27	24	13	16	19	27	24
Rw10	75	22	14	36	29	26	22	14	36	29	26
Rw10	80	3	10	69	64	59	3	10	69	64	59
Rw10	85	17	54	39	57	43	17	54	39	57	43
Rw10	90	24	10	37	55	49	24	10	37	55	49
Rw10	100	41	26	43	53	53	41	26	43	53	53
Rw10	120	37	60	52	52	52	37	60	52	52	52
Rw10	140	69	69	69	69	69	69	69	69	69	69
Rw10	160	87	87	87	87	87	87	87	87	87	87
Rw10	180	87	87	87	87	87	87	87	87	87	87
Rw10	200	87	87	87	87	87	87	87	87	87	87
Rw11	0	2	5	3	2	14	2	5	3	2	14
Rw11	5	2	12	5	1	12	2	12	5	1	12
Rw11	10	8	26	8	1	6	8	26	8	1	6
Rw11	15	8	25	8	4	2	8	25	8	4	2
Rw11	20	2	12	6	6	6	2	12	6	6	6
Rw11	25	6	6	7	9	12	6	6	7	9	12
Rw11	30	7	8	10	13	17	7	8	10	13	17
Rw11	35	10	11	12	14	17	10	11	12	14	17
Rw11	40	12	17	12	15	34	12	17	12	15	34
Rw11	45	11	13	21	34	53	11	13	21	34	53
Rw11	50	21	13	14	31	26	21	13	14	31	26
Rw11	55	17	16	11	29	6	17	16	11	29	6
Rw11	60	18	17	9	30	18	18	17	9	30	18
Rw11	65	19	23	23	25	5	19	23	23	25	5
Rw11	70	24	31	26	31	23	24	31	26	31	23
Rw11	75	29	25	32	33	27	29	25	32	33	27
Rw11	80	16	39	52	80	67	16	39	52	80	67
Rw11	85	22	23	39	71	47	22	23	39	71	47
Rw11	90	28	24	34	62	51	28	24	34	62	51
Rw11	100	36	33	41	53	53	36	33	41	53	53
Rw11	120	34	36	52	52	52	34	36	52	52	52
Rw11	140	69	69	69	69	69	69	69	69	69	69
Rw11	160	87	87	87	87	87	87	87	87	87	87
Rw11	180	87	87	87	87	87	87	87	87	87	87
Rw11	200	87	87	87	87	87	87	87	87	87	87
Rw12	0	3	7	8	4	28	3	7	8	4	28
Rw12	5	2	16	14	2	24	2	16	14	2	24
Rw12	10	10	35	21	2	12	10	35	21	2	12
Rw12	15	11	33	21	7	4	11	33	21	7	4
Rw12	20	12	16	17	11	12	12	16	17	11	12
Rw12	25	8	8	18	17	24	8	8	18	17	24
Rw12	30	12	17	13	20	25	12	17	13	20	25
Rw12	35	12	18	17	23	32	12	18	17	23	32
Rw12	40	16	18	20	32	59	16	18	20	32	59
Rw12	45	15	29	35	9	48	15	29	35	39	48

RW12	50	17	26	30	28	32	17	26	30	28	32
RW12	55	15	25	37	28	28	15	25	37	28	28
RW12	60	15	24	26	28	37	15	24	26	28	37
RW12	65	26	26	31	23	6	26	26	31	23	6
RW12	70	10	28	32	24	22	10	28	32	24	22
RW12	75	36	11	27	34	28	36	11	27	34	28
RW12	80	28	28	35	73	75	28	28	35	73	75
RW12	85	26	22	39	61	51	26	22	39	61	51
RW12	90	33	27	30	57	53	33	27	30	57	53
RW12	100	30	55	39	53	53	30	55	39	53	53
RW12	120	31	45	52	52	52	31	45	52	52	52
RW12	140	69	69	69	69	69	69	69	69	69	69
RW12	160	87	87	87	87	87	87	87	87	87	87
RW12	180	87	87	87	87	87	87	87	87	87	87
RW12	200	87	87	87	87	87	87	87	87	87	87
RW13	0	2	4	6	5	11	2	4	6	5	11
RW13	5	2	8	9	5	9	2	8	9	5	9
RW13	10	5	17	14	5	5	5	17	14	5	5
RW13	15	5	16	11	5	3	5	16	11	15	3
RW13	20	4	9	5	5	5	4	9	5	5	5
RW13	25	6	6	7	9	10	6	6	7	9	10
RW13	30	8	9	9	11	11	8	9	9	11	11
RW13	35	10	11	10	12	16	10	11	10	12	16
RW13	40	12	13	13	12	19	12	13	13	12	19
RW13	45	11	15	18	17	24	11	15	18	17	24
RW13	50	17	17	23	17	14	17	17	23	17	14
RW13	55	16	16	24	17	12	16	16	24	17	12
RW13	60	16	20	15	18	17	16	20	15	18	17
RW13	65	16	21	19	15	5	16	21	19	15	5
RW13	70	14	21	18	19	23	14	21	18	19	23
RW13	75	22	25	17	27	27	22	25	17	27	27
RW13	80	13	23	27	43	67	13	23	27	43	67
RW13	85	33	24	22	41	47	33	24	22	41	47
RW13	90	26	17	23	47	51	26	17	23	47	51
RW13	100	41	28	27	53	53	41	28	27	53	53
RW13	120	41	40	52	52	52	41	40	52	52	52
RW13	140	69	69	69	69	69	69	69	69	69	69
RW13	160	87	87	87	87	87	87	87	87	87	87
RW13	180	87	87	87	87	87	87	87	87	87	87
RW13	200	87	87	87	87	87	87	87	87	87	87

----END OF FILE WRITTEN----

QUASI-BIENNIAL OSCILLATIONS,(QP,QD,QT)

QP 15	2	110	1	440	2	415	2	380	2	375
QP 20	5	260	3	490	3	435	3	375	3	360
QP 25	6	394	4	523	5	470	6	420	6	405
QP 30	6	580	4	642	11	500	16	340	18	280
QP 35	8	701	6	613	19	480	29	330.	33	300
QP 40	9	745	10	653	29	490	46	310	51	245
QP 45	9	819	7	767	30	605	50	310	55	220
QP 50	8	837	6	66	29	620	46	305	51	200
QP 55	7	808	11	127	27	650	44	265	49	175
QP 60	7	737	23	143	26	660	33	280	35	190
QP 65	6	680	25	205	25	690	25	265	25	170
QP 70	5	610	23	255	21	710	16	250	13	160
QP 75	4	550	15	300	14	730	10	240	8	150

QP	80	2	485	8	350	7	755	6	230	5	140
QP	85	1	420	3	400	3	780	2	220	1	130
QP	90	0	360	0	450	0	805	0	210	0	120
QD	15	3	711	1	465	1	610	1	785	1	850
QD	20	5	130	4	530	2	575	2	620	2	640
QD	25	8	277	5	587	4	545	3	495	2	475
QD	30	12	400	2	658	8	500	10	335	10	290
QD	35	8	596	4	489	14	425	20	350	22	325
QD	40	9	714	7	605	21	470	32	315	35	280
QD	45	11	767	11	700	31	525	46	335	51	280
QD	50	11	808	5	822	29	640	52	290	58	210
QD	55	8	847	6	64	33	620	54	270	61	205
QD	60	13	792	18	77	40	630	52	270	56	205
QD	65	10	741	13	122	32	645	44	260	47	190
QD	70	7	690	9	140	25	660	34	260	38	190
QD	75	4	650	6	152	16	660	22	260	23	190
QD	80	2	600	3	162	8	660	11	260	12	190
QD	85	1	555	1	170	3	660	4	260	4	190
QD	90	0	510	0	170	0	660	0	260	0	190
QT	15	2	467	1	750	3	351	4	120	4	0
QT	20	4	568	2	100	5	880	7	180	8	75
QT	25	6	604	2	285	8	750	11	225	12	150
QT	30	12	770	2	630	10	510	13	280	14	240
QT	35	6	868	5	704	15	525	19	300	20	270
QT	40	2	43	4	731	16	548	23	300	25	260
QT	45	9	70	6	192	8	700	10	250	11	210
QT	50	3	287	4	222	3	600	1	860	0	770
QT	55	3	566	6	213	6	540	7	700	7	630
QT	60	6	403	10	254	10	450	11	450	11	350
QT	65	5	518	8	270	9	440	10	370	10	270
QT	70	3	633	6	285	6	400	7	190	7	90
QT	75	3	685	4	297	4	365	5	150	5	30
QT	80	2	800	3	310	3	340	3	70	3	840
QT	85	1	13	1	322	1	300	2	830	2	740
QT	90	0	97	0	332	0	270	0	730	0	640

QUASI-BIENNIAL OSCILLATIONS-WINDS,(QU,QV)

QU	15	70	180	1	45	8	165	20	280	30	305
QU	20	130	280	3	140	20	195	45	260	60	280
QU	25	163	382	4	192	35	230	62	265	75	285
QU	30	161	506	45	265	58	250	69	235	73	225
QU	35	125	761	64	350	55	295	51	245	50	220
QU	40	120	778	48	435	40	320	32	230	30	195
QU	45	117	820	9	533	18	320	28	135	30	70
QU	50	99	836	60	740	30	485	19	240	12	170
QU	55	66	235	62	720	50	485	38	275	30	210
QU	60	54	314	86	682	75	460	60	265	51	200
QU	65	42	420	75	720	65	490	50	270	40	200
QU	70	30	520	65	720	50	520	35	280	30	205
QU	75	23	620	50	720	35	550	25	285	20	210
QU	80	16	720	36	720	20	580	13	295	10	215
QU	85	9	820	20	720	10	615	5	305	5	220
QU	90	0	50	0	720	0	650	0	315	0	230
QV	15	2	450	1	718	5	791	7	835	7	15
QV	20	4	520	2	620	10	710	15	760	15	830
QV	25	6	602	3	510	15	600	22	675	24	700
QV	30	8	562	6	288	15	475	22	650	24	720

QV 35	5	587	16	382	22	485	27	585	29	630
QV 40	8	687	17	292	23	440	28	575	30	640
QV 45	1	96	11	209	19	325	25	430	27	475
QV 50	9	105	12	593	22	240	32	370	37	405
QV 55	19	431	4	651	9	165	14	285	17	320
QV 60	40	660	58	625	35	30	14	140	7	190
QV 65	30	769	45	480	29	0	12	150	5	135
QV 70	22	7	28	376	22	790	9	90	3	80
QV 75	14	285	17	279	15	710	6	20	2	25
QV 80	8	393	9	181	8	630	4	815	1	790
QV 85	3	586	3	84	4	550	2	750	1	635
QV 90	0	770	0	717	0	470	0	685	0	580

----END OF FILE WRITTEN----

APPENDIX B

SAMPLE INPUT AND OUTPUT FOR THE PROFILE PROGRAM

Input to PROFILE is as follows:

(All input data cards are in free field format.)

CARD 1

INITIAL HEIGHT	-	Height of starting position, km
INITIAL LATITUDE	-	Latitude of starting position (degrees, southern latitudes negative)
INITIAL WEST LONGITUDE	-	West longitude of starting position (degrees, 0 to 360 degrees, or east longitudes negative)
F10.7	-	Solar 10.7 cm radio noise flux (10^{-22} watts/m^2) at time of calculations. Use zero if height does not go over 90 km. Use 230 for design applications or consult Aerospace Environment Division (AED) of Marshall Space Flight Center (MSFC) for monthly predictions.
MEAN F10.7	-	81 day mean solar 10.7 cm flux. Use zero if height does not go over 90 km. Use 230 for design applications or consult AED, MSFC for monthly predictions.
AP	-	Geomagnetic index a_p. Use zero if height does not go over 90 km. Use 20.3 for design steady state conditions, or 400 for maximum conditions, or consult AED, MSFC.
DATE	-	Date for starting time of calculations (month, date, two digit year). Use month 13 for annual reference period.
GREENWICH TIME	-	Time for starting position (hours, minutes, seconds). Use time corresponding to local time = 0900 for design steady state, or 1400 for maximum conditions.
LAT INCREMENT	-	Latitude displacement (degrees) between successive positions (new lat = old lat + lat increment). Use zero if trajectory positions are to be read in.
WEST LON INCREMENT	-	West longitude displacement (degrees) between successive positions (new lon = old lon + lon increment). Use zero if trajectory positions are to be read in.
HEIGHT INCREMENT	-	Height decrease (km) between successive positions (new height = old height - height increment). Normal profiles are generated downward. If an upward generated profile is desired set height increment negative.
MAXIMUM NUMBER OF POSITIONS	-	Number of positions to be computed, not including initial position. Use zero if trajectory positions are to be read in.

CARD 1 CONT'D	TIME INCREMENT	-	Time displacement (seconds) between successive positions for automatically generated profiles (new time = old time + time increment)
	TRAJECTORY OPTION	-	0 for linear profile generated automatically internal to the program, greater than 0 for a trajectory with each position to be read in.
	PUNCH OPTION	-	0 for no punch output of atmospheric parameter values, non-zero to get punch output.
CARD 2	GROVES INPUT UNIT	-	Unit number for tape containing Groves and stationary perturbations (SCIDAT tape in Appendix A). Use any available unit number.
	RANDOM INPUT UNIT	-	Unit number of file from which random perturbation data are to be read. If same as Groves input unit, these are read from SCIDAT tape. If card input, use 5.
	QBO INPUT UNIT	-	Unit number of file from which QBO parameters are to be read. If same as Groves input unit, these are read from SCIDAT tape. If card input, use 5.
	4-D INPUT UNIT	-	Unit number for 4-D input data tape. Use any available unit number.
	RANDOM OPTION	-	1 means compute random perturbation output, 2 means do not compute random perturbation output.
	QBO OPTION	-	1 means compute QBO output, 2 means do not compute QBO output.
	FIRST RANDOM NUMBER	-	Initial number for random number generator used to compute random perturbations (can be any odd positive integer). Use 1 for standard design applications.
	NMC READ OPTION	-	0 means read NMC grid data from SCIDAT tape, otherwise these data are read from cards.
	4-D, P, D, T, SCRATCH UNIT	-	Unit number for scratch file for 4-D grid profiles required in computations. Use any available unit number. This normally is a temporary drum file.
	NMC GRID POINTS SCRATCH UNIT	-	Unit number for scratch file to store NMC grid point data. Use any available unit number. This normally is a temporary drum file.
CARD 3 (OPTIONAL) *	INITIAL P, D, T	-	Initial values of random relative pressure, density, and temperature perturbations, percent. Use zeros for standard design applications.
	SIGMA P, D, T	-	Initial values of relative standard deviation (percent) for random pressure, density, and temperature. Use zeros for standard design applications.
	INITIAL U, V	-	Initial values of random wind components, m/s. Use zeros for standard design applications.
	SIGMA U, V	-	Initial values of standard deviation for random winds, m/s. Use zeros for standard design applications.

* - Include card 3 only if random option = 1.

TRAJECTORY INPUT	-	Use only if linear profile is not to be generated automatically. Each record has time (seconds), height (km), latitude (degrees), and west longitude (degrees).
TRAJECTORY BACK-UP CARD	-	Only if trajectory input is used. Same form as a trajectory position but with any negative height value.

The trajectory input cards are optional, in free field format. If included, use as many cards as necessary.

A sample output listing is shown beginning on page 112. The input for this sample run would be:

CARD 1: 121.92, 57.97, 350.80, 136., 155., 9., 1, 1, 73, 0, 0, 0, .0, .0, .0, .0, 58, 0, 58, 0,

CARD 2: 3, 3, 3, 4, 1, 1, 8941, 0, 12, 13,

CARD 3: .0, .0, .0, .0, .0, .0, .0, .0, .0, .0,

TRAJECTORY INPUT: 0, 121.92, 57.97, 350.80,

30, 118.82, 59.80, 352.80,

50, 116.73, 61.00, 354.50,

.

.

.

1850, 5.11, 34.61, 120.43

1882, 3.53, 34.64, 120.47

9999, -9.9, 99.99, 99.99, (trajectory backup card)

Input for the sample outout listing beginning on page 120 is as follows:

CARD 1: 92.9, 28.45, 80.53, .0, .0, .0, 1, 1, 73, 0, 0, 0, .0, .0, 2., 46, 0, 0, 0,

CARD 2: 3, 3, 3, 4, 1, 1, 8941, 0, 12, 13,

CARD 3: -12.7, -7.2, -5.6, 10.21, 10.43, 9.91, -18.0, -16.0, 19.96, 19.96,

A SUMMARY OF THE ORGANIZATION OF AN
INPUT DATA DECK IS AS FOLLOWS

Initial Data

Card 1, See Section 4 or earlier in this Appendix

Card 2, See Section 4 or earlier in this Appendix

Card 3, Optional, included only if random option = 1

NMC Grid Data

Optional. Include as card input only if this is not to be read from the SCIDAT data tape.

Random Perturbation Data

Optional. Include as card input only if the random input unit is 5 and these data are not to be read from the SCIDAT data tape or some other input file. Do not include if random option = 2.

QBO Parameters

Optional. Include as card input only if the QBO input unit is 5 and these data are not to be read from the SCIDAT data tape or some other file. Do not include if QBO option = 2.

Trajectory Position Data and Backup Card

Optional. Include if trajectory, rather than linear profile generated by the program, is to be evaluated.

More Data of the Same Kind (Starting with Initial Data, Card 1)

If additional trajectories or profiles are to be evaluated, the data may be input one set immediately after the other. The program is actually more efficient for such multiple runs if the month remains the same. This is because as long as the month remains the same the SCIDAT data tape read can be avoided for each subsequent data set.

OUTPUT OF PROFILE IS AS FOLLOWS

JULIAN DATE	-	Computed from input date, set equal to zero for month 13 (annual average)
HEIGHT, LAT, LON, TIME	-	Position and time where atmospheric parameters are evaluated
UNPERTURBED PRESSURE DENSITY, TEMPERATURE AND GEOSTROPHIC WIND (monthly mean values)	-	Computed from Jacchia, 4-D, or Groves - plus - stationary perturbations, depending on height.
TOTAL PRESSURE, DENSITY, TEMPERATURE, AND WIND	-	Monthly means plus random perturbations and QBO perturbations
THERMAL WIND SHEAR	-	From thermal wind equations using finite differences of Jacchia, 4-D, or Groves - plus - stationary perturbations, depending on height.
PERTURBATION VALUES	-	Stationary perturbations, QBO perturbations and amplitudes, and random perturbations and magnitudes. Perturbations are those which were added to monthly means to produce total results output.

Following is a listing of sample output from the PROFILE program. Initial lines of output are merely listings of the input data for easy reference. These listings are provided to indicate formats and kinds of input and output data. For a listing of the input cards for these sample outputs, see page 109.

SAMPLE PROFILE PROGRAM OUTPUT

JANUARY MISSION 3 RE-ENTRY AND RETURN TRAJECTORY

INITIAL HEIGHT = 121.92 KM
F10.7 = 136.00
DATE = 1/ 1/73
LAT INCREMENT = .00 DEG
MAXIMUM NUMBER OF POSITIONS = 58
TRAJECTORY OPTION= 58

INITIAL LAT = 57.97 DEG
MEAN F10.7 = 155.00
GREENWICH TIME = 0: 0: 0
WEST LON INCREMENT = .00 DEG
TIME INCREMENT = 0 SEC
PUNCH OPTION= 0

INITIAL WEST LON = 350.80 DEG
AP = 9.00

HEIGHT INCREMENT = .00 KM

GROVES INPUT UNIT = 3
4-D INPUT UNIT = 4
FIRST RANDOM NUMBER = 8941
NMC READ OPTION = 0
NMC GRID POINTS SCRATCH UNIT = 13

RANDOM INPUT UNIT = 3
RANDOM OPTION = 1

4-D P,D,T DATA SCRATCH UNIT = 12
JULIAN DATE = 2441684.0

QBO INPUT UNIT = 3
QBO OPTION = 1

INITIAL P,D,T = .00 % .00 % .00 %
INITIAL U,V = .00 M/S .00 M/S

SIGMA P,D,T = 19.02 % 7.85 % 20.48 %
SIGMA U,V = 53.63 M/S 53.03 M/S

** PERCENT DEVIATIONS FROM 1962 US STANDARD ATMOSPHERE APPEAR BELOW PRESSURE, DENSITY, AND TEMPERATURE VALUES **

			UNPERTURBED (MONTHLY MEAN)					MEAN PLUS PERTURBATIONS					THERMAL WIND SHEAR		PERTURBATION VALUES					
HEIGHT (KM) TIME (SEC)	LAT (DEG)	WEST LON (DEG)	PRES. (NT/ M**2)	DENS. (KG/ M**3)	TEMP (DEG KEL-VIN)	GEOSTROPH. WIND (M/S) E-W	N-S	PRES. (NT/ M**2)	DENS. (KG/ M**3)	TEMP (DEG KEL-VIN)	TOTAL WIND (M/S) E-W	N-S	(M/S/KM) E-W	N-S	P (%)	D (%)	T (%)	U M/S	V M/S	
118.82	59.80	352.80	.303-02	.307-07	317.	-10.	-1.	.326-02	.318-07	330.	-46.	14.	1.	-0.						
30			7.7%	9.2%	-6.3%			15.9%	13.0%	-2.5%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															7.6	3.5	4.1	-36.	15.	RAND
															19.3	8.3	20.3	51.	51.	SIG
116.73	61.00	354.50	.373-02	.405-07	297.	-10.	-1.	.371-02	.380-07	315.	-37.	29.	0.	-0.						
50			8.1%	10.6%	-6.9%			7.7%	3.9%	-1.6%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															-.4	-6.1	5.7	-27.	30.	RAND
															18.7	9.1	18.9	50.	50.	SIG
114.62	62.19	355.80	.471-02	.547-07	280.	-9.	-1.	.523-02	.616-07	276.	-4.	33.	0.	-0.						
70			9.7%	12.3%	-6.8%			21.9%	26.4%	-8.1%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															11.1	12.6	-1.5	5.	34.	RAND
															18.2	9.9	17.4	49.	49.	SIG
112.47	63.36	357.46	.616-02	.760-07	265.	-3.	-1.	.670-02	.784-07	280.	-3.	21.	0.	-0.						
90			12.8%	14.1%	-5.4%			22.8%	17.8%	-.1%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															8.8	3.2	5.6	-0.	22.	RAND
															17.6	10.7	16.0	49.	49.	SIG
109.19	65.09	.23	.934-02	.126-06	244.	9.	-1.	.109-01	.147-06	244.	-9.	-6.	0.	-0.						
120			14.5%	14.0%	-3.5%			33.6%	33.0%	-3.5%										
															.0	.0	.0			SP

REPRODUCIBILITY OF THE ORIGINAL PAGE IS POOR

															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															16.7	16.7	-.0	-18.	-5.	RAND
															16.8	12.0	13.7	49.	49.	SIG
106.99	66.21	2.27	.127-01	.181-06	233.	21.	-0.	.147-01	.198-06	249.	14.	-15.	-0.	-0.						
140			16.5%	16.9%	-4.0%			35.3%	26.0%	2.3%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															16.1	9.5	6.6	-8.	-14.	RAND
															16.2	12.8	12.3	49.	49.	SIG
104.77	67.30	4.49	.172-01	.257-06	223.	29.	-0.	.186-01	.268-06	233.	76.	-36.	-0.	-0.						
160			16.3%	17.1%	-4.1%			26.1%	21.9%	.0%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															8.4	4.1	4.3	47.	-35.	RAND
															15.6	13.6	10.7	50.	50.	SIG
102.53	68.37	6.92	.234-01	.360-06	219.	50.	-0.	.236-01	.353-06	224.	6.	24.	-0.	-0.						
180			14.7%	12.9%	-1.5%			15.2%	10.7%	.9%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															.5	-1.9	2.4	-44.	24.	RAND
															15.1	14.5	9.2	51.	51.	SIG
101.38	68.89	8.21	.274-01	.427-06	217.	55.	-0.	.267-01	.414-06	217.	-15.	40.	-0.	-0.						
190			12.8%	9.7%	-.0%			9.0%	6.4%	.4%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															-2.6	-3.0	.4	-71.	40.	RAND
															14.8	14.9	8.4	51.	51.	SIG
99.10	69.90	10.99	.372-01	.591-06	214.	71.	-0.	.388-01	.594-06	222.	7.	49.	-0.	-0.						
210			7.4%	1.7%	3.3%			11.8%	2.2%	7.0%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															4.1	.5	3.6	-65.	49.	RAND
															14.0	15.3	7.9	53.	53.	SIG
96.80	70.86	14.03	.510-01	.813-06	215.	53.	-0.	.535-01	.846-06	217.	-3.	7.	-0.	-0.						
230			1.3%	-6.8%	7.0%			6.3%	-3.0%	7.9%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															4.9	4.1	.8	-56.	7.	RAND
															12.8	15.0	8.9	53.	53.	SIG
94.51	71.77	17.37	.697-01	.112-05	215.	59.	-0.	.701-01	.110-05	220.	-20.	-31.	-0.	-0.						
250			-5.7%	-15.8%	10.9%			-5.1%	-17.1%	13.3%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															.6	-1.6	2.2	-78.	-31.	RAND
															11.8	14.8	9.9	53.	53.	SIG
92.19	72.63	21.02	.963-01	.156-05	215.	67.	-0.	.953-01	.159-05	207.	-12.	-52.	-0.	-0.						
270			-13.0%	-24.4%	14.6%			-13.9%	-22.6%	10.7%										
															.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO

													.0	.0	.0	0.	0. MAG
													-1.1	2.4	-3.5	-78.	-52. RAND
													10.7	14.6	10.9	52.	52. SIG
89.88	73.41	25.02	.133+00	.217-05	214.	67.	-5.	.151+00	.256-05	205.	-24.	-21.	0.	0.			
290			-20.7%	-32.9%	18.6%			-10.3%	-21.1%	13.2%							
													.2	.1	.2		SP
													-.0	-.0	.0	-0.	0. QBO
													.0	.0	.0	0.	0. MAG
													13.1	17.7	-4.6	-90.	-16. RAND
													9.7	14.4	11.9	52.	52. SIG
87.58	74.11	29.38	.190+00	.311-05	213.	71.	-4.	.192+00	.315-05	213.	6.	-5.	0.	0.			
310			-25.9%	-37.1%	17.8%			-25.0%	-36.3%	17.7%							
													.3	.1	.2		SP
													-.0	-.1	.1	-0.	0. QBO
													.1	.2	.1	0.	0. MAG
													1.2	1.4	-.2	-62.	-1. RAND
													9.9	14.5	11.8	52.	52. SIG
84.19	74.99	36.59	.321+00	.528-05	211.	68.	-4.	.340+00	.546-05	215.	25.	23.	3.	0.			
340			-32.9%	-42.9%	16.9%			-29.1%	-40.8%	19.3%							
													.4	.2	.0		SP
													-.1	-.3	.2	-0.	0. QBO
													.2	.5	.2	1.	0. MAG
													5.7	3.8	1.9	-44.	27. RAND
													10.3	14.7	11.4	54.	54. SIG
80.97	75.63	44.52	.530+00	.871-05	211.	67.	-4.	.593+00	.923-05	222.	125.	49.	-0.	0.			
370			-36.9%	-47.9%	16.8%			-31.6%	-44.8%	23.0%							
													.6	.6	-.0		SP
													-.1	-.5	-.3	-1.	0. QBO
													.5	1.0	.3	1.	0. MAG
													12.1	6.5	5.6	58.	53. RAND
													10.9	15.1	10.6	67.	67. SIG
77.30	76.04	55.87	.947+00	.157-04	206.	67.	-5.	.907+00	.149-04	205.	114.	-23.	3.	0.			
410			-43.7%	-48.9%	7.5%			-46.1%	-51.3%	7.2%							
													.9	1.3	-.2		SP
													-.2	-.9	-.1	-1.	-0. QBO
													.8	1.7	.4	2.	0. MAG
													-4.1	-3.9	-.2	48.	-18. RAND
													11.3	15.8	9.4	51.	51. SIG
75.32	75.99	64.54	.131+01	.217-04	202.	63.	-6.	.113+01	.167-04	220.	123.	-10.	5.	0.			
440			-44.7%	-47.6%	1.4%			-52.3%	-59.7%	10.4%							
													1.3	1.9	-.4		SP
													-.3	-1.1	.1	-1.	0. QBO
													.9	2.2	.5	2.	0. MAG
													-13.4	-22.1	8.7	61.	-4. RAND
													11.4	16.3	8.7	36.	36. SIG
74.00	75.64	72.92	.162+01	.306-04	203.	64.	0.	.166+01	.248-04	222.	82.	-15.	6.	-0.			
470			-44.9%	-46.9%	-.4%			-43.4%	-50.6%	8.6%							
													1.6	2.3	-.5		SP
													-.4	-1.3	.2	-2.	0. QBO
													1.1	2.3	.5	3.	1. MAG
													3.2	-5.7	8.9	20.	-16. RAND
													11.8	16.5	8.3	30.	30. SIG
71.26	72.69	95.73	.258+01	.413-04	214.	59.	1.	.249+01	.359-04	232.	64.	-4.	6.	-0.			
570			-43.2%	-44.0%	-.5%			-45.2%	-51.3%	8.0%							
													2.1	2.7	-.3		SP
													-.7	-1.8	-.0	-2.	0. QBO
													1.4	3.1	.6	3.	1. MAG

												-2.8	-11.4	8.6	7.	-6.	RAND
												12.5	16.6	7.4	21.	21.	SIG
70.04	70.03	105.13	.324+01	.512-04	221.	57.	-11.	.322+01	.482-04	230.	55.	-16.	6.	0.			
630			-40.9%	-41.2%	.7%			-41.3%	-44.7%	4.7%							
												2.9	3.7	-.4			SP
												-.9	-2.1	-.1	-3.	0.	QBO
												1.6	3.4	.7	3.	1.	MAG
												.3	-3.6	4.1	1.	-5.	RAND
												12.6	16.4	6.9	16.	16.	SIG
68.38	66.51	112.97	.445+01	.665-04	227.	76.	-8.	.506+01	.703-04	247.	55.	-3.	2.	0.			
700			-36.8%	-36.9%	.3%			-28.2%	-35.2%	9.3%							
												3.2	4.0	-.4			SP
												-1.8	-3.3	-.6	-4.	-0.	QBO
												2.0	3.5	.8	4.	1.	MAG
												15.7	6.2	9.6	-17.	6.	RAND
												11.3	15.0	6.7	18.	18.	SIG
66.28	63.83	117.07	.634+01	.947-04	233.	70.	-5.	.653+01	.933-04	238.	37.	7.	2.	0.			
750			-33.6%	-33.3%	-.4%			-31.6%	-34.3%	1.7%							
												2.9	3.4	-.2			SP
												-2.3	-3.8	-.9	-5.	0.	QBO
												2.3	3.8	.9	5.	2.	MAG
												5.4	2.3	3.0	-28.	12.	RAND
												10.3	13.9	6.4	21.	21.	SIG
63.47	60.55	120.76	.986+01	.142-03	242.	65.	-2.	.102+02	.141-03	246.	61.	24.	2.	0.			
810			-30.3%	-29.2%	-1.5%			-28.1%	-29.9%	.2%							
												2.4	2.5	.1			SP
												-2.2	-3.7	-1.0	-6.	1.	QBO
												2.6	4.1	1.0	6.	2.	MAG
												5.5	2.8	2.7	22.	25.	RAND
												9.2	12.4	5.3	25.	25.	SIG
62.49	59.45	121.74	.114+02	.163-03	244.	62.	-2.	.122+02	.173-03	239.	77.	14.	-0.	0.			
830			-29.4%	-27.8%	-2.1%			-24.5%	-23.3%	-3.9%							
												2.1	2.1	.1			SP
												-2.0	-3.5	-.9	-6.	1.	QBO
												2.7	4.2	1.0	6.	2.	MAG
												9.2	10.1	-.9	21.	14.	RAND
												8.9	11.9	4.8	26.	26.	SIG
60.43	57.25	123.39	.154+02	.217-03	248.	61.	-0.	.155+02	.212-03	250.	88.	19.	-0.	0.			
870			-27.2%	-25.1%	-2.7%			-26.8%	-26.9%	-2.1%							
												1.7	1.5	.2			SP
												-1.5	-2.9	-.9	-7.	2.	QBO
												2.8	4.4	1.0	7.	3.	MAG
												2.1	.5	1.6	34.	17.	RAND
												8.3	10.9	3.6	30.	30.	SIG
57.23	54.02	125.11	.246+02	.339-03	253.	61.	0.	.265+02	.376-03	241.	95.	25.	0.	0.			
930			-23.5%	-21.0%	-3.2%			-17.5%	-12.3%	-7.6%							
												.9	.8	.1			SP
												-.5	-1.3	-.4	-5.	1.	QBO
												2.9	4.0	.8	6.	2.	MAG
												8.3	12.4	-4.1	40.	24.	RAND
												6.6	9.3	3.6	41.	41.	SIG
54.17	48.98	126.30	.389+02	.527-03	257.	58.	2.	.412+02	.576-03	246.	58.	-5.	1.	0.			
1030			-16.1%	-14.9%	-3.8%			-13.3%	-6.9%	-7.8%							
												.1	.4	-.3			SP
												.3	.0	-.3	-3.	-0.	QBO
												2.6	3.1	.6	5.	1.	MAG
												5.5	9.4	-3.9	3.	-6.	RAND

															4.6	7.3	3.9	51.	51.	SIG
51.52	45.83	126.17	.561+02	.753-03	260.	56.	2.	.578+02	.818-03	250.	63.	-24.	2.	0.						
1100			-15.1%	-11.4%	-3.9%			-12.6%	-3.7%	-7.7%					-.4	.1	-.5			SP
															-1.4	.4	-.3	-2.	-1.	QBO
															2.4	2.5	.4	4.	2.	MAG
															4.5	8.2	-3.8	10.	-25.	RAND
															4.3	6.8	4.0	44.	44.	SIG
47.80	42.11	124.96	.911+02	.121-02	263.	55.	2.	.943+02	.135-02	247.	74.	-26.	3.	1.						
1200			-15.1%	-10.4%	-2.9%			-10.1%	-.3%	-8.6%					-2.8	-2.5	-.3			SP
															-1.1	.9	-.4	-2.	-2.	QBO
															2.0	2.1	.5	3.	2.	MAG
															4.7	10.2	-5.5	21.	-26.	RAND
															3.7	6.2	4.0	36.	36.	SIG
45.84	40.66	124.04	.117+03	.155-02	263.	55.	2.	.123+03	.167-02	255.	91.	-22.	4.	1.						
1250			-12.7%	-11.5%	-1.3%			-8.2%	-4.6%	-4.5%					-3.8	-3.8	-.0			SP
															.4	.4	-.6	-2.	-1.	QBO
															1.9	2.1	.6	2.	2.	MAG
															4.8	7.5	-2.6	38.	-23.	RAND
															3.3	5.8	3.9	33.	33.	SIG
44.21	39.70	123.21	.144+03	.192-02	261.	60.	2.	.141+03	.195-02	249.	66.	-2.	2.	1.						
1290			-12.6%	-12.5%	-.2%			-14.3%	-11.2%	-5.1%					-4.6	-4.9	.2			SP
															.9	.0	-.6	-2.	-1.	QBO
															1.8	2.0	.7	2.	2.	MAG
															-2.8	1.5	-4.3	8.	-3.	RAND
															3.1	5.5	3.9	31.	31.	SIG
41.98	38.22	121.65	.196+03	.267-02	256.	52.	4.	.192+03	.267-02	248.	71.	-18.	2.	1.						
1370			-11.1%	-11.1%	-.1%			-13.0%	-11.2%	-3.0%					-3.8	-4.1	.2			SP
															.4	-.2	-.3	-3.	-2.	QBO
															1.7	1.5	.8	3.	2.	MAG
															-2.5	.2	-2.7	22.	-20.	RAND
															2.9	5.1	3.9	29.	29.	SIG
38.74	37.52	121.20	.304+03	.430-02	247.	41.	1.	.310+03	.439-02	246.	82.	12.	3.	1.						
1410			-10.8%	-10.7%	-.1%			-8.9%	-8.7%	-.2%					-3.7	-4.0	.2			SP
															-.2	-.5	.3	-5.	-2.	QBO
															1.6	1.1	.9	5.	2.	MAG
															2.3	2.7	-.4	46.	13.	RAND
															2.8	4.5	3.8	26.	26.	SIG
37.34	37.03	121.02	.374+03	.538-02	242.	34.	-1.	.392+03	.563-02	242.	64.	10.	3.	1.						
1440			-9.5%	-9.1%	-.4%			-5.1%	-5.0%	-.2%					-2.9	-2.9	.0			SP
															-.2	-.0	.3	-5.	-2.	QBO
															1.3	1.0	.8	5.	2.	MAG
															5.0	5.2	-.1	36.	12.	RAND
															3.0	4.4	3.8	24.	24.	SIG
35.26	36.58	120.97	.507+03	.752-02	235.	24.	-4.	.529+03	.777-02	237.	12.	3.	2.	0.						
1470			-8.4%	-7.5%	-1.0%			-4.4%	-4.4%	-.1%					-1.7	-1.5	-.3			SP
															-.2	-.6	.3	-6.	-2.	QBO
															1.1	.8	.8	6.	2.	MAG
															4.6	4.0	.6	-6.	9.	RAND
															3.2	4.1	3.7	22.	22.	SIG

33.58	36.07	121.03	.654+03	.985-02	231.	14.	-6.	.651+03	.996-02	227.	5.	-22.	2.	0.		
1510			-7.2%	-6.8%	-.6%			-7.6%	-5.7%	-2.3%						
													-.8	-.3	-.6	SP
													-.1	-.4	.2	-5.	-2.	QBO
													.9	.0	.7	6.	2.	MAG
													-.3	1.5	-1.9	-3.	-14.	RAND
													3.6	4.1	3.6	21.	21.	SIG
31.08	35.75	121.99	.956+03	.147-01	226.	2.	-10.	.980+03	.147-01	232.	8.	-15.	2.	-0.		
1540			-6.2%	-5.8%	-.6%			-3.9%	-5.8%	1.9%						
													.5	1.4	-1.0	SP
													-.0	-.1	.0	-4.	-1.	QBO
													.7	.4	.5	5.	1.	MAG
													2.5	.1	2.4	10.	-4.	RAND
													4.2	4.2	3.5	19.	19.	SIG
29.02	35.57	121.92	.131+04	.204-01	223.	-2.	-10.	.127+04	.195-01	226.	8.	-9.	2.	-0.		
1560			-5.6%	-4.6%	-1.3%			-8.4%	-8.7%	.1%						
													.0	.0	.0	SP
													-.1	.0	-.1	-2.	-1.	QBO
													.6	.4	.4	4.	1.	MAG
													-2.9	-4.3	1.5	12.	2.	RAND
													4.5	4.0	3.4	16.	16.	SIG
27.39	35.42	120.83	.108+04	.265-01	220.	-1.	-8.	.160+04	.251-01	221.	-2.	2.	1.	-0.		
1580			-5.2%	-3.8%	-1.6%			-9.9%	-8.9%	-1.1%						
													.0	.0	.0	SP
													-.2	-.0	-.3	-1.	-1.	QBO
													.5	.4	.4	3.	1.	MAG
													-4.6	-5.4	.7	-0.	10.	RAND
													4.5	3.8	3.3	13.	13.	SIG
26.13	35.30	120.73	.204+04	.325-01	218.	-0.	-6.	.202+04	.307-01	229.	-2.	-3.	1.	-0.		
1600			-5.1%	-3.2%	-1.9%			-5.7%	-8.7%	2.7%						
													.0	.0	.0	SP
													-.2	-.1	-.3	-1.	-0.	QBO
													.5	.4	.4	2.	1.	MAG
													-.5	-5.5	5.1	-1.	4.	RAND
													4.6	3.6	3.2	11.	11.	SIG
23.69	35.08	120.58	.298+04	.463-01	215.	2.	-4.	.304+04	.470-01	224.	7.	7.	-0.	-0.		
1640			-4.4%	-2.0%	-2.4%			-2.6%	-4.6%	1.9%						
													.0	.0	.0	SP
													-.3	-.1	-.3	-0.	-0.	QBO
													.4	.4	.3	1.	1.	MAG
													2.1	-2.6	4.7	5.	10.	RAND
													1.4	1.4	1.4	11.	11.	SIG
21.30	34.95	120.52	.437+04	.717-01	212.	4.	-4.	.444+04	.716-01	216.	-11.	-1.	-1.	-0.		
1670			-3.2%	-.7%	-2.5%			-1.7%	-.8%	-1.1%						
													.0	.0	.0	SP
													-.2	-.1	-.3	-0.	0.	QBO
													.3	.4	.3	1.	0.	MAG
													1.7	-.0	1.8	-16.	3.	RAND
													1.2	1.4	1.4	13.	13.	SIG
19.71	34.88	120.47	.566+04	.935-01	211.	10.	-3.	.570+04	.939-01	211.	-17.	19.	-2.	-0.		
1690			-2.1%	.5%	-2.6%			-1.5%	.9%	-2.5%						
													.0	.0	.0	SP
													-.2	-.1	-.2	0.	0.	QBO
													.3	.3	.3	1.	0.	MAG
													.8	.5	.3	-27.	22.	RAND
													1.2	1.0	1.6	16.	16.	SIG

17.56	34.83	120.44	.803+04	.134+00	209.	14.	-4.	.806+04	.134+00	209.	-6.	24.	-3.	0.		
1708			-.9%	2.5%	-3.4%			-.6%	3.0%	-3.6%						
															.0	SP
															-.2	QBO
															.2	MAG
															.5	RAND
															1.6	SIG
15.67	34.79	120.41	.110+05	.182+00	210.	22.	-4.	.112+05	.185+00	211.	1.	66.	-2.	-0.		
1722			.7%	4.0%	-3.1%			2.7%	5.5%	-2.6%						
															.0	SP
															-.1	QBO
															.1	MAG
															2.1	RAND
															2.6	SIG
13.59	34.76	120.39	.154+05	.252+00	212.	25.	-4.	.153+05	.251+00	213.	-19.	61.	-0.	-0.		
1736			1.7%	3.8%	-2.0%			1.3%	3.1%	-1.8%						
															.0	SP
															.0	QBO
															.0	MAG
															-.4	RAND
															2.8	SIG
11.32	34.73	120.38	.221+05	.354+00	218.	22.	-2.	.218+05	.350+00	217.	-37.	72.	2.	-0.		
1752			2.4%	2.0%	.4%			1.1%	1.0%	.2%						
															.0	SP
															.0	QBO
															.0	MAG
															-1.3	RAND
															2.5	SIG
9.52	34.70	120.36	.291+05	.446+00	227.	20.	-3.	.291+05	.446+00	227.	-53.	28.	2.	0.		
1768			2.2%	1.8%	.4%			2.2%	1.8%	.4%						
															.0	SP
															.0	QBO
															.0	MAG
															-.0	RAND
															2.1	SIG
8.46	34.68	120.35	.340+05	.505+00	235.	18.	-3.	.344+05	.512+00	234.	-50.	30.	3.	-0.		
1780			2.0%	1.4%	.6%			3.3%	2.8%	.5%						
															.0	SP
															.0	QBO
															.0	MAG
															1.3	RAND
															1.9	SIG
7.54	34.65	120.35	.388+05	.560+00	241.	16.	-2.	.394+05	.562+00	244.	-44.	20.	3.	-0.		
1796			1.9%	1.0%	.9%			3.5%	1.3%	2.2%						
															.0	SP
															.0	QBO
															.0	MAG
															1.6	RAND
															1.7	SIG
7.07	34.63	120.35	.415+05	.590+00	245.	15.	-2.	.426+05	.594+00	250.	-42.	4.	3.	-0.		
1806			1.9%	.7%	1.1%			4.6%	1.5%	3.1%						
															.0	SP
															.0	QBO
															.0	MAG
															2.7	RAND
															1.6	SIG
5.11	34.61	120.43	.540+05	.727+00	259.	10.	-1.	.557+05	.733+00	265.	-12.	5.	3.	-0.		

.0	.0	.0			SP
-.2	-.1	-.2	0.	0.	QBO
.2	.2	.2	0.	0.	MAG
.5	.6	-.0	-20.	28.	RAND
1.6	1.9	1.9	21.	21.	SIG
.0	.0	.0			SP
-.1	-.1	.0	0.	0.	QBO
.1	.1	.2	0.	0.	MAG
2.1	1.6	.5	-21.	69.	RAND
2.6	2.4	2.0	27.	27.	SIG
.0	.0	.0			SP
.0	.0	.0	0.	0.	QBO
.0	.0	.0	0.	0.	MAG
-.4	-.6	.2	-44.	64.	RAND
2.8	2.4	2.0	29.	29.	SIG
.0	.0	.0			SP
.0	.0	.0	0.	0.	QBO
.0	.0	.0	0.	0.	MAG
-1.3	-1.0	-.2	-59.	74.	RAND
2.5	2.1	1.9	30.	30.	SIG
.0	.0	.0			SP
.0	.0	.0	0.	0.	QBO
.0	.0	.0	0.	0.	MAG
-.0	-.0	-.0	-72.	58.	RAND
2.1	1.8	1.8	29.	29.	SIG
.0	.0	.0			SP
.0	.0	.0	0.	0.	QBO
.0	.0	.0	0.	0.	MAG
1.3	1.3	-.0	-68.	33.	RAND
1.9	1.8	1.8	25.	25.	SIG
.0	.0	.0			SP
.0	.0	.0	0.	0.	QBO
.0	.0	.0	0.	0.	MAG
1.6	.4	1.3	-61.	22.	RAND
1.7	1.7	1.7	22.	22.	SIG
.0	.0	.0			SP
.0	.0	.0	0.	0.	QBO
.0	.0	.0	0.	0.	MAG
2.7	.7	2.0	-57.	6.	RAND
1.6	1.7	1.7	21.	21.	SIG

1650			1.5%	-.1%	1.6%			4.6%	.7%	4.0%				
3.53	34.64	120.47	.662+05	.857+00	269.	6.	-1.	.669+05	.872+00	267.	-10.	0.	3.	-1.
1882			1.0%	-.5%	1.5%			2.1%	1.3%	.7%				

.0	.0	.0			SP
.0	.0	.0	0.	0.	QBO
.0	.0	.0	0.	0.	MAG
3.1	.8	2.3	-22.	7.	RAND
1.2	1.7	1.7	15.	15.	SIG

.0	.0	.0			SP
.0	.0	.0	0.	0.	QBO
.0	.0	.0	0.	0.	MAG
1.0	1.8	-.7	-16.	2.	RAND
.9	1.7	1.7	12.	12.	SIG

SAMPLE PROFILE PROGRAM OUTPUT

VERTICAL PROFILE FOR JANUARY AT CAPE KENNEDY

INITIAL HEIGHT = 92.00 KM
F10.7 = .00
DATE = 1/ 1/73
LAT INCREMENT = .00 DEG
MAXIMUM NUMBER OF POSITIONS = 46
TRAJECTORY OPTION= 0

INITIAL LAT = 28.45 DEG
MEAN F10.7 = .00
GREENWICH TIME = 0: 0: 0
WEST LON INCREMENT = .00 DEG
TIME INCREMENT = 0 SEC
PUNCH OPTION= 0

INITIAL WEST LON = 80.53 DEG
AP = .00

HEIGHT INCREMENT = 2.00 KM

GROVES INPUT UNIT = 3
4-D INPUT UNIT = 4
FIRST RANDOM NUMBER = 8941
NMC READ OPTION = 0
NMC GRID POINTS SCRATCH UNIT = 13

RANDOM INPUT UNIT = 3
RANDOM OPTION = 1

4-D P,D,T DATA SCRATCH UNIT = 12
JULIAN DATE = 2441684.0

QBO INPUT UNIT = 3
QBO OPTION = 1

INITIAL P,D,T = -12.70 % -7.20 % -5.60 %
INITIAL U,V = -18.00 M/S -16.00 M/S

SIGMA P,D,T = 10.21 % 10.43 % 9.91 %
SIGMA U,V = 19.96 M/S 19.96 M/S

** PERCENT DEVIATIONS FROM 1962 US STANDARD ATMOSPHERE APPEAR BELOW PRESSURE, DENSITY, AND TEMPERATURE VALUES **

			UNPERTURBED (MONTHLY MEAN)					MEAN PLUS PERTURBATIONS					THERMAL WIND SHEAR (M/S/KM)		PERTURBATION VALUES					
HEIGHT (KM) TIME (SEC)	LAT (DEG)	WEST LON (DEG)	PRES. (NT/ M**2)	DENS. (KG/ M**3)	TEMP (DEG KELVIN)	GEOSTROPH. WIND (M/S) E-W	GEOSTROPH. WIND (M/S) N-S	PRES. (NT/ M**2)	DENS. (KG/ M**3)	TEMP (DEG KELVIN)	TOTAL WIND (M/S) E-W	TOTAL WIND (M/S) N-S	E-W	N-S	P (%)	D (%)	T (%)	U M/S	V M/S	
90.00	28.45	80.53	.184+00	.341-05	189.	11.	0.	.180+00	.335-05	187.	5.	-2.	-2.	0.						
0			12.2%	7.4%	4.4%			9.3%	5.8%	3.3%					.0	.0	.0			SP
															.0	.0	.0	0.	0.	QBO
															.0	.0	.0	0.	0.	MAG
															-2.6	-1.6	-1.0	-6.	-2.	RAND
															6.9	7.7	10.2	5.	5.	SIG
88.00	28.45	80.53	.269+00	.494-05	190.	6.	11.	.257+00	.449-05	198.	-6.	11.	-2.	-0.						
0			13.3%	7.8%	5.0%			8.1%	-2.0%	9.9%					2.9	3.4	-.5			SP
															-.1	-.0	-.0	0.	-0.	QBO
															.1	.0	.0	1.	0.	MAG
															-4.4	-9.1	4.7	-13.	0.	RAND
															6.8	7.9	9.9	12.	12.	SIG
86.00	28.45	80.53	.382+00	.695-05	191.	4.	12.	.397+00	.743-05	186.	-1.	17.	-1.	-1.						
0			11.4%	5.1%	5.9%			15.8%	12.3%	3.0%					3.1	3.7	-.7			SP
															-.2	-.0	-.1	1.	-0.	QBO
															.2	.1	.1	2.	0.	MAG
															4.2	6.9	-2.7	-6.	4.	RAND
															6.7	8.0	9.5	19.	19.	SIG
84.00	28.45	80.53	.540+00	.975-05	193.	8.	14.	.547+00	.974-05	196.	3.	16.	-1.	-1.						
0			8.8%	1.9%	6.7%			10.4%	1.8%	8.6%					3.4	4.1	-.9			SP
															-.4	-.0	-.1	2.	0.	QBO
															.4	.1	.1	2.	0.	MAG
															1.8	-.1	1.9	-7.	2.	RAND
															6.7	8.1	9.2	21.	21.	SIG
82.00	28.45	80.53	.758+00	.136-04	194.	13.	15.	.802+00	.145-04	193.	7.	15.	-1.	-1.						
0			5.8%	-1.6%	7.5%			11.9%	5.1%	6.8%					3.7	4.5	-.9			SP

															-.6	-.0	-.2	2.	-0.	QBO
															.6	.2	.2	3.	1.	MAG
															6.4	6.8	-.4	-8.	0.	RAND
															6.7	8.3	8.8	17.	17.	SIG
80.00	28.45	80.53	.107+01	.190-04	196.	13.	16.	.112+01	.195-04	201.	12.	13.	-1.	-1.						
0			2.8%	-5.0%	8.3%			7.9%	-2.6%	11.4%					4.0	4.9	-1.0			SP
															-.7	-.1	-.3	3.	-0.	QBO
															.8	.3	.3	3.	1.	MAG
															5.8	2.6	3.2	-3.	-2.	RAND
															6.8	8.4	8.4	13.	13.	SIG
78.00	28.45	80.53	.149+01	.263-04	198.	14.	17.	.151+01	.262-04	201.	31.	6.	-1.	-1.						
0			.5%	-4.3%	5.0%			1.2%	-4.6%	6.7%					4.3	5.2	-1.1			SP
															-1.0	-.1	-.3	3.	-1.	QBO
															1.0	.4	.3	4.	1.	MAG
															1.7	-.2	2.0	14.	-10.	RAND
															6.3	8.3	7.9	16.	16.	SIG
76.00	28.45	80.53	.210+01	.365-04	200.	13.	18.	.204+01	.353-04	203.	-2.	27.	-1.	-1.						
0			-.4%	-2.4%	2.0%			-2.9%	-5.6%	3.4%					4.6	5.6	-1.1			SP
															-1.2	-.1	-.3	3.	-1.	QBO
															1.3	.5	.4	5.	2.	MAG
															-1.4	-3.2	1.8	-18.	10.	RAND
															5.8	8.3	7.4	20.	20.	SIG
74.00	28.45	80.53	.291+01	.497-04	204.	21.	19.	.279+01	.479-04	204.	-8.	37.	-2.	-0.						
0			-.9%	-1.0%	-.0%			-5.0%	-4.4%	.1%					4.7	5.6	-.9			SP
															-1.4	-.1	-.4	4.	-2.	QBO
															1.6	.6	.4	5.	2.	MAG
															-2.8	-3.4	.5	-32.	19.	RAND
															5.7	8.2	6.8	21.	21.	SIG
72.00	28.45	80.53	.400+01	.667-04	209.	30.	21.	.402+01	.658-04	215.	7.	39.	-2.	-0.						
0			-1.1%	.1%	-1.3%			-.8%	-1.1%	1.3%					4.9	5.6	-.7			SP
															-1.5	-.1	-.4	4.	-2.	QBO
															1.9	.8	.5	6.	2.	MAG
															1.9	-1.2	3.1	-27.	20.	RAND
															5.9	8.3	6.2	20.	20.	SIG
70.00	28.45	80.53	.551+01	.896-04	214.	32.	22.	.551+01	.904-04	215.	14.	23.	-3.	-0.						
0			-.3%	2.3%	-2.5%			-.2%	3.3%	-2.3%					5.1	5.6	-.5			SP
															-1.6	-.1	-.5	4.	-3.	QBO
															2.2	.9	.6	6.	3.	MAG
															1.7	1.0	.7	-22.	4.	RAND
															6.1	8.3	5.6	19.	19.	SIG
68.00	28.45	80.53	.746+01	.117-03	222.	39.	24.	.732+01	.115-03	224.	11.	10.	-2.	0.						
0			.2%	2.7%	-2.4%			-1.7%	.8%	-1.6%					5.3	5.7	-.3			SP
															-1.5	-.1	-.5	4.	-3.	QBO
															2.2	1.0	.7	7.	3.	MAG
															-.4	-1.7	1.4	-32.	-10.	RAND
															6.0	8.2	5.1	20.	20.	SIG
66.00	28.45	80.53	.101+02	.153-03	230.	40.	24.	.988+01	.154-03	226.	10.	0.	-1.	0.						
0			1.2%	3.9%	-2.4%			-.6%	4.4%	-4.1%					5.2	5.5	-.2			SP
															-1.3	-.1	-.6	5.	-3.	QBO

															2.3	1.2	.7	7.	4.	MAG
															-.5	.6	-1.1	-35.	-20.	RAND
															5.9	8.1	4.5	22.	22.	SIG
64.00	28.45	80.53	.134+02	.197-03	237.	43.	23.	.143+02	.215-03	233.	3.	14.	-0.	0.						
0			1.8%	4.6%	-2.5%			8.7%	14.1%	-4.2%					5.2	5.4	-.1			SP
															-1.1	.0	-.6	4.	-2.	QBO
															2.3	1.4	.8	7.	5.	MAG
															7.9	9.0	-1.1	-45.	-7.	RAND
															5.7	8.0	4.1	25.	25.	SIG
62.00	28.45	80.53	.176+02	.251-03	244.	47.	23.	.176+02	.253-03	243.	14.	22.	0.	0.						
0			1.9%	5.0%	-2.7%			1.8%	5.8%	-3.2%					5.1	5.3	.0			SP
															-.7	.2	-.6	4.	-1.	QBO
															2.2	1.6	.9	8.	5.	MAG
															.6	.5	.1	-37.	-0.	RAND
															5.4	7.9	3.9	29.	29.	SIG
60.00	28.45	80.53	.230+02	.320-03	251.	47.	23.	.234+02	.327-03	251.	17.	38.	1.	0.						
0			2.6%	4.7%	-1.7%			4.4%	6.9%	-1.8%					5.1	5.1	.1			SP
															-.4	.4	-.6	3.	1.	QBO
															2.2	1.8	1.0	8.	6.	MAG
															2.1	1.6	.5	-33.	14.	RAND
															5.1	7.7	3.7	33.	33.	SIG
58.00	28.45	80.53	.300+02	.407-03	257.	42.	23.	.311+02	.421-03	259.	59.	46.	1.	0.						
0			2.9%	4.3%	-1.1%			6.9%	7.6%	-.3%					5.0	5.0	.2			SP
															-.2	.3	-.5	3.	1.	QBO
															1.7	1.3	.8	8.	4.	MAG
															4.2	2.9	1.3	13.	22.	RAND
															4.9	7.5	3.8	31.	31.	SIG
56.00	28.45	80.53	.390+02	.518-03	262.	37.	22.	.385+02	.515-03	261.	60.	18.	2.	1.						
0			3.6%	4.1%	-.5%			2.3%	3.5%	-1.1%					5.0	4.9	.2			SP
															-.1	.2	-.4	3.	0.	QBO
															1.3	.8	.7	7.	2.	MAG
															-1.1	-.9	-.2	20.	-4.	RAND
															4.6	7.2	3.8	30.	30.	SIG
54.00	28.45	80.53	.503+02	.657-03	267.	35.	21.	.479+02	.599-03	276.	82.	23.	2.	1.						
0			3.7%	4.1%	-.3%			-1.2%	-5.1%	3.1%					5.0	4.8	.2			SP
															-.0	-.4	-.3	4.	0.	QBO
															1.0	.6	.5	6.	1.	MAG
															-4.7	-8.5	3.8	43.	1.	RAND
															4.3	6.9	3.8	29.	29.	SIG
52.00	28.45	80.53	.643+02	.832-03	270.	34.	20.	.658+02	.820-03	278.	51.	7.	1.	1.						
0			3.4%	3.9%	-.3%			5.7%	2.4%	2.8%					5.0	4.7	.2			SP
															.1	-.2	-.2	5.	-0.	QBO
															.8	.6	.5	6.	1.	MAG
															2.1	-1.2	3.3	12.	-13.	RAND
															4.1	6.6	3.9	30.	30.	SIG
50.00	28.45	80.53	.816+02	.104-02	273.	35.	19.	.822+02	.102-02	283.	50.	8.	1.	1.						
0			2.3%	1.6%	1.0%			3.0%	-1.1%	4.6%					4.1	3.7	.4			SP
															.2	.5	-.2	6.	-0.	QBO
															.6	.5	.4	6.	1.	MAG

														.5	-3.3	3.8	10.	-11.	RAND
														3.8	6.3	3.9	31.	31.	SIG
48.00	28.45	80.53	.104+03	.133-02	272.	37.	18.	.104+03	.133-02	277.	41.	5.	0.	1.	3.3	2.7	.5			SP
0			1.8%	1.2%	.5%			1.8%	.9%	2.2%					-.7	.7	-.2	2.	-1.	GBO
															.7	.8	.5	4.	1.	MAG
															.7	-1.1	1.8	2.	-11.	RAND
															3.5	5.9	3.9	30.	30.	SIG
46.00	28.45	80.53	.133+03	.170-02	271.	37.	16.	.141+03	.175-02	282.	16.	19.	-0.	0.	2.4	1.7	.7			SP
0			1.1%	-.7%	1.4%			7.3%	1.9%	5.5%					.2	.8	-.1	-0.	-1.	GBO
															.7	1.0	.6	3.	1.	MAG
															5.9	1.8	4.1	-21.	4.	RAND
															3.2	5.6	3.8	28.	28.	SIG
44.00	28.45	80.53	.169+03	.219-02	268.	39.	15.	.174+03	.222-02	270.	7.	26.	-0.	0.	1.6	.7	.8			SP
0			-.1%	-2.9%	2.5%			2.5%	-1.5%	3.2%					.7	.6	-.4	-1.	-0.	GBO
															.8	1.0	.6	2.	1.	MAG
															1.8	.8	1.1	-32.	11.	RAND
															3.0	5.2	3.8	27.	27.	SIG
42.00	28.45	80.53	.219+03	.290-02	263.	36.	15.	.226+03	.294-02	266.	48.	38.	0.	0.	2.1	1.4	.7			SP
0			-.2%	-3.1%	2.8%			2.9%	-1.8%	3.9%					.6	.3	-.4	-3.	-1.	GBO
															.9	.9	.5	4.	1.	MAG
															2.5	1.0	1.5	14.	23.	RAND
															2.8	4.9	3.8	27.	27.	SIG
40.00	28.45	80.53	.281+03	.379-02	258.	36.	14.	.288+03	.396-02	253.	44.	19.	0.	0.	1.6	.7	.8			SP
0			-2.1%	-5.3%	3.2%			.4%	-1.0%	1.0%					.4	.1	.2	-5.	-1.	GBO
															1.0	.7	.4	5.	2.	MAG
															2.1	4.5	-2.4	13.	7.	RAND
															2.6	4.5	3.8	27.	27.	SIG
38.00	28.45	80.53	.368+03	.510-02	251.	33.	12.	.375+03	.514-02	254.	48.	19.	1.	0.	1.0	.3	.6			SP
0			-2.5%	-5.0%	2.5%			-.6%	-4.3%	3.7%					.3	-.1	.3	-6.	-2.	GBO
															.8	.6	.4	6.	2.	MAG
															1.8	.9	.9	21.	9.	RAND
															2.8	4.3	3.7	25.	25.	SIG
36.00	28.45	80.53	.480+03	.687-02	243.	29.	9.	.492+03	.720-02	237.	43.	19.	2.	0.	.4	-.2	.5			SP
0			-3.6%	-5.3%	1.7%			-1.3%	-.8%	-.7%					.1	-.3	.3	-7.	-2.	GBO
															.7	.5	.5	7.	2.	MAG
															2.3	5.1	-2.8	21.	11.	RAND
															3.0	4.1	3.7	23.	23.	SIG
34.00	28.45	80.53	.632+03	.927-02	238.	25.	7.	.653+03	.976-02	233.	25.	6.	2.	1.	-.2	-.6	.3			SP
0			-4.8%	-6.3%	1.6%			-1.6%	-1.3%	-.3%					.1	-.2	.3	-7.	-1.	GBO
															.6	.4	.5	7.	1.	MAG
															3.2	5.5	-2.3	6.	0.	RAND

															3.4	4.0	3.6	21.	21.	SIG
32.00	28.45	80.53	.837+03	.125-01	233.	21.	5.	.869+03	.132-01	230.	23.	-4.	2.	1.						
0			-5.9%	-7.7%	2.1%			-2.3%	-2.8%	.5%					-.8	-1.0	.1			SP
															.1	-.0	.2	-5.	-1.	GBO
															.5	.3	.4	6.	1.	MAG
															3.7	5.4	-1.7	7.	-8.	RAND
															3.9	4.0	3.5	19.	19.	SIG
30.00	28.45	80.53	.111+04	.169-01	229.	18.	2.	.117+04	.181-01	226.	25.	-9.	1.	1.						
0			-7.5%	-8.3%	1.1%			-2.0%	-1.5%	-.4%					-1.4	-1.4	-.0			SP
															.1	.1	.1	-4.	-1.	GBO
															.4	.3	.3	5.	1.	MAG
															5.7	7.3	-1.6	11.	-11.	RAND
															4.4	4.1	3.4	17.	17.	SIG
28.00	28.45	80.53	.152+04	.235-01	225.	16.	1.	.162+04	.248-01	228.	30.	-8.	1.	0.						
0			-6.2%	-6.2%	.1%			.2%	-1.2%	1.6%					.0	.0	.0			SP
															-.0	.0	-.2	-2.	-0.	GBO
															.4	.4	.3	4.	0.	MAG
															6.9	5.2	1.6	16.	-9.	RAND
															4.4	3.8	3.3	14.	14.	SIG
26.00	28.45	80.53	.207+04	.328-01	220.	14.	1.	.205+04	.330-01	216.	14.	1.	1.	0.						
0			-5.2%	-4.3%	-.9%			-6.5%	-3.6%	-3.1%					.0	.0	.0			SP
															-.2	-.1	-.2	-1.	-0.	GBO
															.4	.5	.2	2.	0.	MAG
															-1.2	.8	-1.9	2.	0.	RAND
															4.5	3.4	3.1	10.	10.	SIG
24.00	28.45	80.53	.284+04	.457-01	216.	11.	0.	.280+04	.458-01	213.	17.	-5.	1.	0.						
0			-4.6%	-2.6%	-1.9%			-5.8%	-2.3%	-3.5%					.0	.0	.0			SP
															-.3	-.2	-.2	-0.	-0.	GBO
															.4	.5	.2	2.	0.	MAG
															-1.0	.4	-1.5	6.	-6.	RAND
															.7	.9	.8	9.	9.	SIG
22.00	28.45	80.53	.391+04	.643-01	212.	8.	0.	.390+04	.646-01	210.	27.	5.	-0.	-0.						
0			-3.5%	-.3%	-3.2%			-3.6%	.2%	-3.8%					.0	.0	.0			SP
															-.3	-.2	-.1	-0.	-0.	GBO
															.4	.5	.2	1.	0.	MAG
															.1	.7	-.6	20.	5.	RAND
															.6	.9	.9	12.	12.	SIG
20.00	28.45	80.53	.545+04	.914-01	207.	16.	3.	.548+04	.924-01	207.	34.	9.	-2.	-0.						
0			-1.5%	2.8%	-4.2%			-.8%	3.9%	-4.6%					.0	.0	.0			SP
															-.3	-.3	.0	0.	0.	GBO
															.3	.4	.2	1.	0.	MAG
															.9	1.3	-.4	18.	6.	RAND
															.7	1.0	1.0	15.	15.	SIG
18.00	28.45	80.53	.759+04	.129+00	205.	19.	4.	.766+04	.130+00	205.	8.	11.	-3.	-0.						
0			.3%	6.0%	-5.4%			1.2%	6.9%	-5.5%					.0	.0	.0			SP
															-.2	-.2	-.2	0.	0.	GBO
															.2	.3	.2	1.	0.	MAG
															1.1	1.1	.0	-11.	7.	RAND
															1.0	1.1	1.1	21.	21.	SIG

16.00 0	28.45	80.53	.107+05 3.5%	.183+00 9.8%	204. -5.8%	30.	3.	.106+05 2.7%	.183+00 9.8%	203. -6.5%	21.	-22.	-4.	-0.	.0 -.1 .1 -.6 1.7	.0 -.1 .2 .2 1.4	.0 .0 .1 -.7 1.2	 0. 1. -9. 28.	 0. 0. -25. 28.	SP QBO MAG RAND SIG
14.00 0	28.45	80.53	.149+05 5.0%	.246+00 8.1%	210. -2.9%	37.	4.	.150+05 5.5%	.246+00 7.9%	212. -2.2%	50.	-8.	-1.	-0.	.0 .0 .0 .5 1.8	.0 .0 .0 -.2 1.5	.0 .0 .0 .7 1.2	 0. 0. 13. 32.	 0. 0. -11. 32.	SP QBO MAG RAND SIG
12.00 0	28.45	80.53	.205+05 5.5%	.328+00 5.2%	217. .3%	35.	3.	.202+05 4.2%	.323+00 3.4%	218. .7%	56.	4.	2.	0.	.0 .0 .0 -1.2 1.7	.0 .0 .0 -1.7 1.4	.0 .0 .0 .5 1.2	 0. 0. 21. 32.	 0. 0. 1. 32.	SP QBO MAG RAND SIG
10.00 0	28.45	80.53	.278+05 4.8%	.421+00 1.8%	230. 3.0%	32.	3.	.273+05 3.2%	.412+00 -.3%	231. 3.4%	25.	28.	4.	0.	.0 .0 .0 -1.6 1.4	.0 .0 .0 -2.0 1.2	.0 .0 .0 .4 1.2	 0. 0. -7. 33.	 0. 0. 25. 33.	SP QBO MAG RAND SIG
8.00 0	28.45	80.53	.370+05 3.9%	.529+00 .6%	244. 3.3%	26.	3.	.373+05 4.6%	.519+00 -1.4%	250. 6.0%	20.	8.	4.	0.	.0 .0 .0 .7 1.2	.0 .0 .0 -1.9 1.1	.0 .0 .0 2.6 1.1	 0. 0. -6. 26.	 0. 0. 5. 26.	SP QBO MAG RAND SIG
6.00 0	28.45	80.53	.486+05 2.9%	.654+00 -.9%	259. 3.8%	20.	3.	.495+05 4.9%	.651+00 -1.4%	265. 6.3%	27.	19.	4.	0.	.0 .0 .0 1.9 1.0	.0 .0 .0 -.5 1.0	.0 .0 .0 2.4 1.0	 0. 0. 7. 19.	 0. 0. 16. 19.	SP QBO MAG RAND SIG
4.00 0	28.45	80.53	.628+05 1.9%	.808+00 -1.4%	271. 3.3%	12.	3.	.636+05 3.2%	.814+00 -.6%	272. 3.9%	-4.	5.	4.	0.	.0 .0 .0 1.3 .7	.0 .0 .0 .7 .9	.0 .0 .0 .5 .9	 0. 0. -16. 13.	 0. 0. 2. 13.	SP QBO MAG RAND SIG
2.00 0	28.45	80.53	.804+05 1.1%	.996+00 -1.1%	281. 2.2%	6.	2.	.805+05 1.3%	.101+01 -.1%	279. 1.4%	-12.	17.	3.	1.	.0 .0 .0 .2 .6	.0 .0 .0 .9 1.1	.0 .0 .0 -.7 1.1	 0. 0. -18. 10.	 0. 0. 15. 10.	SP QBO MAG RAND SIG

APPENDIX C - PROFILE PROGRAM LISTING

Following is a listing of the PROFILE program. The subroutines are in order alphabetically. Numbers on the left hand side of the listing are relative addresses and consecutive record numbers. Sequence numbers containing a three character subroutine code and a five digit number appear on the right of the printout. Information on the storage requirements, and a listing of the identifiers used appear at the beginning of each subroutine.

```
@HDG,P  *****  CORR  *****
@FOR,S PROFAS,CORR,CORR
FOR S11E-02/04/74-18:52:00 (0,)

    FUNCTION CORR        ENTRY POINT 000122

    STORAGE USED: CODE(1) 000126; DATA(0) 000027; BLANK COMMON(2) 000000

    EXTERNAL REFERENCES (BLOCK, NAME)

     0003   NERR3$

    STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

     0001   000037 10L       0001   000110 100L      0001   000046 17L       0001   000056 24L       0001   000066 38L
     0001   000076 62L       0001   000103 90L       0000 R 000000 CORR      0000   000022 INJP$
```

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00101      1*          FUNCTION CORR(H)                                                    COR00100
00101      2*     C.....LINEAR APPROXIMATIONS TO CORRELATION BETWEEN DENSITY AND           COR00200
00101      3*     C        TEMPERATURE FROM NASA-TM X-64589, USED IF CORRELATION COMPUTED  COR00300
00101      4*     C        FROM P,D,T AND T SIGMAS HAS ABSOLUTE VALUE GT 1.               COR00400
00103      5*          IF (H.LT.10.) GO TO 10                                              COR00500
00105      6*          IF (H.LT.17.) GO TO 17                                              COR00600
00107      7*          IF (H.LT.24.) GO TO 24                                              COR00700
00111      8*          IF (H.LT.38.) GO TO 38                                              COR00800
00113      9*          IF (H.LT.62.) GO TO 62                                              COR00900
00115     10*          IF (H.LT.90.) GO TO 90                                              COR01000
00117     11*          GO TO 100                                                           COR01100
00117     12*     C.....-0.95 AT SURFACE TO -0.46 AT 10 KM                                 COR01200
00120     13*        10 CORR = -0.95+0.049*H                                               COR01300
00121     14*          RETURN                                                              COR01400
00121     15*     C.....-0.46 AT 10 KM TO -0.81 AT 17 KM                                   COR01500
00122     16*        17 CORR = -0.46-0.05*(H-10.)                                          COR01600
00123     17*          RETURN                                                              COR01700
00123     18*     C.....-0.81 AT 17 KM TO -0.02 AT 24 KM                                   COR01800
00124     19*        24 CORR = -0.81 + 0.1129*(H-17.)                                      COR01900
```

```
00125     20*          RETURN                                                    COR02000
00125     21*     C.....-0.02 AT 24 KM TO -0.82 AT 38 KM                         COR02100
00126     22*        38 CORR = -0.02 -0.0571*(H-24.)                             COR02200
00127     23*          RETURN                                                    COR02300
00127     24*     C.....-0.82 BETWEEN 38 AND 62 KM                               COR02400
00130     25*        62 CORR = -0.82                                             COR02500
00131     26*          RETURN                                                    COR02600
00131     27*     C.....-0.70 BETWEEN 62 AND 90 KM                               COR02700
00132     28*        90 CORR = -0.7                                              COR02800
00133     29*          RETURN                                                    COR02900
00133     30*     C.....-0.75 ABOVE 90 KM                                        COR03000
00134     31*       100 CORR = -0.75                                             COR03100
00135     32*          RETURN                                                    COR03200
00136     33*          END                                                       COR03300

      END OF COMPILATION:       NO  DIAGNOSTICS.
@HDG,P  *****  DXHLVL  *****
@FOR,S PROFAS,DXHLVL,DXHLVL
FOR S11E-02/04/74-18:52:02 (0,)

   SUBROUTINE DXHLVL    ENTRY POINT 000052

   STORAGE USED: CODE(1) 000056; DATA(0) 000021; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   IOTEMP 000050

   EXTERNAL REFERENCES (BLOCK, NAME)

    0004   COS
    0005   SQRT
    0006   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000 R 000000 AH        0003   000040 AP        0000 R 000002 AV        0000 R 000001 BH        0000 R 000003 BV
    0003 R 000033 CH        0003 R 000034 CLAT      0003 R 000035 CLON      0003   000004 DD        0003 R 000044 DX
    0003   000047 DZ        0003   000036 F10       0003   000037 F10B      0003   000031 G         0003 R 000045 HL
    0003   000024 IDA       0003   000041 IHR       0000   000010 INJPS     0003   000000 IOTEM1    0003   000001 IOTEM2
    0003   000002 IUG       0003   000025 IYR       0003   000042 MIN       0003   000023 MN        0003   000003 NMCOP
    0003   000043 NMORE     0003   000010 NSAME     0003   000026 PH        0003   000007 PHI       0003   000006 PHI1
    0003 R 000027 PLAT      0003 R 000030 PLON      0003 R 000032 R         0003   000012 RD1       0003   000011 RP1
    0003   000013 RT1       0003   000017 RU1       0003   000020 RV1       0003   000015 SD1       0003   000014 SP1
    0003   000016 ST1       0003   000021 SU1       0003   000022 SV1       0003 R 000046 VL        0003   000005 XMJD


00101     1*          SUBROUTINE DXHLVL                                         DXH00100
00103     2*          COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,NSAME,  DXH00200
00103     3*         $ RP1,RD1,RT1,SP1,SD1,ST1,RU1,RV1,SU1,SV1,MN,IDA,IYR,PH,PLAT,  DXH00300
```

```
******  DXHLVL  ******                                                    DATE 020474        PAGE      1

00103      4*          * PLON,G,R,CH,CLAT,CLON,F10,F108,AP,IHR,MIN,NMORE,DX,HL,VL,DZ      DXH00400
00104      5*           DX  =     R*SQRT((CLAT-PLAT)**2 + (COS(CLAT)*(CLON-PLON))**2)     DXH00500
00104      6*     C.....DX IS HORIZONTAL DISTANCE BETWEEN POSITIONS PLAT,PLON AND CLAT,CLODXH00600
                                                                                         DXH00700
00105      7*           AH = 900.                                                         DXH00800
00106      8*           BH = 6.                                                           DXH00900
00107      9*           AV=5.                                                             DXH01000
00110     10*           BV=0.05                                                           DXH01100
00111     11*           HL = AH + BH*CH    @ HORIZONTAL WAVELENGTH, KM                    DXH01200
00112     12*           VL = AV + BV*CH    @ VERTICAL WAVELENGTH, KM                      DXH01300
00113     13*           RETURN                                                            DXH01400
00114     14*           END


      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  FAIR  ******
@FOR,S PROFAS.FAIR,FAIR
FOR S11E-02/04/74-18:52:04 (0,)


   SUBROUTINE FAIR      ENTRY POINT 000110

   STORAGE USED: CODE(1) 000160; DATA(0) 000040; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   ALOG
    0004   EXP
    0005   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000 R 000000 CZ        0000 R 000007 CZI       0000 I 000006 I        0000   000012 INJP$     0000 R 000010 SZI


00101      1*           SUBROUTINE FAIR (PG, DG, TG, PJ, DJ, TJ, IH, P, D, T, DPXG,       FAI00100
00101      2*          $ DPYG, DPXJ, DPYJ, DPX, DPY, DTXG, DTYG, DTXJ, DTYJ, DTX, DTY)    FAI00200
00101      3*     C.....FAIRS BETWEEN GROVES AND JACCHIA VALUES 90 LE HEIGHT LE 115 KM     FAI00300
00103      4*           DIMENSION CZ(6)                                                   FAI00400
00103      5*     C.....FAIRING VALUES                                                    FAI00500
00104      6*           DATA CZ /1.0,0.9045085,0.6545085,0.3454915,0.0954915,0.0/         FAI00600
00106      7*           I = (IH - 85)/5   @.....HEIGHT INDEX                              FAI00700
00107      8*           CZI = CZ(I)  @.....GROVES FAIRING COEFFICIENT                     FAI00800
00110      9*           SZI = 1.0 - CZI   @.....JACCHIA FAIRING COEFFICIENT               FAI00900
00111     10*           T = TG*CZI + TJ*SZI  @.....FAIRED TEMPERATURE                     FAI01000
00112     11*           P = EXP(ALOG(PG)*CZI + ALOG(PJ)*SZI) @.....FAIRED PRESSURE       FAI01100
00113     12*           D = EXP(ALOG(DG)*CZI + ALOG(DJ)*SZI) @.....FAIRED DENSITY        FAI01200
00114     13*           DPX = DPXJ                                                        FAI01300
00115     14*           DPY=DPYG*CZI+DPYJ*SZI  @.....DP/DY FOR GEOSTROPHIC WINDS         FAI01400
00116     15*           DTX = DTXJ                                                        FAI01500
00117     16*           DTY = DTYG * CZI + DTYJ * SZI  @.....DT/DY FOR THERMAL WINDS     FAI01600
00120     17*           RETURN                                                            FAI01700
00121     18*           END                                                               FAI01800
```

```
******  FAIR  ******

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  ******  GEN4D  ******
@FOR,S PROFAS,GEN4D,GEN4D
FOR S11E-02/04/74-18:52:06 (0,)

   SUBROUTINE GEN4D     ENTRY POINT 001134

   STORAGE USED: CODE(1) 001150; DATA(0) 000106; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   C4      004743
    0004   IOTEMP  000054
    0005   PDTCOM  007505


   EXTERNAL REFERENCES (BLOCK, NAME)

    0006   GRID4D
    0007   GTERP
    0010   INTER2
    0011   PDTUV
    0012   ATAN
    0013   NERR2$
    0014   SQRT
    0015   NERR3$


   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001    000216 110L      0001    000225 120L      0001    000234 130L      0001    000243 140L      0001    000247 150L
    0001    000253 160L      0001    000314 170G      0001    000257 170L      0001    000334 174G      0001    000266 180L
    0001    000274 190L      0001    000022 20L       0001    000354 200L      0001    000364 205G      0001    000414 216G
    0001    000415 221G      0001    000446 232G      0001    000467 240G      0001    000571 261G      0001    000050 30L
    0001    000751 306G      0001    001035 325G      0001    000405 400L      0001    000507 440L      0001    000637 445L
    0001    000650 480L      0001    001017 485L      0001    001111 500L      0004    000040 AP        0004    000050 B
    0000 R  000011 CHECK     0004 R  000007 CLAT      0003 R  004742 CLON      0003 R  000701 D         0004 R  000004 DD
    0005 R  001257 DG        0000 R  000031 DH        0000 R  000033 DP        0000 R  000022 DPX       0000 R  000023 DPY
    0005 R  003705 DSP       0000 R  000034 DT        0000 R  000024 DTX       0000 R  000025 DTY       0004 R  000044 DX
    0000 R  000001 DY        0004    000047 DZ        0000 R  000020 D2        0004    000051 EPS       0000 R  000000 F
    0004    000036 F10       0004    000037 F10B      0004    000031 G         0003 R  000000 GLAT      0003 R  000020 GLON
    0000 R  000027 H         0004    000045 HL        0004    000026 H1        0000 I  000006 I         0004    000024 IDA
    0000 I  000026 IHP       0004    000041 IHR       0000 I  000012 IHV       0000    000060 INJP$     0004    000052 IOPP
    0005    000002 IOPR      0004    000000 IOTEM1    0004    000001 IOTEM2    0004    000002 IU6       0005    000000 IU4
    0004    000025 IYR       0000 I  000007 I12       0000 I  000010 J         0000 I  000003 K         0000 I  000004 LAT0
    0000 I  000005 LON0      0004 I  000053 LOOK      0004    000042 MIN       0004    000023 MN        0005    000001 MONTH
    0003 I  000040 NG        0004    000003 NMCOP     0004    000043 NMORE     0004    000010 NSAME     0003 R  000041 P
    0005 R  000003 PG        0000 R  000030 PH        0004    000034 PHIR      0004    000027 PHI1R     0004 R  000006 PLAT
    0003 R  004741 PLON      0005 R  002005 PSP       0000 R  000017 P2        0004    000012 RD1       0004    000032 RI
    0004    000011 RP1       0004    000013 RT1       0004    000017 RU1       0004    000020 RV1       0003 R  003241 SD
    0000 R  000015 SDR       0004    000015 SD1       0003 R  002401 SP        0000 R  000014 SPR       0004    000014 SP1
    0003 R  004101 ST        0000 R  000016 STR       0004    000016 ST1       0004    000021 SU1       0004    000022 SV1
    0003 R  001541 T         0005 R  000531 TG        0000 R  000032 TH        0000 R  000002 THETA     0004    000035 THETR
    0004    000030 THET1R    0005 R  005605 TSP       0000 R  000021 T2        0004    000046 VL        0004    000005 XMJD
    0004    000033 Z         0000 R  000013 Z1
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00101     1*          SUBROUTINE GEN4D                                                GEN00100
00101     2*    C.....GENERATES NG = 9 OR 16 4D PROFILES P,D,T AND SIGMAS SP,SD,ST AT  GEN00200
00101     3*    C        GRID OF LATITUDES AND LONGITUDES GLAT,GLON. CURRENT LATITUDE, GEN00300
00101     4*    C        LONGITUDE=CLAT,CLON. PREVIOUS LATITUDE,LONGITUDE=PLAT,PLON.  GEN00400
00103     5*          COMMON/C4/GLAT(16),GLON(16),NG,P(16,26),D(16,26),T(16,26),      GEN00500
00103     6*         $ SP(16,26),SD(16,26),ST(16,26),PLON,CLON                        GEN00600
00104     7*          COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PLAT,CLAT,        GEN00700
00104     8*         $ NSAME,RP1,RD1,RT1,SP1,SD1,ST1,RU1,RV1,SU1,SV1,                 GEN00730
00104     9*         $ MN,IDA,IYR,H1,PHI1R,THET1R,G,RI,Z,PHIR,THETR,F10,F108,AP,      GEN00760
00104    10*         $ IHR,MIN,NMORE,DX,HL,VL,DZ,R,EPS,IOPP,LOOK                      GEN00790
00105    11*          COMMON/PDTCOM/IU4,MONTH,IOPR,PG(18,19),TG(18,19),DG(18,19),     GEN00800
00105    12*         1     PSP(8,10,12),DSP(8,10,12),TSP(8,10,12)                    GEN00900
00105    13*    C.....GENERATES NG=9 OR 16 4D PROFILES P,D,T AND SIGMAS SP,SD,ST AT    GEN01000
00105    14*    C        GRID OF LATITUDES AND LONGITUDES GLAT,GLON.  CURRENT LATITUDE GEN01100
00105    15*    C         LONGITUDE = CLAT, CLON.  PREVIOUS LATITUDE,LONGITUDE = PLAT, GEN01200
00105    16*    C        PLON                                                         GEN01300
00106    17*          LOOK=0                                                          GEN01350
00107    18*          F = 0.017453293                                                 GEN01400
00110    19*          NG = 16                                                         GEN01500
00111    20*          DX = PLON - CLON                                                GEN01600
00111    21*    C.....LONGITUDE DISPLACEMENT FROM PREVIOUS TO CURRENT POSITION        GEN01700
00112    22*          DY = CLAT - PLAT                                                GEN01800
00112    23*    C.....LATITUDE DISPLACEMENT FROM PREVIOUS TO CURRENT POSITION         GEN01900
00113    24*          IF (DY) 20,10,20                                                GEN02000
00116    25*       10 THETA = 180. + SIGN(90.,DX)                                     GEN02100
00117    26*          GO TO 30                                                        GEN02200
00120    27*       20 THETA = ATAN(DX/DY)/F                                           GEN02300
00121    28*          IF (DY.GT.0.) THETA = THETA + 180.                              GEN02400
00123    29*          IF (THETA.LT.0.) THETA = THETA + 360.                           GEN02500
00123    30*    C.....THETA = AZIMUTH ANGLE OF TRAJECTORY, USED TO ORIENT LAT-LON GRID GEN02600
00125    31*       30 K = INT((THETA + 67.5)/45.)                                     GEN02700
00126    32*          IF (K.GT.8)K=K-8  @ INDEX USED IN COMPUTED GO TO FOR 110 THRU 180 GEN02800
00130    33*          IF (CLAT.GT.75.0.AND.K.GE.3.AND.K.LE.7)GO TO 200@NORTH POLAR GRID GEN02900
00132    34*          IF (CLAT.LT.-75.0.AND.(K.GE.7.OR.K.LE.3))GO TO 200@SOUTH POL GRID GEN03000
00132    35*    C.....INITIAL ESTIMATE OF REFERNCE LATITUDE (LOWER LEFT GRID POINT)    GEN03100
00134    36*          LAT0 = 5*INT(CLAT/5.)                                           GEN03200
00135    37*          IF (CLAT.LT.0.) LAT0 = LAT0 - 5                                 GEN03300
00135    38*    C.....INITIAL ESTIMATE OF REFERENCE LONGITUDE (LOWER LEFT GRID POINT)  GEN03400
00137    39*          LON0=5*INT(CLON/5.)                                             GEN03500
00137    40*    C.....ADJUSTS LAT0,LON0 ACCORDING TO DIRECTION OF TRAJECTORY AZIMUTH   GEN03600
00140    41*          GO TO (110,120,130,140,150,160,170,180),K                       GEN03700
00141    42*      110 LAT0 = LAT0-10                                                  GEN03800
00142    43*          LON0 = LON0 + 10                                                GEN03900
00143    44*          GO TO 190                                                       GEN04000
00144    45*      120 LAT0 = LAT0-10                                                  GEN04100
00145    46*          LON0 = LON0+15                                                  GEN04200
00146    47*          GO TO 190                                                       GEN04300
00147    48*      130 LAT0 = LAT0-5                                                   GEN04400
00150    49*          LON0 = LON0+15                                                  GEN04500
00151    50*          GO TO 190                                                       GEN04600
00152    51*      140 LON0 = LON0+15                                                  GEN04700
00153    52*          GO TO 190                                                       GEN04800
00154    53*      150 LON0 = LON0+10                                                  GEN04900
00155    54*          GO TO 190                                                       GEN05000
00156    55*      160 LON0 = LON0+5                                                   GEN05100
00157    56*          GO TO 190                                                       GEN05200
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00160     57*        170 LAT0 = LAT0-5                                                GEN05300
00161     58*            LON0 = LON0+5                                                GEN05400
00162     59*            GO TO 190                                                    GEN05500
00163     60*        180 LAT0 = LAT0-10                                               GEN05600
00164     61*            LON0 = LON0+5                                                GEN05700
00165     62*        190 IF (LON0.GT.360) LON0 = LON0 - 360                           GEN05800
00167     63*            DO 195 I=1,4                                                 GEN05900
00172     64*            I12 = I+12                                                   GEN06000
00173     65*            DO 195 J=I,I12,4                                             GEN06100
00176     66*            GLAT(J) = LAT0 + 1.25*(J-I)                                  GEN06200
00176     67*     C.....LATITUDE, LONGITUDE GRID AT 5 DEGREE INTERVALS                GEN06300
00177     68*        195 GLON(J) = LON0 - 5. * (I - 1)                                GEN06400
00202     69*            GO TO 400                                                    GEN06500
00203     70*        200 NG = 9  @.....POLAR GRID                                     GEN06600
00204     71*            DO 210 J=1,8                                                 GEN06700
00204     72*     C.....POLAR GRID LATITUDES 1-8 = +75 (N) OR -75 (N)                 GEN06800
00207     73*            GLAT(J) = SIGN(75.,CLAT)                                     GEN06900
00207     74*     C.....POLAR GRID LONGITUDES 1-8 AT 45 DEG INTERVALS                 GEN07000
00210     75*        210 GLON(J) = 45.*(J-1)                                          GEN07100
00210     76*     C.....POLAR GRID LATITUDE 9 = POLE +93 OR -90                       GEN07200
00212     77*            GLAT(9) = SIGN(90.,CLAT)                                     GEN07300
00212     78*     C.....POLAR GRID LONGITUDE 9 = 0                                    GEN07400
00213     79*            GLON(9) = 0.                                                 GEN07500
00213     80*     C.....GENERATES 16 PROFILES (OR 9 PROFILES FOR POLAR GRID)          GEN07600
00214     81*        400 CALL GRID4D                                                  GEN07700
00215     82*            DO 410 I=1,NG                                                GEN07800
00220     83*            DO 410 J=1,26                                                GEN07900
00220     84*     C.....CONVERTS RELATIVE VARIANCES TO RELATIVE STANDARD              GEN08000
00220     85*     C         DEVIATIONS (SIGMAS)                                       GEN08100
00223     86*            SP(I,J) = SQRT(SP(I,J))                                      GEN08200
00224     87*            SD(I,J) = SQRT(SD(I,J))                                      GEN08300
00225     88*            ST(I,J) = SQRT(ST(I,J))                                      GEN08400
00226     89*        410 CONTINUE                                                     GEN08500
00231     90*            DO 500 I=1,NG                                                GEN08600
00234     91*            CHECK=P(I,26)*D(I,26)*T(I,26)*SP(I,26)*SD(I,26)*ST(I,26)     GEN08700
00235     92*            IF (CHECK.GT.0.) GO TO 500  @.....CHECK FOR ZERO DATA AT HEIGHT 25GEN08800
00237     93*            DO 420 J=25,1,-1                                             GEN08900
00242     94*            CHECK = P(I,J) * D(I,J) * T(I,J) * SP(I,J) * SD(I,J) * ST(I,J)  GEN09000
00243     95*            IHV = J @.....FINDS INDEX IHV OF HIGHEST HEIGHT WITH NON-ZERO DATAGEN09100
00244     96*            IF (CHECK.GT.0.) GO TO 440                                   GEN09200
00246     97*        420 CONTINUE                                                     GEN09300
00250     98*        440 Z1 = IHV -1. @.....HEIGHT = HEIGHT INDEX - 1                 GEN09400
00251     99*            SPR=SP(I,IHV)      @.....SPR,SDR,STR=SIGMAS AT HEIGHT Z1     GEN09500
00252    100*            SDR=SD(I,IHV)                                                GEN09600
00253    101*            STR=ST(I,IHV)                                                GEN09700
00253    102*     C.....IF HEIGHT Z1 GEQ 20 KM, USE GROVES AT 30 KM FOR INTERPOLATION,  GEN09800
00253    103*     C         OTHERWISE USE GROVES AT 25 KM                              GEN09900
00254    104*            IF (IHV.GE.21) GO TO 480                                     GEN10000
00254    105*     C.....EVALUATES GROVES AT 25 KM FOR INTERPOLATION AND               GEN10100
00254    106*     C         FILL IN OF ZERO DATA                                       GEN10200
00256    107*            CALL GTERP(25,GLAT(I),P2,D2,T2,PG,DG,TG,DPX,DPY,DTX,DTY)     GEN10300
00257    108*            IHP = IHV + 1                                                GEN10400
00260    109*            DO 450 K=IHP,26                                              GEN10500
00260    110*     C.....AVOIDS INTERPOLATION OF P,D,T IF ONLY SIGMAS ARE ZERO         GEN10600
00263    111*            IF ((P(I,K)*D(I,K)*T(I,K)).GT.0.) GO TO 445                  GEN10700
00265    112*            H=K-1                                                        GEN10800
00265    113*     C.....INTERPOLATES BETWEEN 4D AT HEIGHT Z1 AND GROVES AT 25 TO FILL GEN10900
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00265   114*      C         IN MISSING DATA                                                    GEN11000
00266   115*            CALL INTER2(P(I,IHV),D(I,IHV),T(I,IHV),Z1,P2,D2,T2,25.,PH,DH,TH,H)GEN11100
00267   116*            P(I,K)=PH                                                            GEN11200
00270   117*            D(I,K)=DH                                                            GEN11300
00271   118*            T(I,K)=TH                                                            GEN11400
00272   119*          445 SP(I,K) = SPR                                                      GEN11500
00273   120*            SD(I,K)=SDR                                                          GEN11600
00273   121*      C.....SETS MISSING SIGMAS EQUAL TO SIGMAS AT HEIGHT Z1                     GEN11700
00274   122*          450 ST(I,K)=STR                                                        GEN11800
00276   123*            GO TO 500                                                          GEN11900
00276   124*      C.....EVALUATES GROVES AT 30 KM FOR INTERPOLATION AND FILL IN OF           GEN12000
00276   125*      C         ZERO DATA                                                        GEN12100
00277   126*          480 CALL GTERP(30,GLAT(I),P2,D2,T2,PG,DG,TG,DPX,DPY,DTX,DTY)         GEN12200
00300   127*            CALL PDTUV(PSP,DSP,TSP,GLAT(I),GLON(I),30,DP,DD,DT,DPX,DPY,DTX,DTYGEN12300
00300   128*           $ ) @.....COMPUTE STATIONARY PERTURBATIONS AT 30 KM                  GEN12400
00300   129*      C.....ADD STATIONARY PERTURBATIONS TO GROVES MODEL                         GEN12500
00301   130*            P2 = P2*(1. + DP)                                                  GEN12600
00302   131*            D2 = D2*(1. + DD)                                                  GEN12700
00303   132*            T2 = T2*(1. + DT)                                                  GEN12800
00304   133*            IHP = IHV + 1                                                      GEN12900
00305   134*            DO 490 K=IHP,26                                                    GEN13000
00305   135*      C.....AVOIDS INTERPOLATING P,D,T IF ONLY SIGMAS ARE ZERO                   GEN13100
00310   136*            IF ((P(I,K)*D(I,K)*T(I,K)).GT.0.) GO TO 485                        GEN13200
00312   137*            H=K-1                                                              GEN13300
00312   138*      C.....INTERPOLATES BETWEEN 4D AT HEIGHT Z1 AND GROVES AT 30 KM TO          GEN13400
00312   139*      C         FILL IN MISSING DATA                                           GEN13500
00313   140*            CALL INTER2(P(I,IHV),D(I,IHV),T(I,IHV),Z1,P2,D2,T2,30.,PH,DH,TH,H)GEN13600
00314   141*            P(I,K)=PH                                                          GEN13700
00315   142*            D(I,K)=DH                                                          GEN13800
00316   143*            T(I,K)=TH                                                          GEN13900
00317   144*          485 SP(I,K) = SPR                                                    GEN14000
00320   145*            SD(I,K)=SDR                                                        GEN14100
00321   146*          490 ST(I,K)=STR  @.....SETS MISSING SIGMAS TO SIGMSA AT HEIGHT Z1    GEN14200
00323   147*            IHP = IHV - 1                                                      GEN14300
00324   148*            DO 495 K=1,IHP                                                     GEN14400
00324   149*      C.....SETS ALL ZERO SIGMAS TO SIGMA AT HEIGHT Z1                           GEN14500
00327   150*            IF (SP(I,K).LE.0.0.AND.P(I,K).GT.0.) SP(I,K) = SPR                 GEN14600
00331   151*            IF (SD(I,K).LE.0.0.AND.D(I,K).GT.0.) SD(I,K) = SDR                 GEN14700
00333   152*          495 IF (ST(I,K).LE.0.0.AND.T(I,K).GT.0.) ST(I,K) = STR               GEN14800
00336   153*          500 CONTINUE                                                         GEN14900
00340   154*            RETURN                                                             GEN15000
00341   155*            END                                                                GEN15100

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  GETNMC  *****
@FOR,S PROFAS.GETNMC,GETNMC
FOR S11E-02/04/74-18:52:12 (0,)

  SUBROUTINE GETNMC    ENTRY POINT 000133

  STORAGE USED: CODE(1) 000137; DATA(0) 000057; BLANK COMMON(2) 000000

   COMMON BLOCKS:
```

```
  0003   IOTEMP 000004

EXTERNAL REFERENCES (BLOCK, NAME)

  0004   NTRAN
  0005   NRDU$
  0006   NIO1$
  0007   NIO2$
  0010   NWDU$
  0011   NSTOP$
  0012   NERR3$

STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

 0001   000003 1L       0000   000024 100F     0001   000031 120G     0001   000037 125G     0001   000023 2L
 0000   000025 200F     0001   000035 3L       0001   000075 5L       0001   000111 6L       0000 I 000021 I
 0000 I 000023 IJ       0000   000051 INJP$    0000 I 000000 IP       0003 I 000002 IUG      0000 I 000020 L
 0000 I 000022 M        0003 I 000003 NMCOP    0000 I 000017 NREC     0003   000000 SCRCH1   0003 I 000001 SCRCH2
```

```
00101      1*          SUBROUTINE GETNMC                                                    GET00100
00101      2*    C                                                                          GET00200
00101      3*    C     READS 'SETUP' DATA TAPE, OR NMC GRID DATA CARDS,                     GET00300
00101      4*    C     AND WRITES SCRATCH FILE FOR USE BY SELEC4.                           GET00400
00101      5*    C                                                                          GET00500
00103      6*          DIMENSION IP(15)                                                     GET00600
00103      7*    C                                                                          GET00700
00104      8*          COMMON /IOTEMP/ SCRCH1,SCRCH2,IUG,NMCOP                              GET00800
00104      9*    C                                                                          GET00900
00105     10*          INTEGER SCRCH2                                                       GET01000
00105     11*    C                                                                          GET01100
00106     12*          NREC=0                                                               GET01200
00107     13*          IF(NMCOP.NE.0) GO TO 2                                               GET01300
00107     14*    C                                                                          GET01400
00111     15*        1 CALL NTRAN(IUG,2,15,IP,L)                                          GET01500
00112     16*          CALL NTRAN(IUG,22)                                                   GET01600
00113     17*          IF(L.NE.15) GO TO 6                                                  GET01700
00115     18*          GO TO 3                                                              GET01800
00116     19*        2 READ(5,100) (IP(I),I=1,15)                                         GET01900
00124     20*      100 FORMAT(15I5)                                                       GET02000
00125     21*        3 DO 4 I=1,15,3                                                      GET02100
00130     22*          M=IP(I)                                                            GET02200
00131     23*          IF(M.LT.1) GO TO 5                                                 GET02300
00133     24*          IJ=IP(I+1)*1000+IP(I+2)                                            GET02400
00134     25*          CALL NTRAN (SCRCH2,1,1,IJ,L)                                       GET02500
00135     26*          CALL NTRAN (SCRCH2,22)                                             GET02600
00136     27*          NREC=NREC+1                                                        GET02700
00137     28*        4 CONTINUE                                                           GET02800
00141     29*          IF(NMCOP.NE.0) GO TO 2                                             GET02900
00143     30*          GO TO 1                                                            GET03000
00144     31*        5 IF(NREC.NE.1977) GO TO 6                                           GET03100
00146     32*          CALL NTRAN(IUG,8,1) @  MOVES PAST FIRST EOF ON UNIT IUG            GET03200
00147     33*          RETURN                                                             GET03300
```

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00150     34*          6 WRITE(6,200) NREC,SCRCH2                                    GET03400
00154     35*        200 FORMAT(1H1/1X,I6,' RECORDS WRITTEN BY GETNMC IN SCRATCH FILE',I3) GET03500
00155     36*            STOP                                                        GET03600
00156     37*            END                                                         GET03700

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  ******  GRID4D  ******
@FOR,S PROFAS,GRID4D,GRID4D
FOR S11E-02/04/74-18:52:30 (0,)

   SUBROUTINE GRID4D    ENTRY POINT 000641

   STORAGE USED: CODE(1) 000662; DATA(0) 000334; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   C4      004741
    0004   PDTCOM  000002
    0005   IOTEMP  000002
    0006   POINT   000200
    0007   ORDER   000423
    0010   INT     002037

   EXTERNAL REFERENCES (BLOCK, NAME)

    0011   NTRAN
    0012   SELEC4
    0013   INTRP4
    0014   NWDU$
    0015   NIO2$
    0016   NIO1$
    0017   NSTOP$
    0020   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000204 172G      0001   000057 21L       0001   000261 217G      0001   000063 22L       0001   000267 222G
    0001   000270 225G      0000   000203 23F       0001   000301 234G      0001   000136 24L       0001   000154 25L
    0001   000350 253G      0001   000207 27L       0001   000424 271G      0001   000251 28L       0001   000320 30L
    0001   000433 301G      0001   000454 315G      0001   000415 32L       0001   000437 35L       0001   000447 36L
    0001   000452 37L       0001   000561 39L       0000   000217 40F       0010 R 000000 D         0000 R 000202 DIVIDE
    0010 R 002027 DLA       0010 R 002033 DLO       0006 R 000140 DXY       0010 R 002025 DYX       0000 R 000160 HUNDR
    0000 I 000170 I         0010 I 002020 IG        0000 I 000175 II        0000 I 000000 IN        0000 I 000176 INDEX
    0000   000302 INJP$     0000 I 000172 IP        0006 I 000000 IPT       0007   000000 IPTN      0000 I 000163 IRC
    0007 I 000120 IREAD     0000 I 000164 IRN       0004 I 000000 IT        0000 I 000171 J         0000 I 000165 JT
    0000 I 000200 J1        0000 I 000177 J2        0000 I 000174 K         0000 I 000167 L         0000 I 000201 LALO
    0003 R 000000 LAT       0006 I 000120 LL        0003 R 000020 LON       0000 I 000166 M         0004 I 000001 MONTH
    0000 I 000173 MP        0000 I 000162 N         0003 I 000040 NP        0000 R 000156 ONE       0003 R 000041 P
    0003 R 000701 R         0000 I 000153 READ      0005 I 000000 SCRCH1    0005   000001 SCRCH2    0003 R 002401 SP
    0003 R 003241 SR        0003 R 004101 ST        0003 R 001541 T         0000 R 000157 TEN       0000 R 000161 THOU
    0000 I 000154 WRITE     0000 R 000155 ZERO
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00101     1*          SUBROUTINE GRID4D                                                    GRI00100
00103     2*          REAL LAT,LON                                                         GRI00200
00104     3*          COMMON/C4/LAT(16),LON(16),NP,P(16,26),R(16,26),T(16,26),SP(16,26),GRI00300
00104     4*         $ SR(16,26),ST(16,26)                                                 GRI00400
00105     5*          COMMON /PDTCOM/ IT,MONTH                                             GRI00500
00105     6*    C                                                                          GRI00600
00105     7*    C     SUBROUTINE TO SELECT PRESSURE, TEMPERATURE, AND DENSITY PROFILES (GRI00700
00105     8*    C     TOGETHER WITH THE NORMALIZED VARIANCES IN EACH, AT UP TO 16 'GRID GRI00800
00105     9*    C     AT LAT/LONS SELECTED BY CALLING PROGRAM.                           GRI00900
00105    10*    C                                                                        GRI01000
00105    11*    C     USES NASA HUNTSVILLE MSFC 4-D DATA TAPES                           GRI01100
00105    12*    C                                                                        GRI01200
00106    13*          DIMENSION IN(107)                                                  GRI01300
00106    14*    C                                                                        GRI01400
00107    15*          COMMON /IOTEMP/ SCRCH1,SCRCH2                                      GRI01500
00110    16*          COMMON /POINT/ IPT(16,5),LL(16),DXY(16,2)                          GRI01600
00111    17*          COMMON /ORDER/ IPTN(16,5),IREAD(65,3)                              GRI01700
00112    18*          COMMON /INT/ D(208,5),IG(5),DYX(2),DLA(4),DLO(4)                   GRI01800
00112    19*    C                                                                        GRI01900
00113    20*          INTEGER SCRCH1,READ,WRITE                                          GRI02000
00113    21*    C                                                                        GRI02100
00113    22*    C                                                                        GRI02200
00113    23*    C     INITIALIZE                                                         GRI02300
00113    24*    C                                                                        GRI02400
00114    25*          ZERO=0.0                                                           GRI02500
00115    26*          ONE=1.0                                                            GRI02600
00116    27*          TEN=10.0                                                           GRI02700
00117    28*          HUNDR=100.0                                                        GRI02800
00120    29*          THOU=1000.0                                                        GRI02900
00121    30*          READ=6H READ                                                       GRI03000
00122    31*          WRITE=6H WRITE                                                     GRI03100
00122    32*    C                                                                        GRI03200
00123    33*          N=MONTH-1-((2*MONTH)/9)*4                                          GRI03300
00124    34*          CALL NTRAN (IT,10)                                                 GRI03400
00125    35*          CALL NTRAN (IT,22)                                                 GRI03500
00126    36*          CALL NTRAN(IT,8,N)                                                 GRI03600
00127    37*          CALL NTRAN (IT,22)                                                 GRI03700
00127    38*    C                                                                        GRI03800
00127    39*    C     APPROPRIATE 4-D INPUT TAPE NOW POSITIONED - FILE NEEDED PROFILES   GRI03900
00127    40*    C                                                                        GRI04000
00127    41*    C                                                                        GRI04100
00130    42*       20 CALL SELEC4                                                        GRI04200
00130    43*    C                                                                        GRI04300
00131    44*          IRC=0                                                              GRI04400
00132    45*          IRN=1                                                              GRI04500
00133    46*          IF(IREAD(IRN,3).EQ.0) GO TO 39                                     GRI04600
00135    47*       21 JT=IT                                                              GRI04700
00136    48*          M=READ                                                             GRI04800
00137    49*       22 CALL NTRAN (IT,2,106,IN,L)                                         GRI04900
00140    50*          CALL NTRAN (IT,22)                                                 GRI05000
00141    51*          IRC=IRC+1                                                          GRI05100
00142    52*          IF(L.EQ.-2) GO TO 39                                               GRI05200
00144    53*          IF(L.LT.0) WRITE(6,23) IT,L,IRC                                    GRI05300
00152    54*       23 FORMAT(' INPUT UNIT NO.',I3,' IN ERROR (',I2,') FOR RECORD NO.',I5GRI05400
00152    55*         1)                                                                 GRI05500
00153    56*          IF(IRC.LT.IREAD(IRN,3)) GO TO 22                                   GRI05600
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00155    57*          IF(IRC.GT.IREAD(IRN,3)) GO TO 39                          GRI05700
00157    58*       24 I=IREAD(IRN,1)                                            GRI05800
00160    59*          J=IREAD(IRN,2)                                            GRI05900
00161    60*          IF(IRN.EQ.1) GO TO 25                                     GRI06000
00163    61*          IF(IREAD(IRN,3).EQ.IREAD(IRN-1,3)) GO TO 27               GRI06100
00165    62*       25 IP=FLD(12,12,IN(106))                                     GRI06200
00166    63*          MP=FLD(24,12,IN(106))                                     GRI06300
00167    64*          IF((MP.NE.MONTH).OR.(IP.NE.IPT(I,J))) GO TO 39            GRI06400
00171    65*          DO 26 K=106,1,-1                                          GRI06500
00174    66*          IN(K+1)=IN(K)                                             GRI06600
00175    67*       26 CONTINUE                                                  GRI06700
00177    68*       27 FLD(0,18,IN(1))=I                                         GRI06800
00200    69*          FLD(18,18,IN(1))=J                                        GRI06900
00201    70*          JT=SCRCH1                                                 GRI07000
00202    71*          M=WRITE                                                   GRI07100
00203    72*          CALL NTRAN (SCRCH1,1,107,IN,L)                            GRI07200
00204    73*          CALL NTRAN (SCRCH1,22)                                    GRI07300
00205    74*          IRN=IRN+1                                                 GRI07400
00206    75*          IF(L.NE.107) GO TO 39                                     GRI07500
00210    76*          IF(IREAD(IRN,3).EQ.IRC) GO TO 24                          GRI07600
00212    77*          IF(IREAD(IRN,3).EQ.0) GO TO 28                            GRI07700
00214    78*          GO TO 21                                                  GRI07800
00214    79*    C                                                               GRI07900
00214    80*    C     INTERPOLATE TO GIVEN LAT/LON FROM GRID DATA               GRI08000
00214    81*    C                                                               GRI08100
00215    82*       28 M=READ                                                    GRI08200
00216    83*          DO 38 II=1,NP                                             GRI08300
00221    84*          DO 29 I=1,208                                             GRI08400
00224    85*          DO 29 J=1,5                                               GRI08500
00227    86*          D(I,J)=0.0                                                GRI08600
00230    87*       29 CONTINUE                                                  GRI08700
00233    88*          DO 32 J=1,4                                               GRI08800
00236    89*          IF(IPT(II,J).EQ.0) GO TO 32                               GRI08900
00240    90*          FLD(0,18,INDEX)=II                                        GRI09000
00241    91*          FLD(18,18,INDEX)=J                                        GRI09100
00242    92*          CALL NTRAN(SCRCH1,10)                                     GRI09200
00243    93*          CALL NTRAN(SCRCH1,22)                                     GRI09300
00244    94*       30 CALL NTRAN(SCRCH1,2,107,IN,L)                             GRI09400
00245    95*          CALL NTRAN(SCRCH1,22)                                     GRI09500
00246    96*          IF(L.EQ.-2) GO TO 39                                      GRI09600
00250    97*          IF(IN(1).NE.INDEX) GO TO 30                               GRI09700
00252    98*          DO 31 I=2,105                                             GRI09800
00255    99*          J2=2*I-2                                                  GRI09900
00256   100*          J1=J2-1                                                   GRI10000
00257   101*          D(J1,J)=FLD(0,18,IN(I))/HUNDR                             GRI10100
00260   102*          D(J2,J)=FLD(18,18,IN(I))/HUNDR                            GRI10200
00261   103*       31 CONTINUE                                                  GRI10300
00263   104*          DLA(J)=FLD(0,18,IN(106))/TEN                              GRI10400
00264   105*          DLO(J)=FLD(18,18,IN(106))/TEN                             GRI10500
00265   106*       32 CONTINUE                                                  GRI10600
00265   107*    C                                                               GRI10700
00265   108*    C     IF NECESSARY, INTERPOLATE                                 GRI10800
00265   109*    C                                                               GRI10900
00267   110*          LALO=LL(II)                                               GRI11000
00270   111*          DO 33 I=1,5                                               GRI11100
00273   112*          IG(I)=IPT(II,I)                                           GRI11200
00274   113*       33 CONTINUE                                                  GRI11300
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00276   114*          IF(IG(2).NE.0) GO TO 35                                  GRI11400
00300   115*          DO 34 I=1,208                                            GRI11500
00303   116*          D(I,5)=D(I,1)                                            GRI11600
00304   117*       34 CONTINUE                                                 GRI11700
00306   118*          GO TO 37                                                 GRI11800
00307   119*       35 IF(IG(5).NE.2) GO TO 36                                  GRI11900
00311   120*          DYX(1)=DXY(II,1)                                         GRI12000
00312   121*          DYX(2)=DXY(II,2)                                         GRI12100
00312   122*     C                                                             GRI12200
00313   123*       36 CALL INTRP4 (LALO)                                       GRI12300
00313   124*     C                                                             GRI12400
00314   125*       37 DO 38 I=1,26                                             GRI12500
00317   126*          P(II,I)=D(I,5)*HUNDR                                     GRI12600
00320   127*          R(II,I)=D(I+156,5)/THOU                                  GRI12700
00321   128*          T(II,I) =D(I+52,5)                                       GRI12800
00322   129*          DIVIDE=ONE                                               GRI12900
00323   130*          IF(P(II,I).GT.ZERO) DIVIDE=(P(II,I)/HUNDR)**2            GRI13000
00325   131*          SP(II,I)=D(I+26,5)/DIVIDE                                GRI13100
00326   132*          DIVIDE=ONE                                               GRI13200
00327   133*          IF(R(II,I).GT.ZERO) DIVIDE=(THOU*R(II,I))**2             GRI13300
00331   134*          SR(II,I)=D(I+182,5)/DIVIDE                               GRI13400
00332   135*          DIVIDE=ONE                                               GRI13500
00333   136*          IF(T(II,I).GT.ZERO) DIVIDE=T(II,I)**2                    GRI13600
00335   137*          ST(II,I)=D(I+78,5)/DIVIDE                                GRI13700
00336   138*       38 CONTINUE                                                 GRI13800
00341   139*          CALL NTRAN(SCRCH1,10)                                    GRI13900
00342   140*          CALL NTRAN(SCRCH1,22)                                    GRI14000
00343   141*          RETURN                                                   GRI14100
00344   142*       39 WRITE(6,40) JT,IRC,IREAD(IRN,3),MP,MONTH,IP,I,J,IPT(I,J),IRN,M,L GRI14200
00362   143*       40 FORMAT(' ***** UNIT NO.',I3,' IN ERROR',I7,' RECORDS READ'/   GRI14300
00362   144*         1' IREAD(IRN,3) =',I5,' MP =',I3,' MONTH =',I3,            GRI14400
00362   145*         2' IP =',I5,' IPT(',I2,',',I1,') =',I5,' IRN =',I3/A6,' STATUS',I5)GRI14500
00363   146*          STOP                                                     GRI14600
00364   147*          END                                                      GRI14700
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      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  GTERP  ******
@FOR,S PROFAS,GTERP,GTERP
FOR S11E-02/04/74-18:52:36 (0,)

   SUBROUTINE GTERP     ENTRY POINT 000227

   STORAGE USED: CODE(1) 000263; DATA(0) 000040; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000067 20L       0001   000161 30L       0000 R 000003 CHK       0000 R 000006 DL        0000 I 000000 I
    0000   000017 INJP$     0000 I 000001 J         0000 I 000002 JP        0000 R 000004 PHIF      0000 R 000011 R
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   0000 R 000007 R1        0000 R 000010 R2        0000 R 000005 TL


00101      1*            SUBROUTINE GTERP(IH,PHI,P,D,T,PG,DG,TG,DPX,DPY,DTX,DTY)          GTP00100
00101      2*      C.....INTERPOLATES GROVES DATA TO HEIGHT IH AND LATITUDE PHI            GTP00200
00103      3*            DIMENSION PG(18,19),TG(18,19),DG(18,19)                          GTP00300
00104      4*            I = (IH - 20)/5   @.....HEIGHT INDEX                             GTP00400
00105      5*            J = INT((PHI + 100.)/10.)   @.....LOWER LATITUDE INDEX           GTP00500
00106      6*            JP = J + 1   @.....UPPER LATITUDE INDEX                          GTP00600
00106      7*      C.....CHECK FOR DENSITY OR TEMPERATURE LE0 0                           GTP00700
00107      8*            CHK = DG(I,J) * TG(I,J) * DG(I,JP) * TG(I,JP)                    GTP00800
00110      9*            IF (CHK) 10,10,20                                                GTP00900
00113     10*       10   P = PG(I,J)                                                      GTP01000
00114     11*            D = DG(I,J)                                                      GTP01100
00115     12*            T = TG(I,J)                                                      GTP01200
00116     13*            GO TO 30                                                         GTP01300
00116     14*      C.....LATITUDE DEVIATION FROM GROVES ARRAY POSITION                    GTP01400
00117     15*       20   PHIF = (PHI + 100. - 10.*J)/10.                                 GTP01500
00120     16*            TL= TG(I,J) + (TG(I,JP ) - TG(I,J))*PHIF                         GTP01600
00121     17*            DL= DG(I,J) + (DG(I,JP ) - DG(I,J))*PHIF @LATITUDE INTERPOLATION GTP01700
00122     18*            R1 = PG(I,J)/(DG(I,J)*TG(I,J))                                   GTP01800
00123     19*            R2 = PG(I,JP)/(DG(I,JP)*TG(I,JP))                                GTP01900
00124     20*            R = R1 + (R2 - R1)*PHIF   @.....INTERPOLATED GAS CONSTANT        GTP02000
00125     21*            P = DL*R*TL @.....PRESSURE COMPUTED FROM INTERPOLATED GAS CONSTANTGTP02100
00126     22*            D = DL                                                           GTP02200
00127     23*            T = TL                                                           GTP02300
00130     24*       30   DPX = 0.                                                         GTP02400
00131     25*            DTX = 0.                                                         GTP02500
00132     26*            DPY = (PG(I,JP) - PG(I,J)) * 0.5 @.....DP/DY FOR GEOSTROPHIC WINDSGTP02600
00133     27*            DTY = (TG(I,JP) - TG(I,J)) * 0.5 @.....DT/DY FOR THERMAL WINDS   GTP02700
00134     28*            RETURN                                                           GTP02800
00135     29*            END                                                              GTP02900

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  INTERW  *****
@FOR,S PROFAS.INTERW,INTERW
FOR S11E-02/04/74-18:52:39 (0,)

   SUBROUTINE INTERW    ENTRY POINT 000041

   STORAGE USED: CODE(1) 000072; DATA(0) 000012; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000012 20L       0000 R 000000 A         0000   000001 INJP$
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```
00101     1*          SUBROUTINE INTERW(U1,V1,Z1,U2,V2,Z2,U,V,Z)                    INW00100
00103     2*          IF ( Z1 - Z2 ) 20,10,20                                       INW00200
00106     3*       10 U = U1                                                        INW00300
00107     4*          V = V1  @.....SETS U,V = U1,V1 IF Z1=Z2                       INW00400
00110     5*          RETURN                                                        INW00500
00111     6*       20 A = (Z-Z1)/(Z2-Z1)                                            INW00600
00112     7*          U = U1 + (U2-U1) * A                                          INW00700
00113     8*          V = V1 + (V2-V1) * A                                          INW00800
00113     9*     C.....LINEAR INTERPOLATION BETWEEN U1,V1 AT HEIGHT Z1 AND U2,V2 AT INW00900
00113    10*     C        HEIGHT Z2.  OUTPUT IS U,V AT HEIGHT Z                    INW01000
00114    11*          RETURN                                                        INW01100
00115    12*          END                                                           INW01200

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  INTERZ  *****
@FOR,S PROFAS.INTERZ,INTERZ
FOR S11E-02/04/74-18:52:41 (0,)

   SUBROUTINE INTERZ    ENTRY POINT 000050

   STORAGE USED: CODE(1) 000110; DATA(0) 000014; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000014 20L       0000 R 000000 A         0000   000001 INJP$


00101     1*          SUBROUTINE INTERZ(P1,D1,T1,Z1,P2,D2,T2,Z2,P,D,T,Z)            INZ00100
00103     2*        5 IF (Z1 - Z2)  20,10,20                                        INZ00200
00106     3*       10   P = P1                                                      INZ00300
00107     4*            D = D1                                                     INZ00400
00110     5*            T = T1  @.....SETS P,D,T = P1,D1,T1, IF Z1=Z2              INZ00500
00111     6*            RETURN                                                     INZ00600
00112     7*       20   A = (Z - Z1)/ (Z2 - Z1)                                    INZ00700
00113     8*            T = T1 + (T2 - T1)*A                                       INZ00800
00114     9*            D = D1 + (D2 - D1)*A                                       INZ00900
00115    10*            P = P1 + (P2 - P1) * A                                     INZ01000
00115    11*     C.....LINEAR INTERPOLATION BETWEEN P1,D1,T1 AT HEIGHT Z1 AND P2,D2,T2 INZ01100
00115    12*     C        AT HEIGHT Z2 TO OUTPUT VALUES OF P,D,T AT HEIGHT Z       INZ01200
00116    13*            RETURN                                                     INZ01300
00117    14*            END                                                        INZ01400

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  INTER2  *****
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@FOR,S PROFAS.INTER2,INTER2
FOR S11E-02/04/74-18:52:43 (C,)

   SUBROUTINE INTER2    ENTRY POINT 000135

   STORAGE USED: CODE(1) 000202; DATA(0) 000031; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   ALOG
    0004   EXP
    0005   .ERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000012 10L       0001   000023 20L       0001   000121 30L       0000 R 000001 A        0000 R 000000 CHK
    0000 R 000002 DZ        0000   000007 INJP$     0000 R 000006 R         0000 R 000004 R1       0000 R 000005 R2
    0000 R 000003 TZ
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00101      1*          SUBROUTINE INTER2(P1,D1,T1,Z1,P2,D2,T2,Z2,P,D,T,Z)                IN200100
00101      2*     C.....INTERPOLATES BETWEEN P1,D1,T1 AT HEIGHT Z1 AND P2,D2,T2 AT       IN200200
00101      3*     C        HEIGHT Z2 TO OUTPUT VALUES OF P,D,T AT HEIGHT Z                IN200300
00101      4*     C.....CHECKS FOR T1,D1,T2,D2 PRODUCT = 0, FOR GAS CONSTANT INTERPOLATIONIN20040
00103      5*          CHK=T1*D1*T2*D2                                                   IN200500
00104      6*          IF (CHK) 10,10,5                                                  IN200600
00107      7*        5 IF (Z1 - Z2)  20,10,20                                            IN200700
00112      8*       10 P = P1                                                          IN200800
00113      9*          D = D1                                                          IN200900
00114     10*          T = T1  @.....SETS P,D,T = P1,D1,T1 IF Z1=Z2                    IN201000
00115     11*          RETURN                                                          IN201100
00116     12*       20 IF(P1*D1*T1*P2*D2*T2.LE.0.)GO TO 30                             IN201150
00120     13*          A=ALOG(D2/D1)/(Z2-Z1)                                           IN201200
00121     14*          DZ= D1*EXP(A*(Z - Z1)) @.....LINEAR INTERPOLATION ON LOG D      IN201300
00122     15*          A=(Z-Z1)/(Z2-Z1)                                                IN201400
00123     16*          TZ= T1 + A*(T2-T1)     @.....LINEAR INTERPOLATION ON T          IN201500
00124     17*          R1=P1/(D1*T1)                                                   IN201600
00125     18*          R2=P2/(D2*T2)                                                   IN201700
00126     19*          R=(R2-R1)*A+R1    @.....LINEAR INTERPOLATION ON GAS CONSTANT R  IN201800
00127     20*          P = DZ * R * TZ   @.....PRESSURE FROM PERFECT GAS LAW           IN201900
00130     21*          D = DZ                                                          IN202000
00131     22*          T = TZ                                                          IN202100
00132     23*          RETURN                                                          IN202200
00133     24*       30 P=0.                                                            IN202220
00134     25*          D=0.                                                            IN202240
00135     26*          T=0.                                                            IN202260
00136     27*          RETURN                                                          IN202280
00137     28*          END                                                             IN202300

      END OF COMPILATION:        NO  DIAGNOSTICS.
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@HDG,P  ******  INTER4  ******
@FOR,S PROFAS,INTER4,INTER4
FOR S11E-02/04/74-18:52:45 (0,)

   SUBROUTINE INTER4    ENTRY POINT 001066

   STORAGE USED: CODE(1) 001237; DATA(0) 000106; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   INTLL
    0004   MWDU$
    0005   NIO2$
    0006   SQRT
    0007   WERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000354 100L      0001   000101 110G      0001   000426 110L      0001   000154 20L       0001   000467 200L
    0001   000475 207G      0001   000526 210L      0001   000633 220L      0001   000140 25L       0000   000016 30F
    0001   000646 300L      0001   000341 40L       0000 R 000007 CHECK     0000 R 000015 DLAT      0000 R 000006 DLON
    0000 R 000011 DMIN      0000 R 000013 DR        0000 I 000001 I         0000 I 000003 IA        0000 I 000002 IB
    0000 I 000004 IC        0000 I 000005 ID        0000 I 000000 IH        0000   000036 INJP$     0000 I 000014 I1
    0000 I 000012 J         0000 R 000010 XLON

00101     1*          SUBROUTINE INTER4 (GLAT, GLON, CLAT, CLON, IZ, NG, P, D, T,      IN400100
00101     2*         $ P4, D4, T4, DPX, DPY, DTX, DTY)                                 IN400200
00101     3*     C.....INTERPOLATES BETWEEN 4D ARRAYS P(I,IH),D(I,IH),T(I,IH) AT GRID  IN400300
00101     4*     C        LOCATIONS LATITUDE GLAT(I) LONGITUDE GLON(I),                 IN400400
00101     5*     C        CLAT,CLON = CURRENT LATITUDE,LONGITUDE                        IN400500
00101     6*     C        IZ = HEIGHT                    NG = NUMBER OF 4D GRID POSITIONS IN400600
00101     7*     C        OUTPUT = P4,D4,T4, AND DERIVATIVES DPX,DPY,DTX,DTY            IN400700
00103     8*          DIMENSION GLAT(16),GLON(16),P(16,26),D(16,26),T(16,26)           IN400800
00104     9*          IH=IZ+1 @.....HEIGHT INDEX = HEIGHT + 1                          IN400900
00105    10*          IF (NG.GT.9) GO TO 100                                           IN401000
00107    11*          DO 10 I=10,16     @.....NG = 9 MEANS POLAR GRID                  IN401100
00112    12*          P(I,IH) = P(9,IH)                                                IN401200
00113    13*          D(I,IH) = D(9,IH)                                                IN401300
00114    14*          T(I,IH) = T(9,IH)                                                IN401400
00115    15*          GLAT(I) = GLAT(9)                                                IN401500
00116    16*       10 GLON(I) = GLON(I-8)  @.....I=10-16 ALL AT 90 DEG                 IN401600
00120    17*          IB = INT(CLON/45) + 1  @.....LOWER RIGHT INTERPOLATION INDEX     IN401700
00121    18*          IA = IB+1              @.....LOWER LEFT INTERPOLATION INDEX      IN401800
00122    19*          IF (IA.GT.8) IA = IA-8                                           IN401900
00124    20*          IF (ABS(CLAT).LT.75.) GO TO 20  @.....POSITION OUTSIDE POLAR GRID IN402000
00126    21*          IC = IA+8    @.....UPPER LEFT INTERPOLATION INDEX                IN402100
00127    22*          ID = IB+8    @.....UPPER RIGHT INTERPOLATION INDEX               IN402200
00130    23*          GO TO 300                                                        IN402300
00131    24*       20 IF(ABS(CLAT).LT.70.) GO TO 40                                    IN402350
00131    25*     C.....DIFFERENTIAL LONGITUDE FROM REF LON (IA)                        IN402400
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00133   26*         DLON = (CLON - GLON(IA))/(GLON(IB) - GLON(IA))                    IN402500
00133   27*   C.....INTERPOLATION BETWEEN LATITUDE 75 POINTS FOR POSITION             IN402600
00134   28*         CHECK=P(IA,IH)*D(IA,IH)*T(IA,IH)*P(IB,IH)*D(IB,IH)*T(IB,IH)       IN402610
00135   29*         IF(CHECK) 25,23,25                                                IN402620
00140   30*      23 P4=0.                                                             IN402630
00141   31*         D4=0.                                                             IN402640
00142   32*         T4=0.                                                             IN402650
00143   33*         WRITE(6,30)                                                       IN402660
00145   34*         RETURN                                                            IN402680
00146   35*      25 P4 = P(IA,IH) + (P(IB,IH) - P(IA,IH))*DLON                        IN402700
00147   36*         D4 = D(IA,IH) + (D(IB,IH) - D(IA,IH))*DLON                        IN402800
00150   37*         T4 = T(IA,IH) + (T(IB,IH) - T(IA,IH))*DLON                        IN402900
00150   38*   C.....DP/DX FOR GEOSTROPHIC WIND EQUATIONS                              IN403000
00151   39*         DPX=P(IB,IH)-P(IA,IH)                                             IN403100
00152   40*         DPY=P(IA+8,IH)-P(IA,IH)                                           IN403200
00152   41*   C.....DP/DY FOR GEOSTROPHIC WIND EQUATIONS                              IN403300
00153   42*         DPY = DPY + (P(IB+8,IH)- P(IB,IH) - DPY)*DLON                     IN403400
00153   43*   C.....DT/DX FOR THERMAL WIND EQUATIONS                                  IN403500
00154   44*         DTX = T(IB,IH) - T(IA,IH)                                         IN403600
00155   45*         DTY = T(IA+8,IH) - T(IA,IH)                                       IN403700
00155   46*   C.....DT/DY FOR THERMAL WIND EQUATIONS                                  IN403800
00156   47*         DTY = DTY + (T(IB+8,IH) - T(IB,IH) - DTY)*DLON                    IN403900
00156   48*   C.....INDICATES ERROR BECAUSE OF POSITION OUTSIDE POLAR GRID            IN404000
00157   49*         WRITE (6,30)                                                      IN404100
00161   50*      30 FORMAT (' POSITION OUTSIDE 4-D GRID')                             IN404200
00162   51*         RETURN                                                            IN404300
00163   52*      40 WRITE(6,30)                                                       IN404310
00165   53*         P4=0.                                                             IN404320
00166   54*         D4=0.                                                             IN404330
00167   55*         T4=0.                                                             IN404340
00170   56*         RETURN                                                            IN404350
00171   57*     100 XLON = CLON                                                       IN404400
00172   58*         IF (CLON.GT.345) XLON = CLON - 360.                               IN404500
00172   59*   C.....CHECKS FOR POSITION WITHIN 16 POINT GRID 110=GOOD.  200=POSITION  IN404600
00172   60*   C        OUTSIDE GRID.                                                  IN404700
00174   61*         IF (CLAT.GE.GLAT(1) .AND. CLAT.LT.GLAT(16) .AND. XLON.LE.GLON(1)  IN404800
00174   62*        $  .AND.XLON.GT.GLON(16)) GO TO 110                                IN404900
00176   63*         GO TO 200                                                         IN405000
00177   64*     110 IA = 1 + INT((GLON(1) - XLON) / 5)                                IN405100
00177   65*   C.....IA = LOWER LEFT (REFERENCE) INTERPOLATION INDEX                   IN405200
00200   66*         IA = IA + 4 * INT((CLAT - GLAT(1)) / 5)                           IN405300
00201   67*         IB = IA+1     @.....LOWER RIGHT INTERPOLATION INDEX               IN405400
00202   68*         IC = IA+4     @.....UPPER LEFT INTERPOLATION INDEX                IN405500
00203   69*         ID = IA+5     @.....UPPER RIGHT INTERPOLATION INDEX               IN405600
00204   70*         GO TO 300                                                         IN405700
00205   71*     200 DMIN = 360                                                        IN405800
00206   72*         DO 210 J=1,16                                                     IN405900
00211   73*         DR = SQRT((CLAT-GLAT(J))**2 + (CLON-GLON(J))**2)                  IN406000
00212   74*         IF (DR.GT.DMIN) GO TO 210                                         IN406100
00214   75*         IA = J                                                            IN406200
00215   76*         DMIN = DR                                                         IN406300
00215   77*   C.....210 LOOP FINDS CLOSEST 16 POINT GRID POSITION TO POSITION OUTSIDE IN406400
00215   78*   C        GRID                                                           IN406500
00216   79*     210 CONTINUE                                                        IN406600
00220   80*         IF(DMIN.GT.5.) GO TO 220                                          IN406650
00220   81*   C.....TAKES INTERPOLATED VALUES TO BE CLOSEST GRID POINT                IN406700
00222   82*         P4 = P(IA,IH)                                                     IN406800
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00223     83*           D4 = D(IA,IH)                                                    IN406900
00224     84*           T4 = T(IA,IH)                                                    IN407000
00225     85*           I1=IA                                                            IN407100
00226     86*           IF (I1.GE.9) I1=I1-4                                             IN407200
00230     87*           IF (MOD(I1,4).EQ.0) I1=I1-1                                      IN407300
00232     88*           DPX=P(I1+1,IH)-P(I1,IH) C.....DP/DX FOR GEOSTROPHIC WIND EQUATIONSIN407400
00233     89*           DPY=P(I1+4,IH)-P(I1,IH) C.....DP/DY FOR GEOSTROPHIC WIND EQUATIONSIN407500
00234     90*           DTX = T(I1+1,IH) - T(I1,IH) C.....DT/DX FOR THERMAL WIND EQUATIONSIN407600
00235     91*           DTY = T(I1+4,IH) - T(I1,IH) C.....DT/DY FOR THERMAL WIND EQUATIONSIN407700
00235     92*      C.....INDICATES ERROR BECAUSE OF POSITION OUTSIDE 16 POINT GRID       IN407800
00236     93*           WRITE (6,30)                                                     IN407900
00240     94*           RETURN                                                           IN408000
00241     95*       220 WRITE(6,30)                                                      IN408010
00243     96*           P4=0.                                                            IN408020
00244     97*           D4=0.                                                            IN408040
00245     98*           T4=0.                                                            IN408060
00246     99*           RETURN                                                           IN408080
00246    100*      C.....INTERPOLZTION FOR POSITION INSIDE 16 POINT GRID OR POLAR GRID   IN408100
00247    101*       300 CALL INTLL(P,IA,IB,IC,ID,P4,GLAT,GLON,CLAT,CLON,IH)             IN408200
00250    102*           CALL INTLL(D,IA,IB,IC,ID,D4,GLAT,GLON,CLAT,CLON,IH)              IN408300
00251    103*           CALL INTLL(T,IA,IB,IC,ID,T4,GLAT,GLON,CLAT,CLON,IH)              IN408400
00251    104*      C.....RELATIVE LONGITUDE DISPLACEMENT FROM REFERENCE POSITION (IA)    IN408500
00252    105*           DLON = (CLON - GLON(IA))/(GLON(IB) - GLON(IA))                   IN408600
00252    106*      C.....RELATIVE LATITUDE DISPLACEMENT FROM REFERENCE POSITION(IA)      IN408700
00253    107*           DLAT = (CLAT - GLAT(IA))/(GLAT(IC) - GLAT(IA))                   IN408800
00254    108*           DPX=P(IB,IH)-P(IA,IH)                                            IN408900
00254    109*      C.....DP/DX FOR GEOSTROPHIC WIND EQUATIONS                            IN409000
00255    110*           DPX = DPX + (P(ID,IH) - P(IC,IH) - DPX)*DLAT                     IN409100
00256    111*           DTX = T(IB,IH) - T(IA,IH)                                        IN409200
00256    112*      C.....DT/DX FOR THERMAL WIND EQUATIONS                                IN409300
00257    113*           DTX = DTX + (T(ID,IH) - T(IC,IH) - DTX)*DLAT                     IN409400
00260    114*           DPY = P(IC,IH) - P(IA,IH)                                        IN409500
00260    115*      C.....DP/DY FOR GEOSTROPHIC WIND EQUATIONS                            IN409600
00261    116*           DPY = DPY + (P(ID,IH) - P(IB,IH) - DPY)*DLON                     IN409700
00262    117*           DTY = T(IC,IH) - T(IA,IH)                                        IN409800
00262    118*      C.....DT/DY FOR THERMAL WIND EQUATIONS                                IN409900
00263    119*           DTY = DTY + (T(ID,IH) - T(IB,IH) - DTY)*DLON                     IN410000
00264    120*           RETURN                                                           IN410100
00265    121*           END                                                              IN410200

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  ******  INTLL  ******
@FOR,S PROFAS.INTLL,INTLL
FOR S11E-02/04/74-18:52:51 (0,)

   SUBROUTINE INTLL     ENTRY POINT 000132

   STORAGE USED: CODE(1) 000154; DATA(0) 000025; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   NERR3$
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****** INTLL ******

  STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

   0001   000053 20L       0000   000002 IN.IP$      0000 R 000000 X          0000 R 000001 Y


00101      1*            SUBROUTINE INTLL(F,IA,IB,IC,ID,FLL,GLAT,GLON,CLAT,CLON,IH)          INL00100
00101      2*      C.....INTERPOLATES FUNCTION (ARRAY) F FROM VALUES OF GLAT AND GLON AT     INL00200
00101      3*      C         INDEX VALUES IA, IB, IC, ID TO OUTPUT VALUE FLL AT HEIGHT IH    INL00300
00101      4*      C         AND POSITION CLAT, CLON                                         INL00400
00103      5*            DIMENSION F(16,26),GLAT(16),GLON(16)                                INL00500
00103      6*      C.....NORMALIZES LONGITUDE DISPLACEMENT                                   INL00600
00104      7*            IF(F(IA,IH)*F(IB,IH)*F(IC,IH)*F(ID,IH)) 20,10,20                    INL00630
00107      8*         10 FLL=0.                                                              INL00660
00110      9*            RETURN                                                              INL00690
00111     10*         20 X=(CLON-GLON(IB))/(GLON(IA)-GLON(IB))                               INL00700
00111     11*      C.....NORMALIZES LATITUDE DISPLACEMENT                                    INL00800
00112     12*            Y=(CLAT-GLAT(IA))/(GLAT(IC)-GLAT(IA))                               INL00900
00112     13*      C.....TWO DIMENSIONAL INTERPOLATION                                       INL01000
00113     14*            FLL=F(IB,IH)+(F(ID,IH)-F(IB,IH))*Y+(F(IA,IH)-F(IB,IH))*X            INL01100
00113     15*           1  +(F(IC,IH)-F(IA,IH)-F(ID,IH)+F(IB,IH))*X*Y                        INL01200
00114     16*            RETURN                                                              INL01300
00115     17*            END                                                                 INL01400

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  INTRP4  *****
@FOR,S PROFAS.INTRP4,INTRP4
FOR S11E-02/04/74-18:52:53 (0,)

  SUBROUTINE INTRP4    ENTRY POINT 000775

  STORAGE USED: CODE(1) 001005; DATA(0) 000112; BLANK COMMON(2) 000000

   COMMON BLOCKS:

   0003   INT    002037

  EXTERNAL REFERENCES (BLOCK, NAME)

   0004   ATAN
   0005   COS
   0006   SQRT
   0007   SIN
   0010   NERR3$

  STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

   0001   000045 123G      0001   000054 126G      0001   000067 134G      0001   000134 147G      0001   000200 164G
   0001   000207 167G      0001   000222 175G      0001   000035 20L       0001   000300 220G      0001   000320 230G
   0001   000352 245G      0001   000116 25L       0001   000462 275G      0001   000123 30L       0001   000647 325G
   0001   000656 330G      0001   000671 336G      0001   000252 38L       0001   000257 50L       0001   000266 55L
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0001   000307 60L      0001   000350 63L      0001   000466 66L      0001   000522 69L      0001   000756 70L
0001   000611 71L      0000 R 000051 A        0000 R 000046 B        0000 R 000047 C        0003 R 000000 D
0000 R 000050 DD       0000 R 000020 DEGRAD   0003 R 002027 DLA      0003 R 002033 DLO      0000 R 000037 DNN
0003 R 002025 DXY      0000 R 000042 E        0000 R 000044 EB       0000 R 000045 E4       0000 I 000031 I
0003 I 002020 IG       0000   000070 INJP$    0000 I 000034 ITH      0000 I 000027 J        0000 I 000030 K
0000 I 000026 L        0000 I 000021 LALO     0000 I 000022 L1       0000 I 000023 L2       0000 R 000035 TH2
0000 R 000036 TH3      0000 R 000032 X        0000 R 000010 XC       0000 R 000024 XL       0000 R 000000 XLL
0000 R 000033 Y        0000 R 000014 YC       0000 R 000025 YL       0000 R 000004 YLL      0000 R 000041 Z
0000 R 000040 ZA       0000 R 000043 Z4
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00101      1*            SUBROUTINE INTRP4 (LALON)                                          INP00100
00101      2*      C                                                                        INP00200
00101      3*      C        SUBROUTINE TO INTERPOLATE VALUES                                INP00300
00101      4*      C                                                                        INP00400
00103      5*            DIMENSION XLL(4),YLL(4),XC(4),YC(4)                                INP00500
00103      6*      C                                                                        INP00600
00104      7*            COMMON/INT/D(208,5),IG(5),DXY(2),DLA(4),DLO(4)                     INP00700
00104      8*      C                                                                        INP00800
00105      9*            DEGRAD=3.14159/180.                                                INP00900
00106     10*            LALO=IABS(LALON)                                                   INP01000
00107     11*            L1=LALO/10000                                                      INP01100
00110     12*            L2=LALO-L1*10000                                                   INP01200
00111     13*            XL=L1/10.                                                          INP01300
00112     14*            YL=L2/10.                                                          INP01400
00113     15*            IF (IG(5)-2) 30,20,10                                              INP01500
00116     16*         10 IF (IG(5)-3) 30,30,50                                              INP01600
00116     17*      C                                                                        INP01700
00116     18*      C        INTERPOLATE FROM NMC GRID                                       INP01800
00116     19*      C                                                                        INP01900
00121     20*         20 CONTINUE                                                           INP02000
00122     21*            DO 25 L=1,26                                                       INP02100
00125     22*            DO 22 J=1,4                                                        INP02200
00130     23*         22 IF (D(L,J).LT.0.01) GO TO 25                                       INP02300
00133     24*            DO 24 K=1,8                                                        INP02400
00136     25*            I=(K-1)*26+L                                                       INP02500
00137     26*            D(I,5)=(1.-DXY(2))*((1.-DXY(1))*D(I,1)+DXY(1)*D(I,2))              INP02600
00137     27*           1 +DXY(2)*(((1.-DXY(1))*D(I,3))+DXY(1)*D(I,4))                      INP02700
00140     28*         24 CONTINUE                                                           INP02800
00142     29*         25 CONTINUE                                                           INP02900
00144     30*            RETURN                                                             INP03000
00144     31*      C                                                                        INP03100
00144     32*      C     INTERPOLATE FROM EQUATION FOR SOUTHERN HEMISPHERE GRID             INP03200
00144     33*      C                                                                        INP03300
00145     34*         30 CONTINUE                                                           INP03400
00146     35*            DO 32 J=1,2                                                        INP03500
00151     36*            XLL(J)=DLA(J)                                                      INP03600
00152     37*            YLL(J)=DLO(J)                                                      INP03700
00153     38*            IF ((YL.GE.355.).AND.(YLL(J).LT.0.01)) YLL(J)=360.                 INP03800
00155     39*         32 CONTINUE                                                           INP03900
00157     40*            X=(YLL(1)-YL)/5.                                                   INP04000
00160     41*            Y=(XL-XLL(1))/5.                                                   INP04100
00161     42*            IF (IG(5).EQ.3) Y=-Y                                               INP04200
00163     43*            DO 38 L=1,26                                                       INP04300
00166     44*            DO 36 J=1,4                                                        INP04400
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00171    45*        36 IF (D(L,J).LT.0.01) GO TO 38                                  INP04500
00174    46*           DO 37 K=1,8                                                   INP04600
00177    47*           I=(K-1)*26+L                                                  INP04700
00200    48*           D(I,5)=D(I,1)+X*(D(I,2)-D(I,1))+Y*(D(I,3)-D(I,1))+X*Y*        INP04800
00200    49*         1 (D(I,4)-D(I,3)-D(I,2)+D(I,1))                                 INP04900
00201    50*        37 CONTINUE                                                      INP05000
00203    51*        38 CONTINUE                                                      INP05100
00205    52*           RETURN                                                        INP05200
00205    53*     C                                                                   INP05300
00205    54*     C        INTERPOLATE FROM ACROSS GRIDS                              INP05400
00205    55*     C                                                                   INP05500
00206    56*        50 CONTINUE                                                      INP05600
00207    57*           IF (IG(5).NE.1133) GO TO 55                                   INP05700
00211    58*           IG(5)=3                                                       INP05800
00212    59*           GO TO 30                                                      INP05900
00213    60*        55 CONTINUE                                                      INP06000
00214    61*           IF (IG(5).NE.333) GO TO 60                                    INP06100
00216    62*           DLO(1)=(DLO(2)+DLO(3))/2.                                     INP06200
00217    63*           DO 52 I=1,208                                                 INP06300
00222    64*        52 D(I,4)=D(I,3)                                                 INP06400
00224    65*           DLA(4)=DLA(3)                                                 INP06500
00225    66*           DLO(4)=DLO(3)                                                 INP06600
00226    67*        60 CONTINUE                                                      INP06700
00227    68*           DO 62 I=1,4                                                   INP06800
00232    69*           XLL(I)=DLA(I)                                                 INP06900
00233    70*           YLL(I)=DLO(I)                                                 INP07000
00234    71*           IF ((YL.GT.350.).AND.(YLL(I).LT.0.01)) YLL(I)=360.            INP07100
00236    72*        62 CONTINUE                                                      INP07200
00240    73*           ITH=0                                                         INP07300
00241    74*           X=YLL(1)-YL                                                   INP07400
00242    75*           Y=XL-XLL(1)                                                   INP07500
00243    76*        63 CONTINUE                                                      INP07600
00244    77*           DO 65 I=2,4                                                   INP07700
00247    78*           XC(I)=YLL(1)-YLL(I)                                           INP07800
00250    79*        65 YC(I)=XLL(I)-XLL(1)                                           INP07900
00252    80*           TH2=3.14159/4                                                 INP08000
00253    81*           TH3=3.14159/4                                                 INP08100
00254    82*           IF (ABS(XC(2)).GT.0.01) TH2=ATAN(YC(2)/XC(2))                 INP08200
00256    83*           IF (ABS(YC(3)).GT.0.01) TH3=ATAN(XC(3)/YC(3))                 INP08300
00260    84*           IF (XC(2).LT.0.) TH2=3.14159+TH2                              INP08400
00262    85*           IF (XC(3).LT.0.) TH3=3.14159+TH3                              INP08500
00264    86*           DNN=COS(TH2+TH3)                                              INP08600
00265    87*           IF (ABS(DNN).GT.0.0001) GO TO 66                              INP08700
00267    88*           ITH=ITH+1                                                     INP08800
00270    89*           IF (ITH.EQ.2) GO TO 66                                        INP08900
00272    90*           XLL(3)=XLL(4)                                                 INP09000
00273    91*           YLL(3)=YLL(4)                                                 INP09100
00274    92*           DO 61 I=1,208                                                 INP09200
00277    93*        61 D(I,3)=D(I,4)                                                 INP09300
00301    94*           GO TO 63                                                      INP09400
00302    95*        66 CONTINUE                                                      INP09500
00303    96*           ZA=SQRT(XC(2)**2+YC(2)**2)                                    INP09600
00304    97*           IF (ITH.LT.2) GO TO 69                                        INP09700
00306    98*           Z=SQRT(X**2+Y**2)                                             INP09800
00307    99*           E=0.                                                          INP09900
00310   100*           Z4=0.                                                         INP10000
00311   101*           GO TO 71                                                      INP10100
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00312    102*        69 CONTINUE                                                    INP10200
00313    103*           EB=SQRT(XC(3)**2+YC(3)**2)                                  INP10300
00314    104*           Z4=(XC(4)*COS(TH3)-YC(4)*SIN(TH3))/DNN                      INP10400
00315    105*           E4=(YC(4)*COS(TH2)-XC(4)*SIN(TH2))/DNN                      INP10500
00316    106*           Z=(X*COS(TH3)-Y*SIN(TH3))/DNN                               INP10600
00317    107*           E=(Y*COS(TH2)-X*SIN(TH2))/DNN                               INP10700
00320    108*           B=0.                                                        INP10800
00321    109*           C=0.                                                        INP10900
00322    110*           DD=0.                                                       INP11000
00322    111*     C                                                                 INP11100
00323    112*        71 CONTINUE                                                    INP11200
00324    113*           DO 70 L=1,26                                                INP11300
00327    114*           DO 68 J=1,4                                                 INP11400
00332    115*        68 IF (D(L,J).LT.0.01) GO TO 70                                INP11500
00335    116*           DO 67 K=1,8                                                 INP11600
00340    117*           I=(K-1)*26+L                                                INP11700
00341    118*           A=D(I,1)                                                    INP11800
00342    119*           IF (ZA.GT.0.01) B=(D(I,2)-D(I,1))/ZA                        INP11900
00344    120*           IF (EB.GT.0.01) C=(D(I,3)-D(I,1))/EB                        INP12000
00346    121*           IF ((ABS(Z4).GT.0.01).AND.(ABS(E4).GT.0.01))                INP12100
00346    122*         1 DD=(D(I,4)-A-B*Z4-C*E4)/(Z4*E4)                             INP12200
00350    123*           D(I,5)=A+B*Z+C*E+DD*Z*E                                     INP12300
00351    124*        67 CONTINUE                                                    INP12400
00353    125*        70 CONTINUE                                                    INP12500
00355    126*           RETURN                                                      INP12600
00356    127*           END                                                         INP12700
```

END OF COMPILATION: NO DIAGNOSTICS.

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@HDG,P ***** INTRUV *****
@FOR,S PROFAS,INTRUV,INTRUV
FOR S11E-02/04/74-18:52:58 (0,)
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SUBROUTINE INTRUV ENTRY POINT 000334

STORAGE USED: CODE(1) 000361; DATA(0) 000037; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
 0003   INTERW
 0004   NERR3$
```

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
 0001   000150 10L      0001   000157 20L      0001   000174 30L      0001   000203 40L      0000 I 000000 I
 0000   000021 INJP$    0000 I 000001 IP       0000 I 000002 J        0000 I 000003 JP       0000 R 000004 PHI1
 0000 R 000005 PHI2     0000 R 000010 U1       0000 R 000012 U2       0000 R 000011 V1       0000 R 000013 V2
 0000 R 000006 Z1       0000 R 000007 Z2
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00101     1*           SUBROUTINE INTRUV(UR,VR,H,PHI,SUH,SVH)                     INV00100
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00101     2*-    C.....FINDS RANDOM WIND STANDARD DEVIATION AT HEIGHT H (KM), LATITUDE   INV00200
00101     3*     C         PHI (DEGREES), FROM UR AND VR ARRAYS                          INV00300
00103     4*           DIMENSION UR(25,10),VR(25,10)                                    INV00400
00103     5*     C.....I - LOWER HEIGHT INDEX                                           INV00500
00104     6*           IF (H.LT.95.) I = 1 + INT(H) / 5                                 INV00600
00106     7*           IF (H.GE.95.) I=19+(INT(H)-80)/20                                INV00700
00110     8*           IF (I.GT.25) I = 25                                              INV00800
00112     9*           IP=I+1  @.....UPPER HEIGHT INDEX                                 INV00900
00113    10*           IF (IP.GT.25) IP=25                                              INV01000
00115    11*           J=INT(PHI+110.)/20   @.....LOWER LATITUDE INDEX                  INV01100
00116    12*           JP=J+1  @.....UPPER LATITUDE INDEX                               INV01200
00117    13*           IF (JP.GT.10) JP=10                                              INV01300
00117    14*     C.....PHI1 - LOWER LATITUDE FOR UR AND VR ARRAY VALUES                 INV01400
00121    15*           PHI1=-110.+20.*J                                                 INV01500
00121    16*     C.....PHI2 - UPPER LATITUDE FOR UR AND VR ARRAY VALUES                 INV01600
00122    17*           PHI2=-110.+20.*JP                                                INV01700
00123    18*           IF (I.GT.19) GO TO 10                                            INV01800
00125    19*           Z1=5.*(I-1)  @.....LOWER HEIGHT FOR UR AND VR ARRAY VALUES       INV01900
00126    20*           GO TO 20                                                         INV02000
00127    21*     10    Z1=20.*(I-15)                                                    INV02100
00130    22*     20    IF (IP.GT.19) GO TO 30                                           INV02200
00132    23*           Z2=5.*(IP-1) @.....UPPER HEIGHT FOR UR AND VR ARRAY VALUES       INV02300
00133    24*           GO TO 40                                                         INV02400
00134    25*        30 Z2 = 20. * (IP - 15)                                             INV02500
00135    26*        40 CALL INTERW(UR(I,J),VR(I,J),PHI1,UR(I,JP),VR(I,JP),PHI2,U1,V1,   INV02600
00135    27*          $PHI)    @.....INTERPOLATE ON LATITUDE AT LOWER HEIGHT           INV02700
00136    28*           CALL INTERW(UR(IP,J),VR(IP,J),PHI1,UR(IP,JP),VR(IP,JP),PHI2,U2,V2,INV02800
00136    29*          $PHI)    @.....INTERPOLATE ON LATITUDE AT UPPER HEIGHT           INV02900
00137    30*           CALL INTERW(U1,V1,Z1,U2,V2,Z2,SUH,SVH,H) @...INTERPOLATE ON HEIGHTINV03000
00140    31*           RETURN                                                           INV03100
00141    32*           END                                                              INV03200

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  JAC  *****
@FOR,S PROFAS,JAC,JAC
FOR S11E-02/04/74-18:53:02 (0,)

   SUBROUTINE JAC       ENTRY POINT 002062

   STORAGE USED: CODE(1) 002131; DATA(0) 000227; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   IOTEMP 000050
    0004   COMJAC 000010

   EXTERNAL REFERENCES (BLOCK, NAME)

    0005   EXP
    0006   ALOG10
    0007   XPRR
    0010   ATAN
    0011   NERR3$
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STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000360	166G	0001	001156	276G	0001	001310	323G	0001	001336	332G	0001	000623	40L
0001	001676	416G	0001	001413	48L	0001	001042	50L	0001	001117	51L	0001	001221	52L
0001	000672	55L	0001	000753	56L	0001	001535	60L	0001	001602	62L	0001	002026	64L
0001	000151	70L	0001	000334	73L	0001	000500	75L	0001	000511	76L	0001	001132	81L
0001	001251	83L	0001	001300	85L	0001	001465	90L	0001	001752	91L	0001	001770	95L
0000 R	000057	A	0000 R	000100	AA	0000 R	000104	AH	0000 R	000101	AHE	0000 R	000000	ALPHA
0000 R	000077	AN	0000 R	000102	AO	0000 R	000103	AOE	0003	000040	AP	0000 R	000040	AV
0000 R	000111	A1	0000 R	000047	A2	0000 R	000022	B	0000 R	000073	BUR	0000 R	000056	D
0003	000004	DD	0000 R	000067	DEL	0000 R	000110	DEN1	0000 R	000014	DI	0000 R	000031	DIT
0000 R	000075	DL	0003	000044	DX	0004	000004	DY	0003	000047	DZ	0000 R	000113	D1
0000 R	000006	EI	0004 R	000007	EM	0000 R	000051	EPS	0000 R	000060	FA	0000 R	000112	FA1
0000 R	000061	FD	0000 R	000114	FP1	0000 R	000045	FK	0000 R	000072	FX	0000 R	000116	FX1
0003	000036	F10	0003	000037	F10B	0003	000031	G	0003	000033	H	0003	000045	HL
0003	000026	H1	0000 I	000070	I	0003	000024	IDA	0003	000041	IHR	0000	000203	INJPS
0003	000000	IOTEM1	0003	000001	IOTEM2	0003	000002	IUG	0003	000025	IYR	0000 I	000050	M
0003	000042	MIN	0003	000023	MN	0000 I	000063	N	0000 I	000062	NINT	0003	000003	NMCOP
0003	000043	NMORE	0003	000010	NSAME	0003 R	000076	PAR	0003	000007	PHI	0003	000034	PHIR
0003	000006	PHI1	0003	000027	PHI1R	0000 R	000064	PREV	0000 R	000043	QA	0000 R	000044	QHE
0000 R	000041	QN	0000 R	000042	QO2	0000 R	000037	QQ	0000 R	000074	R	0003	000012	RD1
0003	000032	RI	0003	000011	RP1	0003	000013	RT1	0003	000017	RU1	0003	000020	RV1
0000 R	000117	S	0004	000002	SDA	0003	000015	SD1	0004	000003	SHA	0000 R	000065	SONE
0003	000014	SP1	0000 R	000066	STWO	0003	000016	ST1	0003	000021	SU1	0003	000022	SV1
0004 R	000006	T	0003	000035	THETR	0003	000030	THET1R	0000 R	000046	TX	0000 R	000106	TZ3
0000 R	000052	T1	0000 R	000054	T3	0000 R	000053	T4	0003	000046	VL	0000 R	000071	X
0004	000000	XLAT	0004	000001	XLONG	0003	000005	XMJD	0000 R	000115	X1	0004	000005	Y
0000 R	000107	ZM3	0000 R	000055	Z2	0000 R	000105	Z3						


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00101     1*          SUBROUTINE JAC(Z,TZ,DENS)                                    JAC00100
00103     2*          COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,      JAC00200
00103     3*         .        NSAME,RP1, RD1, RT1, SP1, SD1, ST1, RU1, RV1, SU1, SV1,JAC00300
00103     4*         $ MN, IDA, IYR, H1, PHI1R,THET1R,G,RI,H,PHIR,THETR,F10,F10B,AP,JAC00400
00103     5*         .   IHR,MIN,NMORE,DX,HL,VL,DZ                                 JAC00500
00104     6*          COMMON/COMJAC/XLAT,XLONG,SDA,SHA,DY,Y,T,EM                   JAC00600
00105     7*          DIMENSION ALPHA(6),EI(6),DI(6),     B(7),DIT(6)              JAC00700
00106     8*          QQ = 100.                                                    JAC00800
00107     9*          DATA ALPHA/0.0,0.0,0.0,0.0,0.0,-0.38,0.0/                    JAC00900
00111    10*          DATA EI/28.0134,31.9988,15.9994,39.948,4.0026,1.00797/       JAC01000
00113    11*          DATA B/28.15204,-0.085586,1.284E-04,-1.0056E-05,-1.021E-05,  JAC01100
00113    12*         11.5044E-06,9.9826E-08/                                       JAC01200
00115    13*          AV=6.02257E23                                                JAC01300
00116    14*          QN=.78110                                                    JAC01400
00117    15*          QO2=.20955                                                   JAC01500
00120    16*          QA=.009343                                                   JAC01600
00121    17*          QHE = 1.289E-5                                               JAC01700
00122    18*          FK=8.31432                                                   JAC01800
00122    19*     C                                                                 JAC01900
00122    20*     C    TEMPERATURE AT Z = 125 KM, EQ. 9                             JAC02000
00122    21*     C                                                                 JAC02100
00123    22*          TX=444.3807+.02385*T -392.8292*EXP(-.0021357*T)              JAC02200
00124    23*          A2=2.*(T-TX)/3.14159265                                      JAC02300
00124    24*     C                                                                 JAC02400
00124    25*     C                                                                 JAC02500
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00125   26*          DIT(6)=0.                                                    JAC02600
00126   27*          4=10                                                         JAC02700
00127   28*          EPS=.0001                                                    JAC02800
00127   29*    C                                                                  JAC02900
00127   30*    C     TEMPERATURE FOR 90<Z<125, EQ. 10                             JAC03000
00127   31*    C                                                                  JAC03100
00130   32*          T1=1.9*(TX-183.)/35.                                         JAC03200
00131   33*          T4=3.*(TX-183.-2.*T1*35./3.)/(35.**4)                        JAC03300
00132   34*          T3=-T1/(3.*35.**2)+4.*T4*35./3.                              JAC03400
00133   35*          TZ=TX+T1*(Z-125.)+T3*(Z-125.)**3+T4*(Z-125.)**4              JAC03500
00134   36*          IF (Z-105.) 43,43,40                                         JAC03600
00134   37*    C                                                                  JAC03700
00134   38*    C     MEAN MOLECULAR WEIGHT FOR 90<Z<105, EQ. 1                    JAC03800
00134   39*    C                                                                  JAC03900
00137   40*       43 Z2 = Z - QQ                                                  JAC04000
00140   41*          EM=B(1)+B(2)*Z2+B(3)*Z2**2+B(4)*Z2**3+B(5)*Z2**4+B(6)*Z2**5  JAC04100
00140   42*         1+B(7)*Z2**6                                                 JAC04200
00141   43*          D=Z                                                          JAC04300
00142   44*    70    CONTINUE                                                     JAC04400
00142   45*    C                                                                  JAC04500
00142   46*    C     INTEGRATION OF EQ. 5 FOR DENSITY BETWEEN 90<Z<105            JAC04600
00142   47*    C                                                                  JAC04700
00143   48*          A=90.                                                        JAC04800
00144   49*          FA=B(1)+B(2)*(A-QQ)+B(3)*(A-QQ)**2+B(4)*(A-QQ)**3+B(5)*(A-QQ)**4 JAC04900
00144   50*         1+B(6)*(A-QQ)**5 +B(7)*(A-QQ)**6                             JAC05000
00145   51*          FA=FA*9.80665/((1.+A/6.356766E+3)**2)                        JAC05100
00146   52*          FA=FA/(TX+T1*(A-125.)+T3*(A-125.)**3 +T4*(A-125.)**4)        JAC05200
00147   53*          FD=B(1)+B(2)*(D-QQ)+B(3)*(D-QQ)**2+B(4)*(D-QQ)**3+B(5)*(D-QQ)**4 JAC05300
00147   54*         1+B(6)*(D-QQ)**5 +B(7)*(D-QQ)**6                             JAC05400
00150   55*          FD=FD*9.80665/((1.+D/6.356766E+3)**2)                        JAC05500
00151   56*          FD=FD/(TX+T1*(D-125.)+T3*(D-125.)**3 +T4*(D-125.)**4)        JAC05600
00151   57*    C     SRQ4, SIMPSONS RULE QUADRATURE  -  G.F.KUNCIR                JAC05700
00151   58*    C     DEFINITIONS  -                                               JAC05800
00151   59*    C       A = LOWER LIMIT OF INTEGRATION                             JAC05900
00151   60*    C       D = UPPER LIMIT OF INTEGRATION                             JAC06000
00151   61*    C       FUNC = INTEGRAND FUNCTION SUBPROGRAM                       JAC06100
00151   62*    C       EPS = RELATIVE ERROR CONVERGENCE CRITERION                 JAC06200
00151   63*    C       M = MAXIMUM NUMBER OF INTEGRATIONS                         JAC06300
00151   64*    C       R = RESULT OF INTEGRATION                                  JAC06400
00151   65*    C       N = NUMBER OF INTEGRATIONSORIQHIRID TO FIND R              JAC06500
00151   66*    C                                                                  JAC06600
00152   67*          NINT = 1                                                     JAC06700
00153   68*          N=0                                                          JAC06800
00154   69*          PREV=0.                                                      JAC06900
00155   70*          SONE=(D-A)*(FA+FD)/2.                                        JAC07000
00156   71*    71    N=N+1                                                        JAC07100
00157   72*          IF (N-M) 72,72,75                                            JAC07200
00162   73*    72    NINT = 2 * NINT                                              JAC07300
00163   74*          STWO=0.                                                      JAC07400
00164   75*          DEL=(D-A)/FLOAT(NINT)                                        JAC07500
00165   76*          DO 73 I=1,NINT,2                                             JAC07600
00170   77*          X=A+DEL*FLOAT(I)                                             JAC07700
00171   78*          FX=B(1)+B(2)*(X-QQ)+B(3)*(X-QQ)**2+B(4)*(X-QQ)**3+B(5)*(X-QQ)**4 JAC07800
00171   79*         1+B(6)*(X-QQ)**5 +B(7)*(X-QQ)**6                             JAC07900
00172   80*          FX=FX*9.80665/((1.+X/6.356766E+3)**2)                        JAC08000
00173   81*          FX=FX/(TX+T1*(X-125.)+T3*(X-125.)**3 +T4*(X-125.)**4)        JAC08100
00174   82*    73    STWO=STWO+FX                                                 JAC08200
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00176    83*          CUR=SONE+4.*DEL*STKO                                    JAC08300
00177    84*          IF (EPS*ABS(CUR)-ABS(CUR-PREV)) 74,75,75                JAC08400
00202    85*     74   PREV=CUR                                                 JAC08500
00203    86*          SONE=(SONE+CUR)/4.                                      JAC08600
00204    87*          GO TO 71                                                JAC08700
00205    88*     75   R=CUR/3                                                 JAC08800
00206    89*          IF (Z-105.) 44,76,44                                    JAC08900
00211    90*       44 IF (D-105.) 76,55,76                                    JAC09000
00211    91*     C                                                           JAC09100
00211    92*     C    DENSITY FOR 90<Z<105                                   JAC09200
00211    93*     C                                                           JAC09300
00214    94*     76   DENS=3.46E-9*183.*EM*EXP(-R/FK)/(TZ*28.878)             JAC09400
00215    95*          DL=ALOG10(DENS)                                         JAC09500
00216    96*          PAR=AV*DENS/EM                                          JAC09600
00217    97*          AN=ALOG10(QN*EM*PAR/28.96)                              JAC09700
00220    98*          AA=ALOG10(QA*EM*PAR/28.96)                              JAC09800
00221    99*          AHE=ALOG10(QHE*EM*PAR/28.96)                            JAC09900
00222   100*          AO=ALOG10(2.*PAR*(1.-EM/28.96))                         JAC10000
00223   101*          AO2=ALOG10(PAR*(EM*(1.+Q02)/28.96-1.))                  JAC10100
00224   102*          AH=-0.                                                  JAC10200
00225   103*          RETURN                                                  JAC10300
00225   104*     C                                                           JAC10400
00225   105*     C    TEMPERATURE AND MEAN MOLECULAR WEIGHT AT Z=105 KM      JAC10500
00225   106*     C                                                           JAC10600
00226   107*       40 Z3=105.                                                JAC10700
00227   108*          TZ3=TX+T1*(Z3-125.)+T3*(Z3-125)**3+T4*(Z3-125)**4       JAC10800
00230   109*          ZM3=B(1)+B(2)* 5.+B(3)* 25.+B(4)* 125.+B(5)* 5.**4.+B(6)* 5.**5.  JAC10900
00230   110*         1+B(7)* 5.**6.                                           JAC11000
00231   111*          D=105.                                                  JAC11100
00232   112*          GO TO 70                                                JAC11200
00232   113*     C                                                           JAC11300
00232   114*     C    DENSITY  AT Z=105 KM                                   JAC11400
00232   115*     C                                                           JAC11500
00233   116*     55   DEN1=3.46E-9*183.*ZM3*EXP(-R/FK)/(TZ3*28.878)           JAC11600
00234   117*          PAR=AV*DEN1/ZM3                                         JAC11700
00235   118*          DI(1)=QN*ZM3*PAR/28.96                                  JAC11800
00236   119*          DI(2)=PAR*(ZM3*(1.+Q02)/28.96-1.)                       JAC11900
00237   120*          DI(3)=2.*PAR*(1.-ZM3/28.96)                             JAC12000
00240   121*          DI(4)=QA*ZM3*PAR/28.96                                  JAC12100
00241   122*          DI(5)=QHE*ZM3*PAR/28.96                                 JAC12200
00242   123*          IF(Z-125.) 56,56,90                                     JAC12300
00245   124*     56   CONTINUE                                                JAC12400
00245   125*     C                                                           JAC12500
00245   126*     C    INTEGRATION OF EQ. 6 FOR DENSITY ABOVE 105 KM          JAC12600
00245   127*     C                                                           JAC12700
00246   128*          A1=105.                                                 JAC12800
00247   129*          FA1=9.80665/((1.+A1/6.356766E+3)**2)                    JAC12900
00250   130*          FA1=FA1/(TX+T1*(A1-125.)+T3*(A1-125.)**3+T4*(A1-125.)**4)  JAC13000
00251   131*          D1=Z                                                    JAC13100
00252   132*          FD1=9.80665/((1.+D1/6.356766E+3)**2)                    JAC13200
00253   133*          IF(D1-125.) 45,45,50                                    JAC13300
00256   134*       45 FD1=FD1/(TX+T1*(D1-125.)+T3*(D1-125.)**3+T4*(D1-125.)**4)  JAC13400
00257   135*          GO TO 51                                                JAC13500
00260   136*     50   FD1=FD1/(TX+A2*ATAN(T1*(D1-125.)*(1.+4.5E-6*(D1-125.)**2.5)/A2))  JAC13600
00261   137*          TZ=TX+A2*ATAN(T1*(Z-125.)*(1.+4.5E-6*(Z-125.)**2.5)/A2)  JAC13700
00262   138*     51   N=0                                                     JAC13800
00263   139*          NINT = 1                                                JAC13900
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00264   140*            PREV=0                                                  JAC14000
00265   141*            SONE=(D1-A1)*(FA1+FD1)/2.                               JAC14100
00266   142*      81    N=N+1                                                   JAC14200
00267   143*            IF (N-M) 82,82,85                                       JAC14300
00272   144*      82    NINT = 2 * NINT                                         JAC14400
00273   145*            STWO=0.                                                 JAC14500
00274   146*            DEL=(D1-A1)/FLOAT(NINT)                                 JAC14600
00275   147*            DO 83 I=1,NINT,2                                        JAC14700
00300   148*            X1=A1+DEL*FLOAT(I)                                      JAC14800
00301   149*            FX1=9.80665/((1.+X1/6.356766E+3)**2)                    JAC14900
00302   150*            IF(X1-125.) 46,46,52                                    JAC15000
00305   151*         46 FX1=FX1/(TX+T1*(X1-125.)+T3*(X1-125.)**3+T4*(X1-125.)**4)  JAC15100
00306   152*            GO TO 83                                                JAC15200
00307   153*      52    FX1=FX1/(TX+A2*ATAN(T1*(X1-125.)*(1.+4.5E-6*(X1-125.)**2.5)/A2))  JAC15300
00310   154*      83    STWO=STWO+FX1                                           JAC15400
00312   155*            CUR=SONE+4.*DEL*STWO                                    JAC15500
00313   156*            IF (EPS*ABS(CUR)-ABS(CUR-PREV)) 84,85,85                JAC15600
00316   157*      84    PREV=CUR                                                JAC15700
00317   158*            SONE=(SONE+CUR)/4.                                      JAC15800
00320   159*            GO TO 81                                                JAC15900
00321   160*      85    R=CUR/3.                                                JAC16000
00321   161*      C                                                             JAC16100
00321   162*      C     DENSITY ABOVE 105 KM                                    JAC16200
00321   163*      C                                                             JAC16300
00322   164*            DO 41  I=1,5                                            JAC16400
00325   165*            DIT(I)=DI(I)*(TZ3/TZ)**(1.+ALPHA(I))*EXP(-EI(I)*R/FK)   JAC16500
00326   166*         41 CONTINUE                                                JAC16600
00330   167*            DENS=0                                                  JAC16700
00331   168*            DO 42 I=1,6                                             JAC16800
00334   169*            DENS=DENS+EI(I)*DIT(I)/AV                               JAC16900
00335   170*      42    CONTINUE                                                JAC17000
00335   171*      C                                                             JAC17100
00335   172*      C     MEAN MOLECULAR WEIGHT FOR Z>105 KM                      JAC17200
00335   173*      C                                                             JAC17300
00337   174*            EM=DENS*AV/(DIT(1)+DIT(2)+DIT(3)+DIT(4)+DIT(5)+DIT(6))  JAC17400
00337   175*      C                                                             JAC17500
00337   176*      C     LOG DENSITY                                             JAC17600
00337   177*      C                                                             JAC17700
00340   178*            DL=ALOG10(DENS)                                         JAC17800
00341   179*            AN =ALOG10(DIT(1))                                      JAC17900
00342   180*            AO2=ALOG10(DIT(2))                                      JAC18000
00343   181*            AO =ALOG10(DIT(3))                                      JAC18100
00344   182*            AA =ALOG10(DIT(4))                                      JAC18200
00345   183*            AHE=ALOG10(DIT(5))                                      JAC18300
00346   184*            IF(Z-500.) 47,48,48                                     JAC18400
00351   185*         47 DIT(6)=10.**(-6)                                        JAC18500
00352   186*         48 AH=ALOG10(DIT(6))                                       JAC18600
00353   187*            AN =AMAX1(-0., AN)                                      JAC18700
00354   188*            AO2=AMAX1(-0.,AO2)                                      JAC18800
00355   189*            AO =AMAX1(-0., AO)                                      JAC18900
00356   190*            AA =AMAX1(-0., AA)                                      JAC19000
00357   191*            AHE=AMAX1(-0.,AHE)                                      JAC19100
00360   192*            AH =AMAX1(-0., AH)                                      JAC19200
00361   193*            RETURN                                                  JAC19300
00361   194*      C                                                             JAC19400
00361   195*      C     TEMPERATURE AND DENSITY AT Z=500 KM                     JAC19500
00361   196*      C                                                             JAC19600
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00362   197*     90    S=TX+A2*ATAN(T1*375.*(1.+4.5E-6*375.**2.5)/A2)                    JAC19700
00363   198*           DI(6)=10.**(73.13-39.4*ALOG10(S)+5.5*ALOG10(S)*ALOG10(S))         JAC19800
00364   199*           A1=500.                                                           JAC19900
00365   200*           IF(Z-500.) 49,60,60                                               JAC20000
00365   201*     C                                                                       JAC20100
00365   202*     C     INTEGRATION OF EQ. 6 FOR DENSITY FOR Z>125 KM                     JAC20200
00365   203*     C                                                                       JAC20300
00370   204*        49 A1=Z                                                            JAC20400
00371   205*        60 FA1=9.80665/((1.+A1/6.356766E+3)**2)                            JAC20500
00372   206*           FA1=FA1/(TX+A2*ATAN(T1*(A1-125.)*(1.+4.5E-6*(A1-125.)**2.5)/A2)) JAC20600
00373   207*           D1=Z                                                            JAC20700
00374   208*           IF(Z-500.) 61,62,62                                             JAC20800
00377   209*        61 D1=500.                                                         JAC20900
00400   210*        62 FD1=9.80665/((1.+D1/6.356766E+3)**2)                            JAC21000
00401   211*           FD1=FD1/(TX+A2*ATAN(T1*(D1-125.)*(1.+4.5E-6*(D1-125.)**2.5)/A2)) JAC21100
00402   212*           N=0                                                             JAC21200
00403   213*           NINT = 1                                                        JAC21300
00404   214*           PREV=0                                                          JAC21400
00405   215*           SONE=(D1-A1)*(FA1+FD1)/2.                                       JAC21500
00406   216*     91    N=N+1                                                           JAC21600
00407   217*           IF (N-M) 92,92,95                                               JAC21700
00412   218*     92    NINT = 2 * NINT                                                 JAC21800
00413   219*           STWO=0.                                                         JAC21900
00414   220*           DEL=(D1-A1)/FLOAT(NINT)                                         JAC22000
00415   221*           DO 93 I=1,NINT,2                                                JAC22100
00420   222*           X1=A1+DEL*FLOAT(I)                                              JAC22200
00421   223*           FX1=9.80665/((1.+X1/6.356766E+3)**2)                            JAC22300
00422   224*           FX1=FX1/(TX+A2*ATAN(T1*(X1-125.)*(1.+4.5E-6*(X1-125.)**2.5)/A2)) JAC22400
00423   225*     93    STWO=STWO+FX1                                                   JAC22500
00425   226*           CUR=SONE+4.*DEL*STWO                                            JAC22600
00426   227*           IF (EPS*ABS(CUR)-ABS(CUR-PREV)) 94,95,95                        JAC22700
00431   228*     94    PREV=CUR                                                        JAC22800
00432   229*           SONE=(SONE+CUR)/4.                                              JAC22900
00433   230*           GO TO 91                                                        JAC23000
00434   231*     95    R=CUR/3.                                                        JAC23100
00434   232*     C                                                                     JAC23200
00434   233*     C     TEMPERATURE AT Z>500 KM                                         JAC23300
00434   234*     C                                                                     JAC23400
00435   235*           TZ=TX+A2*ATAN(T1*(Z-125.)*(1.+4.5E-6*(Z-125.)**2.5)/A2)         JAC23500
00436   236*           IF(Z-500.) 63,64,64                                             JAC23600
00441   237*        63 R=-R                                                            JAC23700
00441   238*     C                                                                     JAC23800
00441   239*     C     DENSITY OF HYDROGEN FOR Z>500 KM                                JAC23900
00441   240*     C                                                                     JAC24000
00442   241*        64 DIT(6)=DI(6)*(S/TZ)*EXP(-EI(6)*R/FK)                            JAC24100
00443   242*           GO TO 56                                                        JAC24200
00444   243*           END                                                             JAC24300

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  JACCH  *****
@FOR,S PROFAS,JACCH,JACCH
FOR S11E-02/04/74-18:53:09 (0,)

  SUBROUTINE JACCH     ENTRY POINT 000244
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STORAGE USED: CODE(1) 000302; DATA(0) 000052; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 COMJAC 000010
0004 IOTEMP 000050

EXTERNAL REFERENCES (BLOCK, NAME)

0005 TME
0006 TINF
0007 JAC
0010 SIN
0011 EXP
0012 SQRT
0013 .ERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000131	150L	0001	000160	250L	0001	000224	300L	0001	000017	50L	0001	000021	75L
0001	000063	80L	0001	000074	90L	0004	000040	AP	0004	000034	CLAT	0004	000035	CLON
0000 R	000002	C1	0000 R	000003	C2	0004 R	000004	DD	0000 R	000006	DEM	0000 R	000005	DLRHO
0000 R	000010	DTH	0004	000044	DX	0003	000004	DY	0004	000047	DZ	0003 R	000007	EM
0004	000036	F10	0004	000037	F10B	0004	000031	G	0004	000033	H	0004	000045	HL
0004	000026	H1	0004	000024	IDA	0004	000041	IHR	0000	000042	INJPS	0004	000000	IOTEM1
0004	000001	IOTEM2	0004	000002	IUG	0004 I	000025	IYR	0000 I	000001	J1	0004 I	000023	M
0004	000042	MIN	0004	000003	NMCOP	0004	000043	NMORE	0004	000010	NSAME	0004	000007	PHI
0004	000006	PHI1	0004	000027	PHI1R	0003 R	000005	R	0004	000012	RD1	0004	000032	RI
0004	000011	RP1	0004	000013	RT1	0004	000017	RU1	0004	000020	RV1	0003	000002	SDA
0004	000015	SD1	0003	000003	SHA	0004	000014	SP1	0004	000016	ST1	0004	000021	SU1
0004	000022	SV1	0003 R	000006	T	0004	000030	THET1R	0004	000046	VL	0003 R	000000	XLAT
0003 R	000001	XLONG	0004	000005	XMJD	0000 R	000000	YDA	0000 R	000007	Z110	0000 R	000004	Z90

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00101      1*          SUBROUTINE JACCH(Z,PHIR,THET,PH,DH,TH)                                  JAH00100
00103      2*          COMMON/COMJAC/XLAT,XLONG,SDA,SHA,DY,R,T,EM                              JAH00200
00104      3*          COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,                 JAH00300
00104      4*         .          NSAME,RP1, RD1, RT1, SP1, SD1, ST1, RU1, RV1, SU1, SV1,      JAH00400
00104      5*         $ M , IDA, IYR, H1, PHI1R,THET1R,G,RI,H,CLAT,CLON ,F10,F10B,AP,          JAH00500
00104      6*         .   IHR,MIN,NMORE,DX,HL,VL,DZ                                           JAH00600
00104      7*     C                                                                           JAH00700
00104      8*     C    JACCH CALCULATES THE PRESSURE, DENSITY, AND TEMPERATURE AT A           JAH00800
00104      9*     C    POINT IN SPACE ABOVE 90 KM FOR A PARTICULAR TIME                       JAH00900
00104     10*     C                                                                           JAH01000
00104     11*     C    INPUT                                                                  JAH01100
00104     12*     C    Z = HEIGHT IN KM                                                       JAH01200
00104     13*     C    PHIR = LATITUDE IN RADIANS                                             JAH01300
00104     14*     C    THET = LONGITUDE IN DEGREES  (0 TO 360 DEGREES TURNING WESTWARD)       JAH01400
00104     15*     C    F10 = SOLAR RADIO NOISE FLUX (XE - 22 WATTS/M**2)                      JAH01500
00104     16*     C    F10B = 81-DAY AVERAGE F10                                              JAH01600
00104     17*     C    AP = GEOMAGNETIC INDEX                                                 JAH01700
00104     18*     C    M  = MONTH (FOR YEARLY MEAN VARIABLES M IS SET TO 13)                  JAH01800
00104     19*     C    IDA = DAY OF MONTH                                                     JAH01900
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00104     20*      C     IYR = YEAR                                                                    JAH02000
00104     21*      C     IHR = HOUR OF DAY  (UNIVERSAL TIME)                                           JAH02100
00104     22*      C     MIN = MINUTE  (UNIVERSAL TIME)                                                JAH02200
00104     23*      C     XMJD = MEAN JULIAN DAY  (SET EQUAL TO ZERO FOR ANNUAL MEAN)                   JAH02300
00104     24*      C     DD = DAY NUMBER WITH RESPECT TO JAN 0 OF YEAR IYR                             JAH02400
00104     25*      C     OUTPUT                                                                        JAH02500
00104     26*      C     PH = PRESSURE IN UNITS OF NT/M**2                                             JAH02600
00104     27*      C     DH = DENSITY IN UNITS OF KG/M**3                                              JAH02700
00104     28*      C     TH = TEMPERATURE IN KELVIN DEGREES                                            JAH02800
00104     29*      C                                                                                   JAH02900
00104     30*      C     DD = DAY NUMBER WITH RESPECT TO JAN 1 OF YEAR IYR                             JAH03000
00104     31*      C                                                                                   JAH03100
00104     32*      C     REPLACEMENT OF SUBROUTINE VARIABLES TO INSURE NO CHANGES IN THEM              JAH03200
00104     33*      C                                                                                   JAH03300
00105     34*           R = 0.31                                                                      JAH03400
00106     35*           XLAT = PHIR                                                                   JAH03500
00107     36*           XLONG = THET                                                                  JAH03600
00110     37*           IF (M.EQ.13) GO TO 50                                                         JAH03700
00110     38*      C                                                                                  JAH03800
00110     39*      C     CALCULATE SOLAR DEC. AND HOUR ANGLE                                          JAH03900
00110     40*      C                                                                                  JAH04000
00112     41*           CALL TME                                                                      JAH04100
00112     42*      C                                                                                  JAH04200
00112     43*      C     EXOSPHERIC TEMPERATURE                                                       JAH04300
00112     44*      C                                                                                  JAH04400
00113     45*           CALL TINF                                                                     JAH04500
00114     46*           GO TO 75                                                                      JAH04600
00115     47*        50 T = 1000.0                                                                    JAH04700
00115     48*      C                                                                                  JAH04800
00115     49*      C     TEMPERATURE, MOLECULAR WEIGHT, AND DENSITY WITHOUT SEASONAL                  JAH04900
00115     50*      C        VARIATIONS                                                                JAH05000
00115     51*      C                                                                                  JAH05100
00116     52*        75 CALL JAC(Z,TH,DH)                                                             JAH05200
00117     53*           IF (M.EQ.13) GO TO 300                                                        JAH05300
00121     54*           YDA = 365.0                                                                   JAH05400
00122     55*           J1 = MOD(IYR,4)                                                               JAH05500
00123     56*           IF (J1.EQ.0) YDA = 366.0                                                      JAH05600
00125     57*           C1 = SIN((360. / YDA) * 0.0174532925 * (DD + 100.0))                          JAH05700
00126     58*           IF (PHIR) 80,70,80                                                            JAH05800
00131     59*        70 C2 = 0.0                                                                      JAH05900
00132     60*           GO TO 90                                                                      JAH06000
00133     61*        80 C2 = (SIN(PHIR) ** 2) * (PHIR / ABS(PHIR))                                    JAH06100
00133     62*      C                                                                                  JAH06200
00133     63*      C     DENSITY WITH SEASONAL VARIATIONS                                             JAH06300
00133     64*      C                                                                                  JAH06400
00134     65*        90 Z90 = Z - 90.0                                                                JAH06500
00135     66*           DLRHO = 0.02 * Z90 * EXP(-0.045 * Z90) * C1 * C2                              JAH06600
00136     67*           DH = DH * EXP(DLRHO)                                                          JAH06700
00136     68*      C                                                                                  JAH06800
00136     69*      C     MOLECULAR WEIGHT WITH SEASONAL VARIATION                                     JAH06900
00136     70*      C                                                                                  JAH07000
00137     71*           IF (Z - 120.0) 100,100,150                                                    JAH07100
00142     72*       100 EM = EM + 0.006 * Z90 * C1                                                    JAH07200
00143     73*           GO TO 250                                                                     JAH07300
00144     74*       150 IF (Z - 230.0) 200,250,250                                                    JAH07400
00147     75*       200 DEM = EXP(-0.02424 * Z90) * (0.0316 * Z90 - 0.0002257 * Z90 * Z90)            JAH07500
00150     76*           EM = EM + DEM * C1*0.5                                                        JAH07600
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00150     77*     C                                                              JAH07700
00150     78*     C     TEMPERATURE WITH SEASONAL VARIATIONS                     JAH07800
00150     79*     C                                                              JAH07900
00151     80*       250 IF (Z-260.0) 270,300,300                                 JAH08000
00154     81*       270 Z110 = Z - 110.0                                         JAH08100
00155     82*           DTH = -2.291753 * Z110 + 0.02154336 * Z110*Z110- 4.1766671E-05 *  JAH08200
00155     83*          $ (Z110 ** 3)                                             JAH08300
00156     84*           DTH = EXP(-0.290655 * SQRT(ABS(Z110)))* DTH              JAH08400
00157     85*           TH = TH +(DTH * C1 * C2 *TH) / 100.0                     JAH08500
00157     86*     C                                                              JAH08600
00157     87*     C     DENSITY IN METRIC UNITS AND PRESSURE CALCULATED          JAH08700
00157     88*     C                                                              JAH08800
00160     89*       300 DH = DH * 1000.0                                         JAH08900
00161     90*           PH =((DH * 8.31432 * TH) / EM) * 1000.0                  JAH09000
00162     91*           RETURN                                                   JAH09100
00163     92*           END                                                      JAH09200
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      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  NORMAL  *****
@FOR,S PROFAS,NORMAL,NORMAL
FOR S11E-02/04/74-18:53:12 (0,)
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SUBROUTINE NORMAL ENTRY POINT 000062

STORAGE USED: CODE(1) 000070; DATA(0) 000016; BLANK COMMON(2) 000000

EXTERNAL REFERENCES (BLOCK, NAME)

```
 0003   RAND
 0004   ALOG
 0005   SQRT
 0006   NERR3$
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STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

```
 0001   000000 50L       0000   000011 INJP$     0000 R 000000 L        0003 R 000000 RAND     0000 R 000005 S
 0000 R 000001 X         0000 R 000003 XX        0000 R 000002 Y        0000 R 000004 YY
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00101      1*           SUBROUTINE NORMAL(D1,D2)                               NOR00100
00101      2*     C.....PRODUCES 2 RANDOM NUMBERS, D1, D2, PICKED FROM A NORMAL DIST.  NOR00200
00101      3*     C     WITH ZERO MEAN AND UNIT VARIANCE                         NOR00300
00103      4*           REAL L                                                   NOR00400
00104      5*        50 X = RAND(0)                                              NOR00500
00105      6*           Y = 2*RAND(0) - 1                                        NOR00600
00106      7*           XX = X**2                                                NOR00700
00107      8*           YY = Y**2                                                NOR00800
00110      9*           S = XX + YY                                              NOR00900
00111     10*           IF (S-1) 51,51,50                                        NOR01000
00114     11*        51 L = SQRT(-2*ALOG(RAND(0)))/S                             NOR01100
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00115     12*          D1 = (XX-YY)*L                                    NOR01200
00116     13*          D2 = 2*X*Y*L                                      NOR01300
00117     14*          RETURN                                            NOR01400
00120     15*          END                                               NOR01500

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  PDTUV  *****
@FOR,S PROFAS.PDTUV,PDTUV
FOR S11E-02/04/74-18:53:16 (C,)

   SUBROUTINE PDTUV     ENTRY POINT 000375

   STORAGE USED: CODE(1) 000450; DATA(0) 000062; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000031 10L       0001   000037 20L       0001   000041 30L       0000 R 000007 DLAT      0000 R 000003 DLON
    0000 I 000005 I         0000   000022 INJP$     0000 I 000006 IP        0000 I 000002 J         0000 I 000004 JP
    0000 I 000000 K         0000 R 000001 XLON

00101      1*           SUBROUTINE PDTUV (PSP, DSP, TSP, CLAT, CLON, IH, PS, DS, TS,      PDT00100
00101      2*          $ DPX, DPY, DTX, DTY)                                              PDT00200
00101      3*     C.....INTERPOLATES STATIONARY PERTURBATIONS ON LATITUDE AND LONGITUDE   PDT00300
00101      4*     C        AT HEIGHT IH                                                   PDT00400
00103      5*           DIMENSION PSP(8,10,12),DSP(8,10,12),TSP(8,10,12)                  PDT00500
00104      6*           IF (IH.LT.52) GO TO 10                                            PDT00600
00106      7*           IF (IH.GT.84) GO TO 20                                            PDT00700
00110      8*           K = ((IH+4)/8) - 4@.....HEIGHT INDEX                              PDT00800
00111      9*           GO TO 30                                                          PDT00900
00112     10*        10 K = (IH-20)/10                                                    PDT01000
00113     11*           GO TO 30                                                          PDT01100
00114     12*        20 K = 8                                                             PDT01200
00115     13*        30 XLON = CLON                                                       PDT01300
00116     14*           IF (CLON.LT.10.) XLON = 360. + CLON                               PDT01400
00120     15*           J = INT((XLON + 20.)/30.)  @.....LOWER LONGITUDE INDEX            PDT01500
00120     16*     C.....DLON - RELATIVE LONGITUDE DEVIATION FROM CORNER REFERENCE LOCATIONPDT01600
00121     17*           DLON = (XLON - 30.*J + 20.)/30.                                   PDT01700
00122     18*           JP = J+1@.....UPPER LONGITUDE INDEX                               PDT01800
00123     19*           IF (JP.GT.12) JP=1                                                PDT01900
00125     20*           I = INT((CLAT + 110.)/20.) @.....LOWER LATITUDE INDEX             PDT02000
00126     21*           IP = I+1     @.....UPPER LATITUDE INDEX                           PDT02100
00127     22*           IF (IP.GT.10) IP=10                                               PDT02200
00127     23*     C.....DLAT - RELATIVE LATITUDE DEVIATION FROM CORNER REFERENCE LOCATION PDT02300
00131     24*           DLAT = (CLAT-20.*I + 110.)/20.                                    PDT02400
00132     25*           PS=PSP(K,I,J)+(PSP(K,IP,J)-PSP(K,I,J))*DLAT+(PSP(K,I,JP)-PSP(K,I,JPDT02500
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00132     26*          1))*DLON+(PSP(K,IP,JP)-PSP(K,I,JP)-PSP(K,IP,J)+PSP(K,I,J))*DLAT*   PDT02600
00132     27*          2DLON     @.....PRESSURE LAT-LON INTERPOLATION                      PDT02700
00133     28*           DS=DSP(K,I,J)+(DSP(K,IP,J)-DSP(K,I,J))*DLAT+(DSP(K,I,JP)-DSP(K,I,JPDT02800
00133     29*          1))*DLON+(DSP(K,IP,JP)-DSP(K,I,JP)-DSP(K,IP,J)+DSP(K,I,J))*DLAT*   PDT02900
00133     30*          2DLON     @.....DENSITY LAT-LON INTERPOLATION                       PDT03000
00134     31*           TS=TSP(K,I,J)+(TSP(K,IP,J)-TSP(K,I,J))*DLAT+(TSP(K,I,JP)-TSP(K,I,JPDT03100
00134     32*          1))*DLON+(TSP(K,IP,JP)-TSP(K,I,JP)-TSP(K,IP,J)+TSP(K,I,J))*DLAT*   PDT03200
00134     33*          2DLON     @.....TEMPERATURE LAT-LON INTERPOLATION                   PDT03300
00134     34*     C.....DPX - DP/DX FOR GEOSTROPHIC WINDS                                   PDT03400
00135     35*           DPX = (PSP(K,I,J) - PSP(K,I,JP)) / 6.                             PDT03500
00136     36*           DPX = DPX + ((PSP(K,IP,J) - PSP(K,IP,JP))/6. - DPX)*DLAT          PDT03600
00136     37*     C.....DPY - DP/DY FOR GEOSTROPHIC WINDS                                   PDT03700
00137     38*           DPY=(PSP(K,IP,J)-PSP(K,I,J))/4.                                   PDT03800
00140     39*           DPY = DPY + ((PSP(K,IP,JP) - PSP(K,I,JP))/4. - DPY)*DLON          PDT03900
00140     40*     C.....DTX - DT/DX FOR THERMAL WINDS                                       PDT04000
00141     41*           DTX = (TSP(K,I,J) - TSP(K,I,JP)) / 6.                             PDT04100
00142     42*           DTX = DTX + ((TSP(K,IP,J) - TSP(K,IP,JP))/6. - DTX)*DLAT          PDT04200
00142     43*     C.....DTY - DT/DY FOR THERMAL WINDS                                       PDT04300
00143     44*           DTY = (TSP(K,IP,J) - TSP(K,I,J)) / 4.                             PDT04400
00144     45*           DTY = DTY + ((TSP(K,IP,JP) - TSP(K,I,JP))/4. - DTY)*DLON          PDT04500
00145     46*           RETURN                                                            PDT04600
00146     47*           END                                                               PDT04700


      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  PERTRB  *****
@FOR,S PROFAS.PERTRB,PERTRB
FOR S11E-02/04/74-18:53:20 (0,)


   SUBROUTINE PERTRB    ENTRY POINT 000355

   STORAGE USED: CODE(1) 000360; DATA(0) 000041; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   IOTEMP 000050
    0004   COMPER 000012

   EXTERNAL REFERENCES (BLOCK, NAME)

    0005   NORMAL
    0006   CORR
    0007   SQRT
    0010   EXP
    0011   NWDU$
    0012   NIO2$
    0013   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000205 10L       0001   000275 12L       0001   000074 5L        0000   000017 900F      0000 R 000005 AD
    0003   000040 AP        0000 R 000014 AT        0000 R 000006 BD        0000 R 000015 BT        0006 R 000000 CORR
    0000 R 000016 CT        0003   000004 DD        0003 R 000044 DX        0003 R 000047 DZ        0003 R 000012 D1
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0004 R 000004 D2      0000 R 000002 EX      0003   000036 F10     0003   000037 F10R    0003   000031 G
0003 R 000033 H       0003 R 000045 HL      0003 R 000026 H1      0003   000024 IDA     0003   000041 IHR
0000   000032 INJP$   0003   000000 IOTEM1   0003   000001 IOTEM2  0003   000002 IUG     0003   000025 IYR
0003   000042 MIN     0003   000023 MN      0003   000003 NMCOP   0003   000043 NMORE   0003   000010 NSAME
0003   000007 PHI     0003   000034 PHIR    0003   000006 PHI1    0003   000027 PHI1R   0003   000011 P1
0004 R 000003 P2      0000 R 000013 R       0000 R 000003 RD      0003   000032 RI      0000 R 000007 RT1
0000 R 000010 RT2     0000 R 000011 RX1     0000 R 000012 RX2     0003 R 000015 SD1     0004 R 000001 SD2
0003 R 000014 SP1     0004 R 000000 SP2     0000 R 000004 SRD     0003 R 000016 ST1     0004 R 000002 ST2
0004 R 000010 SU      0003 R 000021 SU1     0004 R 000011 SV      0003 R 000022 SV1     0003   000035 THETR
0003   000030 THET1R  0003 R 000013 T1      0004 R 000005 T2      0003 R 000017 U1      0004 R 000006 U2
0003 R 000046 VL      0003 R 000020 V1      0004 R 000007 V2      0003   000005 XMJD    0000 R 000000 ZD
0000 R 000001 ZT
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00101     1*          SUBROUTINE PERTRB                                                PER00100
00101     2*    C.....COMPUTES PERTURBATIONS P2,D2,T2,U2,V2 AT NEW POSITION FROM       PER00200
00101     3*    C         VALUES P1,D1,T1,U1,V1 AT PREVIOUS POSITION, SIGMAS SP1,SD1,  PER00300
00101     4*    C         ST1,SU1,SV1 AT PREVIOUS POSITION, SIGMAS SP2,SD2,ST2,SU2,SV2 PER00400
00101     5*    C         AT NEW POSITION.  DX AND DZ ARE HORIZONTAL AND VERTICAL      PER00500
00101     6*    C         DISPLACEMENTS BETWEEN OLD AND NEW POSITIONS.  HL AND VL ARE  PER00600
00101     7*    C         HORIZONTAL AND VERTICAL SCALES, H1 AND H ARE PREVIOUS AND    PER00700
00101     8*    C         CURRENT HEIGHT.                                              PER00800
00103     9*          COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,        PER00900
00103    10*         . NSAME,P1,D1,T1,SP1,SD1,ST1,U1,V1,SU1,SV1,                     PER01000
00103    11*         $ MN, IDA, IYR, H1, PHI1R,THET1R,G,RI,H,PHIR,THETR,F10,F10B,AP, PER01100
00103    12*         .   IHR,MIN,NMORE,DX,HL,VL,DZ                                   PER01200
00104    13*          COMMON/COMPER/SP2,SD2,ST2,P2,D2,T2,U2,V2,SU,SV                 PER01300
00105    14*          CALL NORMAL(ZD,ZT)@.....GENERATES GAUSSIAN RANDOM NUMBERS      PER01400
00106    15*          EX=SQRT((DX/HL)**2+(DZ/VL)**2)                                 PER01500
00107    16*          RD=1./EXP(EX)@.....DENSITY CORRELATION BETWEEN OLD AND NEW POS. PER01600
00110    17*          SRD=SQRT(1.-RD*RD)                                             PER01700
00111    18*          IF (SD1*ST1*SD2*ST2.GT.0.) GO TO 5                             PER02100
00111    19*    C.....DEFAULT VALUES AVOID DIVISION BY ZERO                          PER02200
00113    20*          IF (SD1.LE.0.) SD1 = .01                                       PER02300
00115    21*          IF (ST1.LE.0.) ST1 = .01                                       PER02400
00117    22*          IF (SD2.LE.0.) SD2 = .01                                       PER02500
00121    23*          IF (ST2.LE.0.) ST2 = .01                                       PER02600
00123    24*        5 AD=RD*SD2/SD1                                                  PER02630
00124    25*          BD=SD2*SRD                                                     PER02660
00125    26*          D2=AD*D1+BD*ZD  @...NEW DENSITY PERTURBATION                   PER02690
00125    27*    C.....CORRELATION BETWEEN DENSITY AND TEMPERATURE AT OLD POSITION    PER02700
00126    28*          RT1=(SP1*SP1-SD1*SD1-ST1*ST1)/(2.*ST1*SD1)                     PER02800
00126    29*    C.....CORRELATION BETWEEN DENSITY AND TEMPERATURE AT NEW POSITION    PER02900
00127    30*          RT2=(SP2*SP2-SD2*SD2-ST2*ST2)/(2.*ST2*SD2)                     PER03000
00130    31*          IF(ABS(RT1).LE.1.AND.ABS(RT2).LE.1) GO TO 10                   PER03100
00132    32*          RX1 = CORR(H1) @.....DEFAULT CORRELATIONS COMPUTED BY CORR     PER03200
00133    33*          RX2 = CORR(H)                                                  PER03300
00134    34*          IF(ABS(RT1).GT.1.) RT1=RX1                                     PER03400
00136    35*          IF(ABS(RT2).GT.1.) RT2=RX2                                     PER03500
00140    36*       10 R=RD*RT1                                                       PER03600
00141    37*          AT=(ST2/ST1)*((RD-R*RT2)/(1.-R*R))                             PER03700
00142    38*          BT=(ST2/SD2)*((RT2-R*RD)/(1.-R*R))                             PER03800
00143    39*          CT=ST2*ST2-AT*AT*ST1*ST1-2.*AT*BT*R*SD2*ST1-BT*BT*SD2*SD2      PER03900
00144    40*          IF(CT.GE.0.) GO TO 12                                          PER04000
00146    41*          WRITE(6,900) AT,BT,SD2,ST1,ST2,R,CT                            PER04100
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00157     42*       900 FORMAT(' CORRELATION COEFFICIENT ERROR',())                    PER04200
00160     43*           CT=0.                                                         PER04300
00161     44*        12 CT=SQRT(CT)                                                   PER04400
00162     45*           T2 = AT*T1+BT*D2+CT*ZT      C.....NEW TEMPERATURE PERTURBATION PER04500
00163     46*           P2=D2+T2                    C.....NEW PRESSURE PERTURBATION   PER04600
00163     47*     C.....GENERATES 2 NEW GAUSSIAN RANDOM NUMBERS                       PER04700
00164     48*           CALL NORMAL(ZD,ZT)                                            PER04800
00165     49*           AT=RD*SU/SU1                                                  PER04900
00166     50*           BT=SU*SRD                                                     PER05000
00166     51*     C.....NEW EASTWARD VELOCITY PERTURBATION                            PER05100
00167     52*           U2=AT*U1+BT*ZD                                                PER05200
00170     53*           AT=RD*SV/SV1                                                  PER05300
00171     54*           BT=SV*SRD                                                     PER05400
00171     55*     C.....NEW NORTHWARD VELOCITY PERTURBATION                           PER05500
00172     56*           V2=AT*V1+BT*ZT                                                PER05600
00173     57*           RETURN                                                        PER05700
00174     58*           END                                                           PER05800

      END OF COMPILATION:       NO  DIAGNOSTICS.
@HDG,P  *****  PROFIL  *****
@FOR,S PROFAS.PROFIL,PROFIL
FOR S11E-02/04/74-18:53:41 (0,)

   MAIN PROGRAM

   STORAGE USED: CODE(1) 000551; DATA(0) 000175; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   IOTEMP 000055

   EXTERNAL REFERENCES (BLOCK, NAME)

    0004   SETUP
    0005   RIG
    0006   SCIMOD
    0007   NINTR$
    0010   NRDU$
    0011   NIO2$
    0012   NWDU$
    0013   NSTOP$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000   000023 10F      0001   000245 18L      0001   000260 19L      0001   000_27 20L      0001   000367 21L
    0001   000415 22L      0001   000450 23L      0001   000475 25L      0001   000011 5L       0001   000043 6L
    0001   000125 7L       0001   000545 90L      0000   000024 9010F    0000 R 000021 A        0003 R 000040 AP
    0003 R 000050 B        0003   000004 DD       0000 R 000013 DH       0000 R 000011 DPHI     0000 R 000016 DPHIR
    0000 R 000012 DTHET    0000 R 000017 DTHETR   0003   000044 DX       0003   000047 DZ       0003 R 000051 EPS
    0000 R 000001 FAC      0003 R 000036 F10      0003 R 000037 F10B     0003   000031 G        0003 R 000033 H
    0003   000045 HL       0003 R 000026 H1       0003 I 000024 IDA      0003 I 000054 IET      0003 I 000041 IHR
    0000 I 000006 IHRO     0000 I 000015 INCT     0003 I 000052 IOPP     0000 I 000003 IOPT     0003   000000 IOTEM1
    0003   000001 IOTEM2   0000 I 000022 ISEC     0000 I 000010 ISECO    0003   000002 IUG      0003 I 000025 IYR
    0003 I 000053 LOOK     0003 I 000042 MIN      0000 I 000007 MINO     0003 I 000023 MN       0000 I 000002 MONTH
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0000 I 000014 NMAX     0003   000003 NMCOP    0003 I 000043 NMORE    0003 I 000010 NSAME    0000 I 000020 NT
0003 R 000007 PHI      0003 R 000034 PHIR     0003 R 000006 PHI1     0003 R 000027 PHI1R    0000 R 000000 PI
0003   000012 RD1      0003   000032 RI       0003   000011 RP1      0003   000013 RT1      0003   000017 RU1
0003   000020 RV1      0003   000015 SD1      0003   000014 SP1      0003   000016 ST1      0003   000021 SU1
0003   000022 SV1      0000 R 000004 THET     0003 R 000035 THETR    0000 R 000005 THET1    0003 R 000030 THET1R
0003   000046 VL       0003   000005 XMJD
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00100      1*     C.....FIRST DATA CARD READS INITIAL HEIGHT (KM), INITIAL LATITUDE (DEG) PR000100
00100      2*     C        INITIAL LONGITUDE (DEG), F10.7, MEAN F10.7, AP, MONTH, DAY,    PR000200
00100      3*     C        YEAR (TOTAL YEAR - 1900), GREENWICH HOUR, MINUTES, SECONDS,    PR000300
00100      4*     C        LATITUDE INCREMENT (DEG), LONGITUDE INCREMENT (DEG),           PR000400
00100      5*     C        HEIGHT DECREASE (KM), MAXIMUM NUMBER OF POSITIONS (EXCLUDING   PR000500
00100      6*     C        INITIAL POSITION) TO BE COMPUTED, TIME INCREMENT BETWEEN       PR000600
00100      7*     C        POSITIONS, TRAJECTORY OPTION, PUNCH OPTION.                    PR000700
00101      8*           COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,          PR000800
00101      9*          .          NSAME,RP1, RD1, RT1, SP1, SD1, ST1, RU1, RV1, SU1, SV1,PR000900
00101     10*          $ MN, IDA, IYR, H1, PHI1R,THET1R,G,RI,H,PHIR,THETR,F10,F10B,AP,   PR001000
00101     11*          .  IHR,MIN,NMORE,DX,HL,VL,DZ,B,EPS,IOPP,LOOK,IET                  PR001050
00103     12*           PI=3.1415927                                                     PR001100
00104     13*           FAC=0.017453293                                                  PR001150
00105     14*           LOOK=0                                                           PR001180
00106     15*           MONTH = 0                                                        PR001200
00107     16*           IOPT=0                                                           PR001220
00110     17*         5 IF(IOPT.EQ.0.OR.(IOPT.GT.0.AND.H.LT.0.)) GO TO 6                 PR001240
00112     18*           READ(5,10)IET,H,PHI,THET                                         PR001260
00120     19*           GO TO 5                                                          PR001280
00121     20*         6 MN = MONTH                                                       PR001300
00122     21*           NSAME = 0                                                        PR001400
00123     22*           READ(5,10,END=90) H1,PHI1,THET1,F10,F10B,AP,MN,IDA ,IYR,IHRO,MINO,PR001500
00123     23*          1 ISECO,DPHI,DTHET,DH,NMAX,INCT,IOPT,IOPP                         PR001520
00150     24*           IF(ABS(PHI).LT.90.)GO TO 7                                       PR001540
00152     25*           PHI1=SIGN(180.-ABS(PHI1),PHI1)                                   PR001560
00153     26*           THET1=THET1+180.                                                 PR001580
00154     27*           IF(THET1.GT.360.)THET1=THET1-360.                                PR001600
00156     28*         7 IF(THET1.LT.0.) THET1=THET1+360                                  PR001620
00160     29*           WRITE(6,9010) H1,PHI1,THET1,F10,F10B,AP,MN,IDA ,IYR,IHRO,MINO,   PR001700
00160     30*          $ ISECO,DPHI,DTHET,DH,NMAX,INCT,IOPT,IOPP                         PR001800
00205     31*        10  FORMAT( )                                                       PR001900
00206     32*          15 IF (MN.EQ.MONTH) NSAME = 1  @.....SETS NSAME TO AVOID SETUP   PR002000
00210     33*           MONTH = MN                    @.....LOOKUP ON MULTIPLE PASSES    PR002100
00211     34*           PHI1R=PHI1*FAC     @.....LATITUDE TO RADIANS                   PR002400
00212     35*           THET1R=THET1*FAC   @.....LONGITUDE TO RADIANS                  PR002500
00213     36*           DPHIR=DPHI*FAC     @.....LATITUDE INCREMENT TO RADIANS         PR002600
00214     37*           DTHETR=DTHET*FAC   @.....LONGITUDE INCREMENT TO RADIANS        PR002700
00215     38*           CALL SETUP         @.....READS DATA TAPE TO INITIALIZE ARRAYS  PR002800
00216     39*           NT = 1                                                          PR002900
00217     40*           IF(IOPT.EQ.0) GO TO 18                                          PR002910
00221     41*           READ(5,10)IET,H,PHI,THET                                        PR002920
00227     42*           IF(THET.LT.0.)THET=THET+360.                                    PR002930
00231     43*           PHIR=PHI*FAC                                                    PR002940
00232     44*           THETR=THET*FAC                                                  PR002950
00233     45*           GO TO 19                                                        PR002960
00234     46*         18 H = H1 - DH                                                    PR003000
00234     47*      C.....DISPLACES POSITION BEFORE EVALUATION OF ATMOSPHERIC PARAMETERS  PR003100
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00235    48*          IET = INCT                                                    PR004000
00236    49*          PHIR=PHI1R+DPHIR                                              PR003200
00237    50*          THETR=THETIR+DTHETR                                           PR003300
00240    51*       19 A = 6378.160       @.....EQUATORIAL EARTH RADIUS              PR003400
00241    52*          B = 6356.7747      @.....POLAR EARTH RADIUS                   PR003500
00242    53*          EPS=(1.-(B*B)/(A*A))   @.....EARTH ECCENTRICITY               PR003600
00242    54*       C.....COMPUTES RADIUS TO HEIGHT H, AND GRAVITY AT HEIGHT AND     PR003700
00242    55*       C        LATITUDE PHIR                                          PR003800
00243    56*          CALL RIG                                                      PR003900
00244    57*          ISEC=ISEC0+IET                                                PR004000
00245    58*          ISEC=MOD(ISEC,60)                                             PR004050
00246    59*          MIN = MIN0 + IET/60                                           PR004100
00247    60*          IHR = IHR0 + MIN / 60                                         PR004200
00250    61*          MIN = MOD(MIN,60)                                             PR004300
00250    62*       C.....COMPUTES P,D,T,U,V AT FIRST POSITION AFTER INITILL POSITION PR004400
00251    63*          IF(H1.LE.30.) LOOK=1                                          PR004450
00253    64*          CALL SCIMOD                                                   PR004500
00254    65*       20 NT = NT + 1                                                   PR004505
00255    66*          IF (IOPT.EQ.0) GO TO 22                                       PR004510
00257    67*          READ(5,10)IET,H,PHI,THET                                      PR004515
00265    68*          IF(H.LT.0.)GO TO 5                                            PR004520
00267    69*          IF(ABS(PHI).LT.90.)GO TO 21                                   PR004530
00271    70*          PHI=SIGN(180.-ABS(PHI),PHI)                                   PR004540
00272    71*          THET=THET+180.                                                PR004550
00273    72*       21 IF(THET.LT.0.)THET=THET+360.                                  PR004560
00275    73*          IF(THET.GE.360.)THET=THET-360.                                PR004570
00277    74*          PHIR=PHI*FAC                                                  PR004580
00300    75*          THETR=THET*FAC                                                PR004585
00301    76*          GO TO 25                                                      PR004590
00302    77*       22 H = H1 - DH        @.....INCREMENTS HEIGHT                    PR004600
00303    78*          IF (H .LT. 0.0) GO TO 5                                       PR004700
00305    79*          PHIR=PHIR+DPHIR    @.....INCREMENTS LATITUDE                  PR004800
00306    80*          THETR=THETR+DTHETR     @.....INCREMENTS LONGITUDE             PR004850
00306    81*       C.....READS NEW INPUT IF ABS(LAT) GTR 90 DEG                     PR004900
00307    82*          IF (ABS(PHIR).LT.PI/2) GO TO 23                               PR005000
00311    83*          PHIR=SIGN(PI-ABS(PHIR),PHIR)                                  PR005100
00312    84*          THETR=THETR+PI                                                PR005150
00313    85*       23 IF (THETR.GE.2.*PI) THETR = THETR - 2. * PI                   PR005200
00315    86*          IF (THETR.LT.0.) THETR = THETR + 2. * PI                      PR005300
00317    87*          IET=IET+INCT       @.....INCREMENTS TIME                      PR005400
00320    88*       25 MIN=MIN0+IET/60                                               PR005500
00321    89*          ISEC=ISEC0+IET                                                PR005530
00322    90*          ISEC=MOD(ISEC,60)                                             PR005560
00323    91*          IHR=IHR0+MIN/60                                               PR005600
00324    92*          MIN=MOD(MIN,60)                                               PR005700
00325    93*          CALL RIG      @.....COMPUTE RADIUS AND GRAVITY AT NEW POSITION PR005800
00326    94*          CALL SCIMOD   @.....COMPUTE P,D,T,U,V AT NEW POSITION         PR006000
00326    95*       C.....READS NEW INPUT IF NMORE = 0 OR MAX POINTS COMPUTED        PR006100
00327    96*          IF(NMORE.EQ.0.OR.(IOPT.EQ.0.AND.NT.GE.NMAX)) GO TO 5          PR006200
00331    97*          GO TO 20      @.....CYCLES TO NEW POSITION                    PR006300
00332    98*       90 STOP                                                          PR006400
00333    99*       9010 FORMAT(2H1 ,'INITIAL HEIGHT = ',F7.2,' KM',T43,'INITIAL LAT = ',  PR006500
00333   100*          1F6.2,' DEG',T83,'INITIAL WEST LON = ',F6.2,' DEG'/,'  F10.7 = ',FPR006600
00333   101*          $8.2,                                                         PR006650
00333   102*          2T43,'MEAN F10.7 = ',F7.2,T83,'AP = ',F8.2,/,'  DATE = ',I2,'/',I2,PR006700
00333   103*          3'/',I2,T43,'GREENWICH TIME = ',I2,':',I2,':',I2/,'  LAT INCREMENT PR006750
00333   104*          4= ',F6.2,' DEG',T43,'WEST LON INCREMENT = ',F6.2,' DEG',T83,'HEI',PR006800
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00333    105*          S'GHT INCR',                                                    PR006850
00333    106*          5'EMENT = ',F7.2,' KM',/,'  MAXIMUM NUMBER OF POSITIONS = ',I4,T43,PR006900
00333    107*          6'TIME INCREMENT = ',I4,' SEC',/2X,'TRAJECTORY OPTION=',I4,      PR007000
00333    108*          7T43,'PUNCH OPTION=',I2/)                                       PR007100
00334    109*           END                                                            PR007200

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  ******  QBOGEN  ******
@FOR,S PROFAS,QBOGEN,QBOGEN
FOR S11E-02/04/74-18:53:51 (0,)

   SUBROUTINE QBOGEN    ENTRY POINT 000620

   STORAGE USED: CODE(1) 000631; DATA(0) 000074; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   IOTEMP 000050
    0004   PDTCOM 012701

   EXTERNAL REFERENCES (BLOCK, NAME)

    0005   INTERZ
    0006   INTERW
    0007   COS
    0010   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001    000014 10L       0003    000040 AP        0004 R 012675 DA        0004 R 007625 DAQ       0000 R 000014 DA1
    0000 R  000020 DA2       0003 R  000004 DD        0004 R 010205 DDQ       0000 R 000023 DD1       0000 R 000026 DD2
    0004    001257 DG        0004 R  012670 DQ        0004    010755 DR       0004    003705 DSP      0003    000044 DX
    0003    000047 DZ        0003    000036 F10       0003    000037 F10B     0003    000031 G        0003 R  000033 H
    0000 R  000010 HI        0003    000045 HL        0000 R  000016 HP       0003    000026 HI       0003    000024 IDA
    0000 I  000000 IH        0003    000041 IHR       0000    000054 INJP$    0004    000002 IOPR     0003    000000 IOTEM1
    0003    000001 IOTEM2    0000 I  000001 IP        0003    000002 IUG      0004    000000 IU4      0003    000025 IYR
    0000 I  000003 JL        0000 I  000004 JP        0003    000042 MIN      0003    000023 MN       0004    000001 MONTH
    0003    000003 NMCOP     0003    000043 NMORE     0003    000010 NSAME    0004 R  012674 PA       0004 R  007505 PAQ
    0000 R  000013 PA1       0000 R  000017 PA2       0000 R  000030 PD       0004 R  010065 PDQ      0000 R  000022 PD1
    0000 R  000025 PD2       0004    000003 PG        0000 R  000002 PHA      0003 R  000007 PHI      0000 R  000011 PHIJ
    0000 R  000012 PHIP      0003    000034 PHIR      0003    000006 PHI1     0003    000027 PHI1R    0004 R  012667 PQ
    0004    010445 PR        0004    002005 PSP       0003    000012 RD1      0003    000032 RI       0003    000011 RP1
    0003    000013 RT1       0003    000017 RU1       0003    000020 RV1      0003    000015 SD1      0003    000014 SP1
    0003    000016 ST1       0003    000021 SU1       0003    000022 SV1      0004 R  012676 TA       0004 R  007745 TAQ
    0000 R  000015 TA1       0000 R  000021 TA2       0000 R  000031 TD       0004 R  010325 TDQ      0000 R  000024 TD1
    0000 R  000027 TD2       0004    000531 TG        0003    000035 THETR    0003    000030 THET1R   0000 R  000006 TMJD
    0000 R  000007 TP        0004 R  012671 TQ        0004    011265 TR       0004    005605 TSP      0004 R  012677 UA
    0004 R  011575 UAQ       0000 R  000032 UA1       0000 R  000034 UA2      0000 R  000042 UD       0004 R  012035 UDQ
    0000 R  000036 UD1       0000 R  000040 UD2       0004 R  012672 UQ       0004    012775 UR       0004 R  012700 VA
    0004 R  011715 VAQ       0000 R  000033 VA1       0000 R  000035 VA2      0000 R  000043 VD       0004 R  012155 VDQ
    0000 R  000037 VD1       0000 R  000041 VD2       0003    000046 VL       0004 R  012673 VQ       0003 R  000005 XMJD
    0000 R  000005 XMJDO
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00101     1*            SUBROUTINE QBOGEN                                                    QB000100
00101     2*      C.....COMPUTES QBO VALUES PQ,DQ,TQ,UQ,VQ AT HEIGHT H, LATITUDE PHI         QB000200
00101     3*      C       ON JULIAN DAY XMJD FROM ARRAYS OF AMPLITUDES PAQ,DAQ,TAQ,          QB000300
00101     4*      C       UAQ,VAQ AND PHASES PDQ,DDQ,TDQ,UDQ,VDQ.                            QB000400
00103     5*            COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,              QB000500
00103     6*           .       NSAME,RP1, RD1, RT1, SP1, SD1, ST1, RU1, RV1, SU1, SV1,     QB000600
00103     7*           $ MN, IDA, IYR, H1, PHI1R,THET1R,G,RI,H,PHIR,THETR,F10,F10B,AP,      QB000700
00103     8*           .   IHR,MIN,NMORE,DX,HL,VL,DZ                                        QB000800
00104     9*            COMMON/PDTCOM/IU4,MONTH,IOPR,PG(18,19),TG(18,19),DG(18,19)          QB000900
00104    10*           . ,PSP(8,10,12)                                                      QB001000
00104    11*           . ,DSP(8,10,12),TSP(8,10,12),PAQ(16,5),DAQ(16,5),TAQ(16,5),          QB001100
00104    12*           . PDQ(16,5),DDQ(16,5),TDQ(16,5),PR(20,10),DR(20,10),TR(20,10),       QB001200
00104    13*           .UAQ(16,5),VAQ(16,5),UDQ(16,5),VDQ(16,5),UR(25,10),PQ,DQ,TQ,UQ,VQ    QB001300
00104    14*           . ,PA,DA,TA,UA,VA                                                    QB001350
00105    15*            IF (XMJD.GT.0) GO TO 10                                             QB001400
00107    16*            PQ=0.          Q.....SETS QBO VALUES TO ZERO FOR ANNUAL MEAN        QB001500
00110    17*            DQ=0.                                                               QB001600
00111    18*            TQ=0.                                                               QB001700
00112    19*            UQ=0.                                                               QB001800
00113    20*            VQ=0.                                                               QB001900
00114    21*            RETURN                                                              QB002000
00115    22*         10 IH=INT((H-10.)/5.)      Q.....LOWER HEIGHT INDEX                    QB002100
00116    23*            IF (IH.LT.1) IH=1                                                   QB002200
00120    24*            IP = IH+1              Q.....UPPER HEIGHT INDEX                     QB002300
00121    25*            IF (IP.GT.16) IP = 16                                               QB002400
00123    26*            PHA = ABS(PHI)                                                      QB002500
00124    27*            JL = INT((  PHA    + 10.)/20.)   Q.....LOWER LATITUDE INDEX         QB002600
00125    28*            JP = JL+1                        Q.....UPPER LATITUDE INDEX         QB002700
00126    29*            IF (JL.LE.0) JL=1                                                   QB002800
00130    30*            IF (JP.GT.5) JP=5                                                   QB002900
00132    31*            XMJDO = 2439126.  Q.....JULIAN DAY FOR JAN 0, 1966                  QB003000
00133    32*            TMJD=XMJD-XMJDO   Q.....TIME RELATIVE TO JAN 0, 1966                QB003100
00134    33*            TP = 6.2831853/870.    Q.....2*PI/PERIOD, PERIOD = 870 DAYS         QB003200
00135    34*            HI = 10. + 5.*IH  Q.....LOWER HEIGHT                               QB003300
00136    35*            PHIJ = 20.*JL - 10.    Q.....LOWER LATITUDE                        QB003400
00137    36*            PHIP=20.*JP-10.        Q.....UPPER LATITUDE                        QB003500
00137    37*      C.....INTERPOLATES QBO P,D,T AMPLITUDE ON LATITUDE AT LOWER HEIGHT         QB003600
00140    38*            CALL INTERZ(PAQ(IH,JL),DAQ(IH,JL),TAQ(IH,JL),PHIJ,PAQ(IH,JP),       QB003700
00140    39*           1DAQ(IH,JP),TAQ(IH,JP),PHIP,PA1,DA1,TA1,PHA)                         QB003800
00141    40*            HP=10.+5.*IP       Q.....UPPER HEIGHT                              QB003900
00141    41*      C.....INTERPOLATES QBO P,D,T AMPLITUDE ON LATITUDE AT UPPER HEIGHT         QB004000
00142    42*            CALL INTERZ(PAQ(IP,JL),DAQ(IP,JL),TAQ(IP,JL),PHIJ,PAQ(IP,JP),       QB004100
00142    43*           2DAQ(IP,JP),TAQ(IP,JP),PHIP,PA2,DA2,TA2,PHA)                         QB004200
00142    44*      C.....INTERPOLATES QBO P,D,T AMPLITUDE ON HEIGHT AT LATITUDE PHI           QB004300
00143    45*            CALL INTERZ(PA1,DA1,TA1,HI,PA2,DA2,TA2,HP,PA,DA,TA,H)               QB004400
00143    46*      C.....INTERPOLATES QBO P,D,T PHASE ON LATITUDE AT LOWER HEIGHT             QB004500
00144    47*            CALL INTERZ(PDQ(IH,JL),DDQ(IH,JL),TDQ(IH,JL),PHIJ,PDQ(IH,JP),       QB004600
00144    48*           3DDQ(IH,JP),TDQ(IH,JP),PHIP,PD1,DD1,TD1,PHA)                         QB004700
00144    49*      C.....INTERPOLATES QBO P,D,T PHASE ON LATITUDE AT UPPER HEIGHT             QB004800
00145    50*            CALL INTERZ(PDQ(IP,JL),DDQ(IP,JL),TDQ(IP,JL),PHIJ,PDQ(IP,JP),       QB004900
00145    51*           4DDQ(IP,JP),TDQ(IP,JP),PHIP,PD2,DD2,TD2,PHA)                         QB005000
00145    52*      C.....INTERPOLATES QBO P,D,T PHASE ON HEIGHT AT LATITUDE PHI               QB005100
00146    53*            CALL INTERZ(PD1,DD1,TD1,HI,PD2,DD2,TD2,HP,PD,DD,TD,H)               QB005200
00146    54*      C.....INTERPOLATES QBO WIND AMPLITUDE ON LATITUDE AT LOWER HEIGHT          QB005300
00147    55*            CALL INTERW(UAQ(IH,JL),VAQ(IH,JL),PHIJ,UAQ(IH,JP),VAQ(IH,JP),       QB005400
00147    56*           5PHIP,UA1,VA1,PHA)                                                   QB005500
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00147     57*     C.....INTERPOLATES QBO WIND AMPLITUDES ON LATITUDE AT UPPER HEIGHT      QB005600
00150     58*           CALL INTERW(UAQ(IP,JL),VAQ(IP,JL),PHIJ,UAQ(IP,JP),VAQ(IP,JP),   QB005700
00150     59*          6PHIP,UA2,VA2,PHA)                                                QB005800
00150     60*     C.....INTERPOLATES QBO WIND AMPLITUDES ON HEIGHT AT LATITUDE PHI        QB005900
00151     61*           CALL INTERW(UA1,VA1,HI,UA2,VA2,HP,UA,VA,H)                        QB006000
00151     62*     C.....INTERPOLATES QBO WIND PHASE ON LATITUDE AT LOWER HEIGHT           QB006100
00152     63*           CALL INTERW(UDQ(IH,JL),VDQ(IH,JL),PHIJ,UDQ(IH,JP),VDQ(IH,JP),    QB006200
00152     64*          7PHIP,UD1,VD1,PHA)                                                QB006300
00152     65*     C.....INTERPOLATES QBO WIND PHASE ON LATITUDE AT UPPER HEIGHT           QB006400
00153     66*           CALL INTERW(UDQ(IP,JL),VDQ(IP,JL),PHIJ,UDQ(IP,JP),VDQ(IP,JP),    QB006500
00153     67*          8PHIP,UD2,VD2,PHA)                                                QB006600
00153     68*     C.....INTERPOLATES QBO WIND PHASE ON HEIGHT AT LATITUDE PHI             QB006700
00154     69*           CALL INTERW(UD1,VD1,HI,UD2,VD2,HP,UD,VD,H)                        QB006800
00154     70*     C.....EVALUATES QBO VALUES FROM INTERPOLATED AMPLITUDES AND PHASES      QB006900
00155     71*           PQ=PA*COS(TP*(TMJD-PD))                                           QB007000
00156     72*           DQ=DA*COS(TP*(TMJD-DD))                                           QB007100
00157     73*           TQ=TA*COS(TP*(TMJD-TD))                                           QB007200
00160     74*           UQ=UA*COS(TP*(TMJD-UD))                                           QB007300
00161     75*           VQ=VA*COS(TP*(TMJD-VD))                                           QB007400
00162     76*           RETURN                                                            QB007500
00163     77*           END                                                               QB007600

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  RAND  *****
@FOR,S PROFAS.RAND,RAND
FOR S11E-02/04/74-18:53:58 (0,)

   FUNCTION RAND        ENTRY POINT 000035

   STORAGE USED: CODE(1) 000037; DATA(0) 000011; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0000   000005 INJP$      0000 R 000000 RAND       0000 R 000001 X


00101      1*           FUNCTION RAND(X0)                                               RAN00100
00101      2*     C.....PRODUCES A RANDOM NUMBER FROM A UNIFORM DIST. FROM 0 TO +1      RAN00200
00103      3*           INTEGER X0                                                      RAN00300
00104      4*           IF (X0.NE.0) X = X0/262144.                                     RAN00400
00106      5*           X = X*509                                                       RAN00500
00107      6*           X = X - INT(X)                                                  RAN00600
00110      7*           RAND = X                                                        RAN00700
00111      8*           RETURN                                                          RAN00800
00112      9*           END                                                             RAN00900
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      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  ******  RIG  ******
@FOR,S PROFAS,RIG,RIG
FOR S11E-02/04/74-18:54:01 (0,)

   SUBROUTINE RIG       ENTRY POINT 000072

   STORAGE USED: CODE(1) 000075; DATA(0) 000024; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   IOTEMP 000052

   EXTERNAL REFERENCES (BLOCK, NAME)

    0004   COS
    0005   SQRT
    0006   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0003   000040 AP        0003 R 000050 B         0000 R 000000 CPHI2     0000 R 000001 C2PHI     0000 R 000002 C4PHI
    0003   000004 DD        0003   000044 DX        0003   000047 DZ        0003 R 000051 EPS       0003   000036 F10
    0003   000037 F10B      0003 R 000031 G         0003 R 000033 H         0003   000045 HL        0003   000026 H1
    0003   000024 IDA       0003   000041 IHR       0000   000015 INJP$     0003   000000 IOTEM1    0003   000001 IOTEM2
    0003   000002 IUG       0003   000025 IYR       0003   000042 MIN       0003   000023 MN        0003   000003 NMCOP
    0003   000043 NMORE     0003   000010 NSAME     0003   000007 PHI       0003 R 000034 PHIR      0003   000006 PHI1
    0003   000027 PHI1R     0003   000012 RD1       0000 R 000003 RE        0003 R 000032 RI        0003   000011 RP1
    0003   000013 RT1       0003   000017 RU1       0003   000020 RV1       0003   000015 SD1       0003   000014 SP1
    0003   000016 ST1       0003   000021 SU1       0003   000022 SV1       0003   000035 THETR     0003   000030 THET1R
    0003   000046 VL        0003   000005 XMJD
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00101     1*          SUBROUTINE RIG                                                    RIG00100
00103     2*          COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,           RIG00200
00103     3*         .          NSAME,RP1, RD1, RT1, SP1, SD1, ST1, RU1, RV1, SU1, SV1,RIG00300
00103     4*         $ MN, IDA, IYR, H1, PHI1R,THET1R,G,RI,H,PHIR,THETR,F10,F10B,AP,    RIG00400
00103     5*         .   IHR,MIN,NMORE,DX,HL,VL,DZ,B,EPS                               RIG00500
00103     6*     C.....GRAVITY G AT H, LATITUDE PHIR (RADIANS)                         RIG00600
00103     7*     C.....RADIUS RI FROM CENTER OF EARTH TO HEIGHT H                      RIG00700
00103     8*     C.....B = POLAR EARTH RADIUS, EPS = ECCENTRICITY                      RIG00800
00104     9*          CPHI2 = COS(PHIR) ** 2                                           RIG00900
00105    10*          RI = B / SQRT(1. - EPS * CPHI2)  @.....EARTH RADIUS              RIG01000
00106    11*          C2PHI = 2. * CPHI2 - 1. @.....COS(2*PHIR)                        RIG01100
00107    12*          C4PHI = 8. * CPHI2 * (CPHI2 - 1.) + 1.  @.....COS(4*PHIR)        RIG01200
00107    13*     C.....G AT SURFACE                                                    RIG01300
00110    14*          G = 9.80616 * (1. - 0.0026373 * C2PHI + 0.0000059 * C2PHI * C2PHI)RIG01400
00110    15*     C.....EFFECTIVE RADIUS                                                RIG01500
00111    16*          RE = 2. * G / (3.085462E-3 + C2PHI * 2.27E-6 - C4PHI * 2.E-9)    RIG01600
00112    17*          G = G / (1. + (H / RE)) ** 2 @.....G AT HEIGHT H                 RIG01700
00113    18*          RI = RI + H   @.....RADIUS AT HEIGHT H                           RIG01800
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00114     19*          END                                                    RIG01900

      END OF COMPILATION:       NO  DIAGNOSTICS.
@HDG,P  *****  RTERP  *****
@FOR,S PROFAS,RTERP,RTERP
FOR S11E=02/04/74-18:54:08 (C,)

   SUBROUTINE RTERP     ENTRY POINT 000353

   STORAGE USED: CODE(1) 000404; DATA(0) 000047; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   INTERZ
    0004   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000121 10L       0001   000139 20L       0001   000144 30L       0001   000153 40L       0000 R 000011 D1
    0000 R 000014 D2        0000 I 000000 I         0000   000026 INJP$     0000 I 000001 IP        0000 I 000002 J
    0000 I 000003 JP        0000 R 000006 PHI1      0000 R 000007 PHI2      0000 R 000010 P1        0000 R 000013 P2
    0000 R 000012 T1        0000 R 000015 T2        0000 R 000004 Z1        0000 R 000005 Z2

00101      1*          SUBROUTINE RTERP(H,PHI,PR,DR,TR,P,D,T)                 RTP00100
00101      2*     C....COMPUTES RANDOM PERTURBATION STANDARD DEVIATIONS P,D,T AT  RTP00200
00101      3*     C       HEIGHT H (KM), LATITUDE PHI(DEGREES) FROM SIGMA ARRAYS  RTP00300
00101      4*     C       PR,DR,AND TR                                           RTP00400
00103      5*          DIMENSION PR(20,10),DR(20,10),TR(20,10)                   RTP00500
00103      6*     C....I = LOWER HEIGHT INDEX                                    RTP00600
00104      7*          IF (H.LT.95.) I = INT((H-20.)/5.)                         RTP00700
00106      8*          IF (H.GE.95.) I = 14 + INT((H-80.)/20.)                   RTP00800
00110      9*          IP = I+1                                                  RTP00900
00111     10*          IF (IP.GT.20) IP = 20                                     RTP01000
00113     11*          J = INT((PHI + 110.)/20.) @.....LOWER LATITUDE INDEX      RTP01100
00114     12*          JP = J+1                                                  RTP01200
00115     13*          IF (JP.GT.10) JP=10                                       RTP01300
00117     14*          IF (I.GT.14) GO TO 10                                     RTP01400
00121     15*          Z1=5.*I+20. @.....LOWER HEIGHT FOR PR,TR,DR ARRAYS        RTP01500
00122     16*          GO TO 20                                                  RTP01600
00123     17*       10 Z1=20.*(I-10)                                             RTP01700
00124     18*       20 IF (IP.GT.14) GO TO 30                                    RTP01800
00126     19*          Z2=5.*IP+20. @.....UPPER HEIGHT FOR PR,DR,TR ARRAYS       RTP01900
00127     20*          GO TO 40                                                  RTP02000
00130     21*       30 Z2=20.*(IP-10)                                            RTP02100
00131     22*       40 PHI1=-110.+20.*J                                          RTP02200
00132     23*          PHI2=-110.+20.*JP                                         RTP02300
00132     24*     C....INTERPOLATE ON LATITUDE AT LOWER HEIGHT                   RTP02400
00133     25*          CALL INTERZ(PR(I,J),DR(I,J),TR(I,J),PHI1,PR(I,JP),DR(I,JP),...  RTP02500
00133     26*         1            TR(I,JP),PHI2,P1,D1,T1,PHI)                  RTP02600
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00133     27*     C.....INTERPOLATE ON LATITUDE AT UPPER HEIGHT                          RTP02700
00134     28*           CALL INTERZ(PR(IP,J),DR(IP,J),TR(IP,J),PHI1,PR(IP,JP),DR(IP,JP),  RTP02800
00134     29*          1            TR(IP,JP),PHI2,P2,D2,T2,PHI)                         RTP02900
00134     30*     C.....INTERPOLATION ON HEIGHT USING LATITUDE INTERPOLATED VALUES        RTP03000
00135     31*           CALL INTERZ(P1,D1,T1,Z1,P2,D2,T2,Z2,P,D,T,H)                      RTP03100
00136     32*           RETURN                                                           RTP03200
00137     33*           END                                                              RTP03300

      END OF COMPILATION:       NO  DIAGNOSTICS.
@HDG,P  *****  RTRAN  *****
@FOR,S PROFAS,RTRAN,RTRAN
FOR S11E-02/04/74-18:54:16 (0,)

   SUBROUTINE RTRAN     ENTRY POINT 000115
              RTRAN1    ENTRY POINT 000122
              RTRAN2    ENTRY POINT 000125

   STORAGE USED: CODE(1) 000130; DATA(0) 000017; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   IOTEMP 000003
    0004   COTRAN 000041

   EXTERNAL REFERENCES (BLOCK, NAME)

    0005   NTRAN
    0006   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000043 120G      0001   000072 133G      0000 I 000001 I      0000   000007 INJP$     0003   000000 IOTEM1
    0003   000001 IOTEM2    0003 I 000002 IUG       0004 I 000023 I1     0004 I 000024 I2        0004 I 000025 I3
    0004 I 000026 I4        0004 I 000040 I5        0000 I 000000 L      0004 I 000000 NDATA

00101      1*           SUBROUTINE RTRAN(N)                                            RTR00100
00103      2*           COMMON/IOTEMP/IOTEM1,IOTEM2,IUG                                RTR00200
00104      3*           COMMON/COTRAN/NDATA(19),I1,I2,I3,I4(10),I5                     RTR00300
00104      4*     C.....ENTRY POINT FOR NTRAN READ OF STATIONARY PERTURBATION DATA, AND RTR00400
00104      5*     C          RANDOM PERTURBATION DATA IN SETUP                           RTR00500
00105      6*           CALL NTRAN(IUG,2,N,NDATA,L)                                    RTR00600
00106      7*           CALL NTRAN(IUG,22)                                             RTR00700
00107      8*           RETURN                                                         RTR00800
00110      9*           ENTRY RTRAN1                                                   RTR00900
00110     10*     C.....ENTRY POINT FOR NTRAN READ OF GROVES DATA IN SETUP             RTR01000
00111     11*           CALL NTRAN(IUG,2,19,NDATA,L)                                   RTR01100
00112     12*           CALL NTRAN(IUG,22)                                             RTR01200
00113     13*           I1=NDATA(1)                                                    RTR01300
00114     14*           I2=NDATA(2)                                                    RTR01400
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00115     15*           I3=NDATA(3)                                                    RTR01500
00116     16*           I5=NDATA(14)                                                   RTR01600
00117     17*           DO 1 I=1,10                                                    RTR01700
00122     18*         1 I4(I)=NDATA(I+3)                                               RTR01800
00124     19*           RETURN                                                         RTR01900
00125     20*           ENTRY RTRAN2                                                   RTR02000
00125     21*     C.....ENTRY POINT FOR NTRAN READ OF QBO PARAMETERS IN SETUP          RTR02100
00126     22*           CALL NTRAN(IUG,2,12,NDATA,L)                                   RTR02200
00127     23*           CALL NTRAN(IUG,22)                                             RTR02300
00130     24*           I1=NDATA(1)                                                    RTR02400
00131     25*           I3=NDATA(2)                                                    RTR02500
00132     26*           DO 2 I=1,10                                                    RTR02600
00135     27*         2 I4(I)=NDATA(2+I)                                               RTR02700
00137     28*           RETURN                                                         RTR02800
00140     29*           END                                                            RTR02900

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  SCIMOD  *****
@FOR,S PROFAS,SCIMOD,SCIMOD
FOR S11E-02/04/74-18:54:20 (0,)

   SUBROUTINE SCIMOD    ENTRY POINT 002712

   STORAGE USED: CODE(1) 002720; DATA(0) 000347; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   IOTEMP 000055
    0004   PDTCOM 012701
    0005   C4     004743
    0006   COMPER 000012

   EXTERNAL REFERENCES (BLOCK, NAME)

    0007   JACCH
    0010   GTERP
    0011   FAIR
    0012   INTER2
    0013   INTERW
    0014   PDTUV
    0015   INTERZ
    0016   QBOGEN
    0017   GEN4D
    0020   INTER4
    0021   INTRUV
    0022   RTERP
    0023   DXHLVL
    0024   PERTRB
    0025   STDATM
    0026   SIN
    0027   COS
    0030   ALOG
    0031   .WDU$
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0032   NIO2$
0033   NWDC$
0034   NERR3$
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STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

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0001   000104 10L      0001   000217 20L      0001   000611 200L     0001   000707 210L     0001   000725 220L
0001   000727 230L     0001   001035 240L     0001   001037 250L     0001   001072 300L     0001   001500 500L
0001   001513 505L     0001   001517 510L     0001   001565 515L     0001   001624 520L     0001   001633 540L
0001   001715 550L     0001   001755 570L     0001   001757 575L     0001   002007 600L     0001   002154 800L
0001   002211 810L     0001   002301 820L     0001   002332 825L     0001   002356 830L     0001   002422 870L
0001   002460 880L     0000   000222 900F     0000   000264 950F     0000   000274 960F     0003   000040 AP
0003   000050 B        0000 R 000177 DA       0004   007625 DAQ      0000 R 000170 DB       0003   000004 DD
0004   010205 DDQ      0004 R 001257 DG       0000 R 000067 DGA      0000 R 000076 DGB      0000 R 000032 DGH
0000 R 000215 DGHP     0000 R 000007 DH       0000 R 000017 DHE      0000 R 000014 DHN      0000 R 000220 DHP
0000 R 000043 DJA      0000 R 000060 DJB      0000 R 000051 DJE      0000 R 000046 DJN      0000 R 000022 DPX
0000 R 000107 DPXA     0000 R 000116 DPXB     0000 R 000150 DPXG     0000 R 000071 DPXGA    0000 R 000100 DPXGB
0000 R 000053 DPXJA    0000 R 000062 DPXJB    0000 R 000152 DPXS     0000 R 000144 DPXSA    0000 R 000131 DPXSB
0000 R 000163 DPX4     0000 R 000201 DPX4A    0000 R 000172 DPX4B    0000 R 000021 DPY      0000 R 000110 DPYA
0000 R 000117 DPYB     0000 R 000151 DPYG     0000 R 000072 DPYGA    0000 R 000101 DPYGB    0000 R 000054 DPYJA
0000 R 000063 DPYJB    0000 R 000153 DPYS     0000 R 000145 DPYSA    0000 R 000132 DPYSB    0000 R 000164 DPY4
0000 R 000202 DPY4A    0000 R 000173 DPY4B    0004 R 012670 DQ       0004 R 012775 DQA      0004 R 010755 DR
0006 R 000004 DRH      0000 R 000213 DS       0000 R 000142 DSA      0000 R 000127 DSB      0000 R 000002 DSH
0004 R 003705 DSP      0000 R 000025 DTX      0000 R 000111 DTXA     0000 R 000120 DTXB     0000 R 000154 DTXG
0000 R 000073 DTXGA    0000 R 000102 DTXGB    0000 R 000055 DTXJA    0000 R 000064 DTXJB    0000 R 000156 DTXS
0000 R 000146 DTXSA    0000 R 000133 DTXSB    0000 R 000165 DTX4     0000 R 000103 DTX4A    0000 R 000174 DTX4B
0000 R 000026 DTY      0000 R 000112 DTYA     0000 R 000121 DTYB     0000 R 000155 DTYG     0000 R 000074 DTYGA
0000 R 000103 DTYGB    0000 R 000056 DTYJA    0000 R 000065 DTYJB    0000 R 000157 DTYS     0000 R 000147 DTYSA
0000 R 000134 DTYSB    0000 R 000166 DTY4     0000 R 000204 DTY4A    0000 R 000175 DTY4B    0000 R 000027 DUH
0000 R 000030 DVH      0003   000044 DX       0003 R 000047 DZ       0000 R 000105 D1       0000 R 000114 D2
0000 R 000161 D4A      0005 R 000701 D4D      0003   000051 EPS      0000 R 000000 FAC      0000 R 000005 FCORX
0000 R 000004 FCORY    0003   000036 F10      0003   000037 F10B     0003 R 000031 G        0005 R 000000 GLAT
0005 R 000020 GLON     0003 R 000033 H        0000 R 000040 HA       0000 R 000041 HB       0000 R 000136 HGA
0000 R 000123 HGB      0003   000045 HL       0000 R 000140 HSA      0000 R 000125 HSB      0003 R 000026 H1
0003   000024 IDA      0003 I 000054 IET      0000 I 000036 IHA      0000 I 000037 IHB      0000 I 000135 IHGA
0000 I 000122 IHGB     0003   000041 IHR      0000 I 000137 IHSA     0000 I 000124 IHSB     0000   000331 INJP$
0003 I 000052 IOPP     0004 I 000002 IOPR     0003   000000 IOTEM1   0003   000001 IOTEM2   0003   000002 IUG
0004   000000 IU4      0003   000025 IYR      0003 I 000053 LOOK     0003   000042 MIN      0003 I 000023 MN
0004 I 000001 MONTH    0005 I 000040 NG       0003   000003 NMCOP    0003 I 000043 NMORE    0003   000010 NSAME
0000 R 000176 PA       0004   007505 PAQ      0000 R 000167 PB       0004   010065 PDQ      0004 R 000003 PG
0000 R 000066 PGA      0000 R 000075 PGB      0000 R 000031 PGH      0000 R 000114 PGHP     0000 R 000006 PH
0000 R 000016 PHE      0003 R 000007 PHI      0000 R 000011 PHIN     0003 R 000034 PHIR     0003 R 000006 PHI1
0003 R 000027 PHI1R    0000 R 000013 PHN      0000 R 000217 PHP      0000 R 000042 PJA      0000 R 000057 PJB
0000 R 000050 PJE      0000 R 000045 PJN      0004 R 012667 PQ       0004 R 012774 PQA      0004 R 010445 PR
0006 R 000003 PRH      0000 R 000212 PS       0000 R 000141 PSA      0000 R 000126 PSB      0000 R 000001 PSH
0004 R 002005 PSP      0000 R 000104 P1       0000 R 000113 P2       0000 R 000160 P4A      0005 R 000041 P4D
0003 R 000012 RD1      0003 R 000032 RI       0003 R 000011 RP1      0003 R 000013 RT1      0003 R 000017 RU1
0003 R 000020 RV1      0006 R 000001 SDH      0003 R 000015 SD1      0000 R 000207 SD2      0005 R 003241 SD4
0006 R 000000 SPH      0003 R 000014 SP1      0000 R 000206 SP2      0005 R 002401 SP4      0006 R 000002 STH
0003 R 000016 ST1      0000 R 000210 ST2      0005 R 004101 ST4      0006 R 000010 SUH      0003 R 000021 SU1
0006 R 000011 SVH      0003 R 000022 SV1      0000 R 000200 TA       0004   007745 TAQ      0000 R 000171 TB
0004   010325 TDQ      0004 R 000531 TG       0000 R 000070 TGA      0000 R 000077 TGB      0000 R 000033 TGH
0000 R 000216 TGHP     0000 R 000010 TH       0000 R 000020 THE      0005 R 004742 THET     0000 R 000012 THETE
0003 R 000035 THETR    0005 R 004741 THET1    0003 R 000030 THET1P   0000 R 000015 THN      0000 R 000221 THP
0000 R 000044 TJA      0000 R 000061 TJB      0000 R 000052 TJE      0000 R 000047 TJN      0004 R 012671 TQ
0004 R 012676 TQA      0004 R 011265 TR       0006 R 000005 TRH      0000 R 000211 TS       0000 R 000143 TSA
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0000 R 000130 TSB      0000 R 000003 TSH      0004 R 005605 TSP      0000 R 000105 TZ       0000 R 000106 T1
0000 R 000115 T2       0000 R 000162 T4A      0005 R 001541 T4D      0004 R 012677 UA       0004   011575 UAQ
0004   012035 UDQ      0000 R 000034 UGH      0000 R 000023 UH       0004 R 012672 UQ       0004 R 012275 UR
0006 R 000006 URH      0004 R 012700 VA       0004   011715 VAQ      0004   012155 VDQ      0000 R 000035 VGH
0000 R 000024 VH       0003   000046 VL       0004 R 012673 VQ       0004 R 012275 VR       0006 R 000007 VRH
0003   000005 XMJD
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00101     1*          SUBROUTINE SCIMOD                                                    SCI00100
00101     2*    C.....COMPUTES VALUES P,D,T,U,V AND SHEAR DUH,DVH FROM INPUT AND           SCI00200
00101     3*    C       ARRAYS IN COMMON PDTCOM.  INPUT TO SCIMOD IS:                      SCI00300
00101     4*    C       G = GRAVITY AT POSITION        RI = RADIUS AT HEIGHT H             SCI00400
00101     5*    C       PHIR = LATITUDE (RADIANS)      THETR = LONGITUDE (RADIANS)         SCI00500
00101     6*    C       F10 = F10.7 SOLAR FLUX         F10B = MEAN F10.7 FLUX              SCI00600
00101     7*    C       AP = SOLAR-GEOMAGNETIC A SUB P INDEX                               SCI00700
00101     8*    C       MN/IDA/IYR = DATA (IYR = FULL YEAR-1900)                           SCI00800
00101     9*    C       IHR:MIN = TIME                 H1 = PREVIOUS HEIGHT                SCI00900
00101    10*    C       PHI1R = PREVIOUS LATITUDE      THET1R = PREVIOUS LONGITUDE         SCI01000
00101    11*    C       RP1,RD1,RT1 = PREVIOUS RANDOM PERTURBATIONS                        SCI01100
00101    12*    C       SP1,SD1,ST1 = PREVIOUS RANDOM STANDARD DEVIATIONS (SIGMAS)         SCI01200
00101    13*    C       RU1,RV1 = PREVIOUS RANDOM WINDS                                    SCI01300
00101    14*    C       SU1,SV1 = PREVIOUS RANDOM WIND SIGMAS                              SCI01400
00103    15*          COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,            SCI01500
00103    16*         .          NSAME,RP1, RD1, RT1, SP1, SD1, ST1, RU1, RV1, SU1, SV1,SCI01600
00103    17*         $ MN, IDA, IYR, H1, PHI1R,THET1R,G,RI,H,PHIR,THETR,F10,F10B,AP,     SCI01700
00103    18*         .   IHR,MIN,NMORE,DX,HL,VL,DZ,B,EPS,IOPP,LOOK,IET                   SCI01800
00104    19*          COMMON/PDTCOM/IU4,MONTH,IOPR,PG(18,19),TG(18,19),DG(18,19)         SCI01900
00104    20*         . ,PSP(8,10,12)                                                     SCI02000
00104    21*         . ,DSP(8,10,12),TSP(8,10,12),PAQ(16,5),DAQ(16,5),TAQ(16,5),        SCI02100
00104    22*         . PDQ(16,5),DDQ(16,5),TDQ(16,5),PR(20,10),DR(20,10),TR(20,10),     SCI02200
00104    23*         ,UAQ(16,5),VAQ(16,5),UDQ(16,5),VDQ(16,5),UR(25,10),PQ,DQ,TQ,UQ,VQ  SCI02300
00104    24*         . ,PQA,DQA,TQA,UA,VA                                                SCI02350
00105    25*          COMMON /C4/ GLAT(16),GLON(16),NG,P4D(16,26),D4D(16,26),T4D(16,26),SCI02400
00105    26*         .  SP4(16,26),SD4(16,26),ST4(16,26),THET1,THET                      SCI02500
00106    27*          DIMENSION VR(25,10)                                                SCI02600
00107    28*          COMMON/COMPER/SPH,SDH,STH,PRH,DRH,TRH,URH,VRH,SUH,SVH              SCI02700
00107    29*    C.....THE PRESENT SCIDAT TAPE HAS UR=VR.  IF THESE ARE MADE DIFFERENT,   SCI02800
00107    30*    C       REMOVE THIS EQUIVALENCE AND PLACE VR(25,10) INTO COMMON PDTCOM   SCI02900
00110    31*          EQUIVALENCE (UR(1,1),VR(1,1))                                      SCI03000
00111    32*          FAC = 57.2957795  C.....FACTOR FOR RADIANS TO DEGREES              SCI03100
00112    33*          PQ=0.                                                              SCI03200
00113    34*          DQ=0.                                                              SCI03300
00114    35*          TQ=0.                                                              SCI03400
00115    36*          PRH=0.                                                             SCI03500
00116    37*          DRH=0.                                                             SCI03600
00117    38*          TRH=0.                                                             SCI03700
00120    39*          URH=0.                                                             SCI03800
00121    40*          VRH=0.                                                             SCI03900
00122    41*          UQ=0.                                                              SCI04000
00123    42*          VQ=0.                                                              SCI04100
00124    43*          PQA=0.                                                             SCI04110
00125    44*          DQA=0.                                                             SCI04120
00126    45*          TQA=0.                                                             SCI04130
00127    46*          UA=0.                                                              SCI04140
00130    47*          VA=0.                                                              SCI04150
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00131     48*          PSH=0.                                                    SCI04160
00132     49*          QSH=0.                                                    SCI04170
00133     50*          TSH=0.                                                    SCI04180
00134     51*          MONTH=MN                                                  SCI04200
00135     52*          PHI = PHIR*FAC     @.....PRESENT LATITUDE, DEG            SCI04300
00136     53*          THET = THETR*FAC   @.....PRESENT LONGITUDE, DEG           SCI04400
00137     54*          PHI1 = PHI1R*FAC   @.....PREVIOUS LATITUDE, DEG           SCI04500
00140     55*          THET1 = THET1R*FAC@.....PREVIOUS LONGITUDE, DEG           SCI04600
00140     56*     C.....FCORY = NORTH COMPONENT CORIOLIS FACTOR TIMES DISTANCE FOR SCI04700
00140     57*     C         5 DEGREES OF LATITUDE                                SCI04800
00141     58*          FCORY=(100.*RI*SIN(PHIR))/(4.*FAC*FAC)                    SCI04900
00142     59*          IF(ABS(FCORY).LE.0.0) FCORY=0.01                          SCI04950
00142     60*     C.....FCORX = EAST COMPONENT CORIOLIS FACTOR TIMES DISTANCE FOR SCI05000
00142     61*     C         5 DEGREES OF LONGITUDE                               SCI05100
00144     62*          FCORX=FCORY*COS(PHIR)                                     SCI05200
00144     63*     C.....IN JACCHIA OR MIXED GROVES-JACCHIA HEIGHT RANGE          SCI05300
00145     64*      8   IF (H.GE.90.0) GO TO 10                                  SCI05400
00145     65*     C.....IN 4-D DATA HEIGHT RANGE                                 SCI05500
00147     66*          IF (H.LE.25.0) GO TO 500                                  SCI05600
00151     67*          GO TO 200     @.....IN GROVES OR MIXED GROVES-4D HEIGHT RANGE SCI05700
00151     68*     C.....IN MIXED JACCHIA-GROVES RANGE NEED TO FAIR DATA          SCI05800
00152     69*      10  IF (H.LT.115.) GO TO 20                                  SCI05900
00152     70*     C.....FOLLOWING IS THE PURE JACCHIA HEIGHT RANGE SECTION       SCI06000
00152     71*     C.....JACCHIA VALUES AT CURRENT POSITION                       SCI06100
00154     72*          CALL JACCH(H,PHIR,THET,PH,DH,TH)                          SCI06200
00155     73*          PHIN = PHIR + 5. / FAC                                    SCI06300
00156     74*          THETE = THET - 5.                                         SCI06400
00156     75*     C.....JACCHIA VALUES AT CURRENT POSITION+5 DEGREES LAT, FOR DP/DY AND SCI06500
00156     76*     C         DT/DY                                                SCI06600
00157     77*          CALL JACCH(H,PHIN,THET,PHN,DHN,THN)                       SCI06700
00157     78*     C.....JACCHIA VALUES AT CURRENT POSITION-5 DEGREES LON, FOR DP/DX AND SCI06800
00157     79*     C         DT/DX                                                SCI06900
00160     80*          CALL JACCH(H,PHIR,THETE,PHE,DHE,THE)                      SCI07000
00161     81*          DPY=PHN-PH    @.....DP/DY FOR GEOSTROPHIC WIND            SCI07100
00162     82*          DPX=PHE-PH    @.....DP/DX FOR GEOSTROPHIC WIND            SCI07200
00163     83*          UH=-DPY/(FCORY*DH) @.....EASTWARD GEOSTROPHIC WIND COMPONENT SCI07300
00164     84*          VH=DPX/(FCORX*DH)  @.....NORTHWARD GEOSTROPHIC WIND COMPONENT SCI07400
00165     85*          DTX = THE - TH     @.....DT/DX FOR THERMAL WIND SHEAR     SCI07500
00166     86*          DTY = THN - TH     @.....DT/DY FOR THERMAL WIND SHEAR     SCI07600
00166     87*     C.....DUH = THERMAL WIND SHEAR EASTWARD COMPONENT              SCI07700
00167     88*          DUH = -(G * DTY) / (FCORY * TH)                           SCI07800
00167     89*     C.....DVH = THERMAL WIND SHEAR NORTHWARD COMPONENT             SCI07900
00170     90*          DVH =  (G * DTX) / (FCORX * TH)                           SCI08000
00171     91*          PGH=PH  @.....CHANGE NOTATION FOR OUTPUT                  SCI08100
00172     92*          DGH=DH                                                    SCI08200
00173     93*          TGH=TH                                                    SCI08300
00174     94*          UGH=UH                                                    SCI08400
00175     95*          VGH=VH                                                    SCI08500
00176     96*          GO TO 800     @.....GO TO RANDOM PERTURBATIONS SECTION    SCI08600
00176     97*     C.....FOLLOWING IS THE MIXED JACCHIA-GROVES HEIGHT RANGE SECTION SCI08700
00177     98*      20  IHA = 5*(INT(H)/5)@.....LOWER HEIGHT INDEX                SCI08800
00200     99*          IHB = IHA + 5      @.....UPPER HEIGHT INDEX               SCI08900
00201    100*          HA = IHA*1.  @.....LOWER HEIGHT FOR INTERPOLATION         SCI09000
00202    101*          HB = IHB*1.  @.....UPPER HEIGHT FOR INTERPOLATION         SCI09100
00202    102*     C.....JACCHIA VALUES AT LOWER HEIGHT, CURRENT LAT-LON          SCI09200
00203    103*          CALL JACCH(HA,PHIR,THET,PJA,DJA,TJA)                      SCI09300
00204    104*          PHIN = PHIR + 5. / FAC                                    SCI09400
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00205   105*          THETE = THET - 5.                                          SCI09500
00205   106*    C.....JACCHIA VALUES AT LOWER HEIGHT, CURRENT LAT-LON+5 DEGREES  SCI09600
00205   107*    C        LAT, FOR DP/DY AND DT/DY                                SCI09700
00206   108*          CALL JACCH(HA,PHIN,THET,PJN,DJN,TJN)                       SCI09800
00206   109*    C.....JACCHIA VALUES AT LOWER HEIGHT, CURRENT LAT-LON-5 DEGREES  SCI09900
00206   110*    C        LON, FOR DP/DX, AND DT/DX                               SCI10000
00207   111*          CALL JACCH(HA,PHIR,THETE,PJE,DJE,TJE)                      SCI10100
00210   112*          DPXJA=PJE-PJA @.....JACCHIA DP/DY AT LOWER HEIGHT          SCI10200
00211   113*          DPYJA=PJN-PJA @.....JACCHIA DP/DY AT LOWER HEIGHT          SCI10300
00212   114*          DTXJA = TJE - TJA @.....JACCHIA DT/DX AT LOWER HEIGHT      SCI10400
00213   115*          DTYJA = TJN - TJA @.....JACCHIA DT/DY AT LOWER HEIGHT      SCI10500
00213   116*    C.....JACCHIA VALUES AT UPPER HEIGHT, CURRENT LAT-LON            SCI10600
00214   117*          CALL JACCH(HB,PHIR,THET,PJB,DJB,TJB)                       SCI10700
00215   118*          PHIN = PHIR + 5. / FAC                                     SCI10800
00216   119*          THETE=THETE-5                                              SCI10900
00216   120*    C.....JACCHIA VALUES AT UPPER HEIGHT, CURRENT LAT/LON+5 DEGREES  SCI11000
00216   121*    C        LAT, FOR DP/DY AND DT/DY                                SCI11100
00217   122*          CALL JACCH(HB,PHIN,THET,PJN,DJN,TJN)                       SCI11200
00217   123*    C.....JACCHIA VALUES AT UPPER HEIGHT, CURRENT LAT-LON-5 DEGREES  SCI11300
00217   124*    C        LON, FOR DP/DX AND DT/DX                                SCI11400
00220   125*          CALL JACCH(HB,PHIR,THETE,PJE,DJE,TJE)                      SCI11500
00221   126*          DPXJB = PJE - PJB @.....JACCHIA DP/DX FOR GEOSTROPHIC WINDS SCI11600
00222   127*          DPYJB = PJN - PJB @.....JACCHIA DP/DY FOR GEOSTROPHIC WINDS SCI11700
00223   128*          DTXJB = TJE - TJB @.....JACCHIA DT/DX FOR THERMAL WIND SHEAR SCI11800
00224   129*          DTYJB = TJN - TJB @.....JACCHIA DT/DY FOR THERMAL WIND SHEAR SCI11900
00224   130*    C.....GROVES AT LOWER HEIGHT, TO BE FAIRED WITH JACCHIA          SCI12000
00225   131*          CALL GTERP(IHA,PHI,PGA,DGA,TGA,PG,DG,TG,DPXGA,DPYGA,DTXGA,DTYGA) SCI12100
00225   132*    C.....GROVES AT UPPER HEIGHT, TO BE FAIRED WITH JACCHIA          SCI12200
00226   133*          CALL GTERP(IHB,PHI,PGB,DGB,TGB,PG,DG,TG,DPXGB,DPYGB,DTXGB,DTYGB) SCI12300
00226   134*    C.....FAIRED RESULTS AT LOWER HEIGHT                             SCI12400
00227   135*          CALL FAIR(PGA,DGA,TGA,PJA,DJA,TJA,IHA,P1,D1,T1,DPXGA,DPYGA, SCI12500
00227   136*         $ DPXJA,DPYJA,DPXA,DPYA,DTXGA,DTYGA,DTXJA,DTYJA,DTXA,DTYA) SCI12600
00227   137*    C.....FAIRED RESULTS AT UPPER HEIGHT                             SCI12700
00230   138*          CALL FAIR(PGB,DGB,TGB,PJB,DJB,TJB,IHB,P2,D2,T2,DPXGB,DPYGB, SCI12800
00230   139*         $ DPXJB,DPYJB,DPXB,DPYB,DTXGB,DTYGB,DTXJB,DTYJB,DTXB,DTYB) SCI12900
00230   140*    C.....HEIGHT INTERPOLATION ON FAIRED P,D,T                       SCI13000
00231   141*          CALL INTER2(P1,D1,T1,HA,P2,D2,T2,HB,PH,DH,TH,H)            SCI13100
00231   142*    C.....HEIGHT INTERPOLATION ON FAIRED DP/DX,DP/DY                 SCI13200
00232   143*          CALL INTERW(DPXA,DPYA,HA,DPXB,DPYB,HB,DPX,DPY,H)           SCI13300
00232   144*    C.....HEIGHT INTERPOLATION ON FAIRED DT/DX,DT/DY                 SCI13400
00233   145*          CALL INTERW(DTXA,DTYA,HA,DTXB,DTYB,HB,DTX,DTY,H)           SCI13500
00233   146*    C.....EASTWARD COMPONENT OF GEOSTROPHIC WIND                     SCI13600
00234   147*          UH = -DPY / (FCORY * DH)                                   SCI13700
00234   148*    C.....NORTHWARD COMPONENT OF GEOSTROPHIC WIND                    SCI13800
00235   149*          VH =  DPX / (FCORX * DH)                                   SCI13900
00235   150*    C.....EASTWARD COMPONENT OF THERMAL WIND SHEAR                   SCI14000
00236   151*          DUH = -(G * DTY) / (FCORY * TH)                            SCI14100
00236   152*    C.....NORTHWARD COMPONENT OF THERMAL WIND SHEAR                  SCI14200
00237   153*          DVH =  (G * DTX) / (FCORX * TH)                            SCI14300
00240   154*          PGH=PH              @.....CHANGE OF VARIABLES FOR OUTPUT   SCI14400
00241   155*          DGH=DH                                                     SCI14500
00242   156*          TGH=TH                                                     SCI14600
00243   157*          UGH=UH                                                     SCI14700
00244   158*          VGH=VH                                                     SCI14800
00245   159*          GO TO 800     @.....GO TO RANDOM PERTURBATIONS SECTION     SCI14900
00245   160*    C.....THE FOLLOWING SECTION IS FOR GROVES OR MIXED GROVES 4D HEIGHTS SCI15000
00246   161*     200  IHGB = 5*(INT(H)/5) + 5  @.....UPPER HEIGHT INDEX         SCI15100
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00247   162*          HGB = IHGB*1.     @.....UPPER HEIGHT                                        SCI15200
00247   163*     C.....GROVES AT UPPER HEIGHT                                                     SCI15300
00250   164*          CALL GTERP(IHGB,PHI,PGB,DGB,TGB,PG,DG,TG,DPXGB,DPYGB,DTXGB,DTYGB)          SCI15400
00250   165*     C.....UPPER STATIONARY PERTURBATION HEIGHT = 40                                  SCI15500
00251   166*          IF (H.LT.40.0) GO TO 210                                                    SCI15600
00251   167*     C.....UPPER STATIONARY PERTURBATION HEIGHT = 90                                  SCI15700
00253   168*          IF (H.GT.84.0) GO TO 220                                                    SCI15800
00253   169*     C.....UPPER STATIONARY PERTURBATION HEIGHT = 52,60,68,76,OR 84                   SCI15900
00255   170*          IHSB = 8*((INT(H) + 4)/8) + 4                                               SCI16000
00255   171*     C.....UPPER STATIONARY PERTURBATION HEIGHT = 52                                  SCI16100
00256   172*          IF (IHSB.LT.52.0) IHSB = 52                                                 SCI16200
00260   173*          GO TO 230                                                                   SCI16300
00261   174*        210 IHSB = 10*(INT(H)/10) + 10                                                SCI16400
00262   175*          GO TO 230                                                                   SCI16500
00263   176*        220 IHSB = 90                                                                 SCI16600
00264   177*        230 HSB = IHSB*1. @.....UPPER STATIONARY PERTURBATION HEIGHT                  SCI16700
00264   178*     C.....STATIONARY PERTURBATIONS AT UPPER HEIGHT                                   SCI16800
00265   179*          CALL PDTUV(PSP,DSP,TSP,PHI,THET,IHSB,PSB,DSB,TSB,DPXSB,DPYSB,              SCI16900
00265   180*         $ DTXSB,DTYSB)                                                               SCI17000
00266   181*          IF (H.LT.30.0) GO TO 300 @.....MIXED GROVES 4D SECTION                      SCI17100
00270   182*          IHGA = IHGB - 5   @.....LOWER HEIGHT INDEX                                  SCI17200
00271   183*          HGA = IHGA*1.     @.....LOWER HEIGHT INDEX                                  SCI17300
00271   184*     C.....GROVES AT LOWER HEIGHT                                                     SCI17400
00272   185*          CALL GTERP(IHGA,PHI,PGA,DGA,TGA,PG,DG,TG,DPXGA,DPYGA,DTXGA,DTYGA)          SCI17500
00272   186*     C.....LOWER STATIONARY PERTURBATION HEIGHT = 30                                  SCI17600
00273   187*          IF (H.LT.40.0) GO TO 240                                                    SCI17700
00273   188*     C.....LOWER STATIONARY PERTURBATION HEIGHT = 52,60,68,76, OR 84                  SCI17800
00275   189*          IHSA = 8*((INT(H) + 4)/8) - 4                                               SCI17900
00275   190*     C.....LOWER STATIONARY PERTURBATIONS HEIGHT = 40                                 SCI18000
00276   191*          IF (IHSA.LT.40.0) IHSA = 40                                                 SCI18100
00300   192*          GO TO 250                                                                   SCI18200
00301   193*        240 IHSA = 30                                                                 SCI18300
00302   194*        250 HSA = IHSA*1. @.....LOWER STATIONARY PERTURBATION HEIGHT                  SCI18400
00302   195*     C.....STATIONARY PERTURBATIONS AT LOWER HEIGHT                                   SCI18500
00303   196*          CALL PDTUV(PSP,DSP,TSP,PHI,THET,IHSA,PSA,DSA,TSA,DPXSA,DPYSA,              SCI18600
00303   197*         $ DTXSA,DTYSA)                                                               SCI18700
00303   198*     C.....GROVES VALUES HEIGHT INTERPOLATIONS                                        SCI18800
00304   199*          CALL INTER2(PGA,DGA,TGA,HGA,PGB,DGB,TGB,HGB,PGH,DGH,TGH,H)                  SCI18900
00304   200*     C.....STATIONARY PERTURBATION HEIGHT INTERPOLATION                               SCI19000
00305   201*          CALL INTERZ(PSA,DSA,TSA,HSA,PSB,DSB,TSB,HSB,PSH,DSH,TSH,H)                  SCI19100
00306   202*          CALL QBOGEN  @.....QUASI-BIENNIAL VALUES                                    SCI19200
00306   203*     C.....UNPERTURBED (MONTHLY MEAN) VALUES FOR OUTPUT                               SCI19300
00307   204*          TGH = TGH * (1. + TSH)                                                      SCI19400
00310   205*          PGH = PGH * (1. + PSH)                                                      SCI19500
00311   206*          DGH = DGH * (1. + DSH)                                                      SCI19600
00311   207*     C.....UNPERTURBED VLAUES PLUS QBO PERTURBATIONS                                  SCI19700
00312   208*          PH = (1. + PQ) * PGH                                                        SCI19800
00313   209*          DH = DGH * (1. + DQ)                                                        SCI19900
00314   210*          TH = (1. + TQ) * TGH                                                        SCI20000
00314   211*     C.....HEIGHT INTERPOLATION OF GROVES DP/DX AND DP/DY                             SCI20100
00315   212*          CALL INTERW(DPXGA,DPYGA,HGA,DPXGB,DPYGB,HGB,DPXG,DPYG,H)                    SCI20200
00315   213*     C.....HEIGHT INTERPOLATION OF STATIONARY PERTURBATION DP/DX AND DP/DY            SCI20300
00316   214*          CALL INTERW(DPXSA,DPYSA,HSA,DPXSB,DPYSB,HSB,DPXS,DPYS,H)                    SCI20400
00316   215*     C.....HEIGHT INTERPOLATION OF GROVES DT/DX AND DT/DY                             SCI20500
00317   216*          CALL INTERW(DTXGA,DTYGA,HGA,DTXGB,DTYGB,HGB,DTXG,DTYG,H)                    SCI20600
00317   217*     C.....HEIGHT INTERPOLATION OF STATIONARY PERTURBATION DT/DX AND DT/DY            SCI20700
00320   218*          CALL INTERW(DTXSA,DTYSA,HSA,DTXSB,DTYSB,HSB,DTXS,DTYS,H)                    SCI20800
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00321   219*          DTX = DTXG + DTXS * TGH@....,TOTAL DT/DX                          SCI20900
00322   220*          DTY = DTYG + DTYS * TGH@....,TOTAL DT/DY                          SCI21000
00322   221*     C.....THERMAL WIND SHEAR, EASTWARD COMPONENT                           SCI21100
00323   222*          DUH = -(G * DTY) / (FCORY * TH)                                   SCI21200
00323   223*     C.....THERMAL WIND SHEAR, NORTHWARD COMPONENT                          SCI21300
00324   224*          DVH =  (G * DTX) / (FCORX * TH)                                   SCI21400
00325   225*          DPX = DPXG + DPXS * PGH  @.....TOTAL DP/DX                        SCI21500
00326   226*          DPY = DPYG + DPYS * PGH  @.....TOTAL DP/DY                        SCI21600
00326   227*     C.....EASTWARD COMPONENT GEOSTROPHIC WIND                              SCI21700
00327   228*          UGH=-DPY/(FCORY*DH)                                               SCI21800
00327   229*     C.....NORTHWARD COMPONENT GEOSTROPHIC WIND                             SCI21900
00330   230*          VGH=DPX/(FCORX*DH)                                                SCI22000
00331   231*          UH=UGH+UQ  @.....GEOSTROPHIC WIND PLUS QBO WIND PERTURBATIONS     SCI22100
00332   232*          VH=VGH+VQ                                                         SCI22200
00333   233*          GO TO 800  @.....GO TO RANDOM PERTURBATIONS SECTION               SCI22300
00333   234*     C.....THE FOLLOWING IS THE MIXED GROVES 4D SECTION                     SCI22400
00333   235*     C.....GENERATE GRID OF 4D PROFILES IF PREVIOUS HEIGHT GE 30            SCI22500
00334   236*      300  IF (H1.GE.30..OR.LOOK.EQ.1) CALL GEN4D                         SCI22600
00334   237*     C.....LAT-LON INTERPOLATION OF 4D DATA AT 25 KM                        SCI22700
00336   238*          CALL INTER4(GLAT,GLON,PHI,THET,25,NG,P4D,D4D,T4D,P4A,D4A,T4A,     SCI22800
00336   239*         $ DPX4,DPY4,DTX4,DTY4)                                             SCI22900
00337   240*          PB = PGB*(1. + PSB) @.....GROVES PLUS STATIONARY PERTURBATION:    SCI23000
00340   241*          DB = DGB*(1. + DSB) @    P,D,T                                    SCI23100
00341   242*          TB = TGB*(1. + TSB)                                               SCI23200
00342   243*          DPXB = DPXGB + DPXSB * PB   @.....GROVES PLUS STATIONARY          SCI23300
00343   244*          DPYB = DPYGB + DPYSB * PB   @  PERTURBATIONS:  DP/DX,DP/DY,       SCI23400
00344   245*          DTXB = DTXGB + DTXSB * TB   @  DT/DX,DT/DY                        SCI23500
00345   246*          DTYB = DTYGB + DTYSB * TB                                         SCI23600
00345   247*     C.....HEIGHT INTERPOLATION BETWEEN 4D AT 25 AND GROVES AT UPPER HEIGHT SCI23700
00345   248*     C         DP/DX AND DP/DY                                             SCI23800
00346   249*          CALL INTERW(DPX4,DPY4,25.,DPXB,DPYB,HSB,DPX,DPY,H)                SCI23900
00346   250*     C.....HEIGHT INTERPOLATION BETWEEN 4D AT 25 AND GROVES AT UPPER HEIGHT SCI24000
00346   251*     C         P,D,T                                                       SCI24100
00347   252*          CALL INTER2(P4A,D4A,T4A,25.,PB,DB,TB,HGB,PGH,DGH,TGH,H)           SCI24200
00347   253*     C.....HEIGHT INTERPOLATION BETWEEN 4D AT 25 AND GROVES AT UPPER HEIGHT SCI24300
00347   254*     C         DT/DX AND DT/DY                                             SCI24400
00350   255*          CALL INTERW(DTX4,DTY4,25.,DTXB,DTYB,HSB,DTX,DTY,H)                SCI24500
00351   256*          CALL QBOGEN        @.....QUASI-BIENNIAL PERTURBATIONS             SCI24600
00352   257*          PH=PGH*(1.+PQ) @.....ADD QBO PERTURBATIONS TO P,D,T               SCI24700
00353   258*          DH=DGH*(1.+DQ)                                                    SCI24800
00354   259*          TH=TGH*(1.+TQ)                                                    SCI24900
00355   260*          UGH=-DPY/(FCORY*DH)  @.....GEOSTROPHIC WIND COMPONENTS            SCI25000
00356   261*          VGH=DPX/(FCORX*DH)                                                SCI25100
00356   262*     C.....THERMAL WIND SHEAR COMPONENTS                                    SCI25200
00357   263*          DUH = -(G * DTY) / (FCORY * TH)                                   SCI25300
00360   264*          DVH =  (G * DTX) / (FCORX * TH)                                   SCI25400
00361   265*          UH=UGH+UQ  @.....ADD QBO WIND PERTURBATIONS TO WIND               SCI25500
00362   266*          VH=VGH+VQ                                                         SCI25600
00363   267*          GO TO 800    @.....GO TO RANDOM PERTURBATIONS SECTION             SCI25700
00364   268*        500 IF (H.GE.0.0) GO TO 510                                         SCI25800
00366   269*          IF (H.LT.-0.005) GO TO 505                                        SCI25900
00370   270*          H = 0.  @.....IF -5 METER LE H LT 0 , H IS SET TO 0               SCI26000
00371   271*          GO TO 510                                                         SCI26100
00372   272*         505 NMORE = 0  @..NO MORE COMPUTATIONS TO BE MADE IF HEIGHT LT -5 M SCI26200
00373   273*          RETURN                                                            SCI26300
00373   274*     C.....GENERATE GRID OF 4D PROFILES IF PREVIOUS HEIGHT GE 30            SCI26400
00374   275*      510  IF (H1.GE.30..OR.LOOK.EQ.1) CALL GEN4D                         SCI26500
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***** SCIMOD *****

00376 276*          IHA = INT(H) @.....LOWER HEIGHT INDEX                                  SCI26600
00377 277*          IA = IHA+1.  @.....LOWER HEIGHT INDEX                                  SCI26700
00400 278*          IHB = IHA + 1    @.....UPPER HEIGHT INDEX                              SCI26800
00401 279*          IF (IHB.GT.25) IHB = 25                                                SCI26900
00403 280*          HB = IHB*1.  @.....UPPER HEIGHT                                        SCI27000
00403 281*    C.....LAT-LON INTERPOLATION OF 4D VALUES AT UPPER HEIGHT                     SCI27400
00404 282*      515 CALL INTER4(GLAT,GLON,PHI,THET,IHB,NG,P4D,D4D,T4D,PB,DB,TB,            SCI27500
00404 283*         $ DPX4B,DPY4B,DTX4B,DTY4B)                                            SCI27600
00405 284*           IF(IHA.EQ.0.AND.PB*DB*TB.LE.0.)GO TO 520                            SCI27603
00407 285*           GO TO 540                                                           SCI27606
00410 286*      520 IHB=IHB+1                                                            SCI27609
00410 287*    C.....LOOP TO FIND LOWEST VALID HEIGHT                                     SCI27612
00411 288*          HB=HB+1.                                                            SCI27615
00412 289*          GO TO 515                                                           SCI27618
00413 290*      540 IF(IHA.GT.0)CALL INTER4(GLAT,GLON,PHI,THET,IHA,NG,P4D,D4D,T4D,      SCI27622
00413 291*         1PA,DA,TA,DPX4A,DPY4A,DTX4A,DTY4A)                                   SCI27624
00415 292*           IF(IHA.EQ.0.OR.(PA*DA*TA.LE.0.AND.IHA.LT.10.AND.PB*DB*TB.GT.0.))   SCI27627
00415 293*          1GO TO 550                                                          SCI27630
00417 294*          GO TO 600                                                           SCI27633
00420 295*      550 CALL INTER4(GLAT,GLON,PHI,THET,0.,NG,P4D,D4D,T4D,                   SCI27636
00420 296*         *PA,DA,TA,DPX4A,DPY4A,DTX4A,DTY4A)                                   SCI27639
00421 297*           IF(TA-TB)560,570,560                                              SCI27642
00424 298*      560 TZ=(TA-TB)/ALOG(TA/TB)                                             SCI27645
00425 299*          GO TO 575                                                           SCI27648
00426 300*      570 TZ=TA                                                              SCI27651
00426 301*    C .....COMPUTES HEIGHT OF SURFACE                                        SCI27654
00427 302*      575 HA=HB+0.28705*TZ*ALOG(PB/PA)/G                                     SCI27657
00430 303*          IF(H.GT.HA) GO TO 600                                              SCI27660
00432 304*          PH=0.                                                              SCI27663
00433 305*          DH=0.                                                              SCI27666
00434 306*          TH=0.                                                              SCI27669
00435 307*          PGH=C.                                                             SCI27672
00436 308*          DGH=0.                                                             SCI27675
00437 309*          TGH=0.                                                             SCI27678
00440 310*          GO TO 800                                                          SCI27681
00440 311*    C.....LAT-LON INTERPOLATION OF 4D VALUES AT LOWER HEIGHT                 SCI27684
00440 312*    C.....HEIGHT INTERPOLATION OF P,D,T                                      SCI27687
00441 313*      600 CALL INTER2(PA,DA,TA,HA,PB,DB,TB,HB,PGH,DGH,TGH,H)                 SCI27690
00442 314*          PH=PGH                                                             SCI27693
00443 315*          DH=DGH                                                             SCI27696
00444 316*          TH=TGH                                                             SCI27699
00444 317*    C.....HEIGHT INTERPOLATION OF DP/DX AND DP/DY                            SCI27900
00445 318*          CALL INTERW(DPX4A,DPY4A,HA,DPX4B,DPY4B,HB,DPX,DPY,H)               SCI28000
00445 319*    C.....HEIGHT INTERPOLATION OF DT/DX AND DT/DY                            SCI28100
00446 320*          CALL INTERW(DTX4A,DTY4A,HA,DTX4B,DTY4B,HB,DTX,DTY,H)               SCI28200
00447 321*          PH = PGH     @.....CHANGE OF NOTATION FOR OUTPUT                   SCI28300
00450 322*          DH = DGH                                                           SCI28400
00451 323*          TH = TGH                                                           SCI28500
00452 324*          IF(PH*DH*TH.LE.0.) GO TO 800                                       SCI28550
00454 325*          UGH=-DPY/(FCORY*DH)                                                SCI28600
00455 326*          VGH= DPX/(FCORX*DH)  @.....GEOSTROPHIC WIND COMPONENTS             SCI28700
00456 327*          UH = UGH     @.....CHANGE OF NOTATION FOR OUTPUT                   SCI28800
00457 328*          VH = VGH                                                           SCI28900
00457 329*    C.....THERMAL WIND SHEAR COMPONENTS                                      SCI29000
00460 330*          DUH = -(G * DTY) / (FCORY * TH)                                    SCI29100
00461 331*          DVH = (G * DTX) / (FCORX * TH)                                     SCI29200
00462 332*          IF (H.LT.15.) GO TO 800 @.....QBO=0 IF H LT 15                     SCI29300
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00464   333*          CALL QBOGEN  Q.....COMPUTES QUASI-BIENNIAL PERTURBATIONS          SCI29400
00465   334*          PH=PGH*(1.+PQ)  Q.....ADDS QBO PERTURBATIONS TO P,D,T             SCI29500
00466   335*          DH=DGH*(1.+DQ)                                                    SCI29600
00467   336*          TH=TGH*(1.+TQ)                                                    SCI29700
00470   337*          UH=UGH+UQ  Q.....ADDS QBO WIND PERTURBATIONS TO U,V               SCI29800
00471   338*          VH=VGH+VQ                                                         SCI29900
00471   339*     C.....THE FOLLOWING IS THE RANDOM PERTURBATIONS SECTION                SCI30000
00471   340*     C.....NO RANDOM PERTURBATIONS IF IOPR GT 1                             SCI30100
00472   341*       800 IF (IOPR.GT.1) GO TO 830                                        SCI30200
00472   342*     C.....INTERPOLATES RANDOM WIND MAGNITUDES TO HEIGHT H, LATITUDE PHI    SCI30300
00474   343*          CALL INTRUV(UR,VR,H,PHI,SUH,SVH)                                  SCI30400
00474   344*     C.....IF H LE 25 USE 4D DATA RANDOM P,D,T SIGMAS                       SCI30500
00475   345*          IF (H.LE.25.) GO TO 810                                           SCI30600
00475   346*     C.....INTERPOLATE PR,DR,TR ARRAYS TO GET P,D,T SIGMAS AT HEIGHT H,     SCI30700
00475   347*     C         LATITUDE PHI                                                SCI30800
00477   348*          CALL RTERP(H,PHI,PR,DR,TR,SPH,SDH,STH)                            SCI30900
00500   349*          GO TO 820                                                         SCI31000
00500   350*     C.....LAT-LON INTERPOLATION ON P,D,T SIGMAS AT LOWER HEIGHT            SCI31500
00501   351*       810 CALL INTER4(GLAT,GLON,PHI,THET,IHA,NG,SP4,SD4,ST4,SP1,SD1,ST1,  SCI31600
00501   352*          $ DPX,DPY,DTX,DTY)                                              SCI31700
00501   353*     C.....LAT-LON INTERPOLATION ON P,D,T SIGMSA AT UPPER HEIGHT            SCI31800
00502   354*          CALL INTER4(GLAT,GLON,PHI,THET,IHB,NG,SP4,SD4,ST4,SP2,SD2,ST2,  SCI31900
00502   355*          $ DPX,DPY,DTX,DTY)                                              SCI32000
00502   356*     C.....HEIGHT INTERPOLATION OF SIGMAS                                   SCI32100
00503   357*          CALL INTERZ(SP1,SD1,ST1,HA,SP2,SD2,ST2,HB,SPH,SDH,STH,H)          SCI32200
00504   358*          IF(PH*DH*TH.LE.0.) GO TO 825                                      SCI32250
00504   359*     C.....HEIGHT DISPLACEMENT BETWEEN PREVIOUS AND CURRENT POSITION        SCI32300
00506   360*       820 DZ = H1 - H                                                     SCI32400
00506   361*     C.....COMPUTES HORIZONTAL DIXPLACEMENT DX BETWEEN PREVIOUS AND CURRENT SCI32500
00506   362*     C         POSITION, HORIZONTAL SCALE HL, AND VERTICAL SCALE VL        SCI32600
00507   363*          CALL DXHLVL                                                       SCI32700
00507   364*     C.....COMPUTES PERTURBATION VALUES PRH,DRH,TRH,URH AND VRH             SCI32800
00510   365*          CALL PERTRB                                                       SCI32900
00511   366*          PH = PH*(1. + PRH) Q.....ADDS RANDOM PERTURBATIONS TO PH,DH,TH    SCI33000
00512   367*          DH = DH*(1. + DRH)                                                SCI33100
00513   368*          TH = TH*(1. + TRH)                                                SCI33200
00514   369*          UH=UH+URH  Q.....ADDS RANDOM WINDS TO UH,VH                       SCI33300
00515   370*          VH=VH+VRH                                                         SCI33400
00515   371*     C.....SETS PREVIOUS RANDOM PERTURBATION IN P,D,T TO CURRENT            SCI33500
00515   372*     C         PERTURBATIONS, FOR NEXT CYCLE                               SCI33600
00516   373*       825 RP1 = PRH                                                       SCI33700
00517   374*          RD1 = DRH                                                         SCI33800
00520   375*          RT1 = TRH                                                         SCI33900
00520   376*     C.....SETS PREVIOUS MAGNITUDES FO CURRENT VALUES, FOR NEXT CYCLE       SCI34000
00521   377*          SP1=SPH                                                           SCI34100
00522   378*          SD1 = SDH                                                         SCI34200
00523   379*          ST1=STH                                                           SCI34300
00523   380*     C.....SETS PREVIOUS WIND PERTURBATION VALUES TO CURRENT VALUES,        SCI34400
00523   381*     C         FOR NEXT CYCLE                                              SCI34500
00524   382*          RU1=URH                                                           SCI34600
00525   383*          RV1=VRH                                                           SCI34700
00525   384*     C.....SETS PREVIOUS WIND PERTURBATION MAGNITUDES TO CURRENT VALUES,    SCI34800
00525   385*     C         FOR NEXT CYCLE                                              SCI34900
00526   386*          SU1=SUH                                                           SCI35000
00527   387*          SV1=SVH                                                           SCI35100
00527   388*     C.....SETS PREVIOUS HEIGHT TO CURRENT HEIGHT, FOR NEXT CYCLE           SCI35200
00530   389*       830 H1 = H                                                          SCI35300
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00530   390*     C.....SETS PREVIOUS LATITUDE TO CURRENT LATITUDE, FOR NEXT CYCLE        SCI35400
00531   391*           PHI1R=PHIR                                                        SCI35500
00531   392*     C.....SETS PREVIOUS LONGITUDE TO CURRENT LONGITUDE, FOR NEXT CYCLE      SCI35600
00532   393*           THET1R=THETR                                                      SCI35700
00533   394*           NMORE = 1  C.....SETS NMORE TO COMPUTE MORE DATA ON NEXT CYCLE    SCI35800
00533   395*     C.....NO MORE DATA IF P, D, OR T LEQ 0                                  SCI35900
00534   396*           IF(PH*DH*TH.LE.0.) RETURN                                         SCI35910
00536   397*           CALL STDATM(H,TS,PS,DS)                                           SCI35920
00537   398*           IF ((PS*DS*TS).GT.0.) GO TO 870                                   SCI35930
00541   399*           PGHP=0.                                                           SCI35940
00542   400*           DGHP=0.                                                           SCI35950
00543   401*           TGHP=0.                                                           SCI35960
00544   402*           PHP=0.                                                            SCI35970
00545   403*           DHP=0.                                                            SCI35980
00546   404*           THP=0.                                                            SCI35990
00547   405*           GO TO 880                                                         SCI35999
00550   406*       870 PGHP=100.*(PGH-PS)/PS                                             SCI36010
00551   407*           DGHP=100.*(DGH-DS)/DS                                             SCI36020
00552   408*           TGHP=100.*(TGH-TS)/TS                                             SCI36030
00553   409*           PHP=100.*(PH-PS)/PS                                               SCI36040
00554   410*           DHP=100.*(DH-DS)/DS                                               SCI36050
00555   411*           THP=100.*(TH-TS)/TS                                               SCI36060
00556   412*       880 PQ=100.*PQ     C.....CONVERTS QBO P,D,T TO PERCENT                SCI36100
00557   413*           DQ=100.*DQ                                                        SCI36200
00560   414*           TQ=100.*TQ                                                        SCI36300
00561   415*           PRH=100.*PRH  C.....CONVERTA RANDOM P,D,T TO PERCENT              SCI36400
00562   416*           DRH=100.*DRH                                                      SCI36500
00563   417*           TRH=100.*TRH                                                      SCI36600
00564   418*           DUH = DUH * 1000. C.....CONVERTS WIND SHEAR TO M/S/KM             SCI36700
00565   419*           DVH = DVH * 1000.                                                 SCI36800
00566   420*           PQA=PQA*100.                                                      SCI36810
00567   421*           DQA=DQA*100.                                                      SCI36820
00570   422*           TQA=TQA*100.                                                      SCI36830
00571   423*           SPH=SPH*100.                                                      SCI36840
00572   424*           SDH=SDH*100.                                                      SCI36850
00573   425*           STH=STH*100.                                                      SCI36860
00574   426*           PSH=PSH*100.                                                      SCI36870
00575   427*           DSH=DSH*100.                                                      SCI36880
00576   428*           TSH=TSH*100.                                                      SCI36890
00577   429*           WRITE(6,900)     H,PHI,THET,PGH,DGH,TGH,UGH,VGH,PH,DH,TH,UH,VH,   SCI36900
00577   430*          $ DUH,DVH,IET,PGHP,DGHP,TGHP,PHP,DHP,THP,PSH,DSH,TSH,PQ,DQ,TQ,UQ,  SCI36830
00577   431*          $ VQ,PQA,DQA,TQA,UA,VA,PRH,DRH,TRH,URH,VRH,SPH,SDH,STH,SUH,SVH     SCI36860
00656   432*       900 FORMAT(1X,3F7.2,2(2F8.3,3F6.0),2F5.0/                             SCI36890
00656   433*          $18,13X,2(2(F7.1,'%'),F6.1,'%',11X),11X,                           SCI36920
00656   434*          $3F5.1,10X,' SP',/100X,3F5.1,2F5.0,' QBO'/100X,3F5.1,2F5.0,' MAG'/1SCI36950
00656   435*          $00X,3F5.1,2F5.0,' RAND',/100X,3F5.1,2F5.0,' SIG'/)               SCI36980
00657   436*           IF (IOPP.EQ.0) RETURN                                            SCI37010
00661   437*           PUNCH 950,IET,H,PHI,THET,PGH,DGH,TGH,PGHP,DGHP,TGHP,UGH,VGH,     SCI37040
00661   438*          $DUH,DVH                                                          SCI37070
00701   439*       950 FORMAT(I4,F5.1,2F7.2,2E8.3,F5.0,3F5.1,4F5.0,'A')                 SCI37100
00702   440*           PUNCH 960,IET,H,PHI,THET,PH,DH,TH,PHP,DHP,THP,UH,VH              SCI37130
00720   441*       960 FORMAT(I4,F5.1,2F7.2,3E8.3,F5.0,3F5.1,2F5.0,10X,'B')             SCI37160
00721   442*           THET=THET*FAC                                                    SCI37190
00722   443*           RETURN                                                           SCI37300
00723   444*           END                                                              SCI37400
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      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  ******  SELEC4  ******
@FOR,S PROFAS.SELEC4,SELEC4
FOR S11E-02/04/74-18:54:51 (0,)

   SUBROUTINE SELEC4    ENTRY POINT 001625

   STORAGE USED: CODE(1) 001644; DATA(0) 000262; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   C4      000041
    0004   IOTEMP  000002
    0005   POINT   000200
    0006   ORDER   000423

   EXTERNAL REFERENCES (BLOCK, NAME)

    0007   NTRAN
    0010   SORT4
    0011   COS
    0012   SIN
    0013   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   001561 100L      0001   000013 122G      0001   000014 125G      0001   000025 133G      0001   000425 220G
    0001   000443 225G      0001   000521 244G      0001   000541 247G      0001   000073 30L       0001   000712 307G
    0001   000233 31L       0001   000732 312G      0001   000260 32L       0001   000360 34L       0001   000402 35L
    0001   000460 40L       0001   001305 422G      0001   001323 427G      0001   000573 45L       0001   001525 475G
    0001   000631 50L       0001   001543 502G      0001   000671 51L       0001   001566 516G      0001   000774 52L
    0001   001567 521G      0001   001040 54L       0001   001055 55L       0001   001070 70L       0001   001211 72L
    0001   001240 73L       0001   001246 74L       0001   001261 75L       0001   001267 76L       0001   001340 80L
    0001   001424 82L       0001   001443 84L       0001   001470 86L       0001   001507 88L       0001   001553 89L
    0000 R 000160 DEGRAD    0000 R 000173 DX        0005 R 000140 DXY       0000 R 000174 DY        0000 R 000166 EL
    0000 I 000161 I         0000 I 000000 IC        0000 I 000163 II        0000 I 000177 IJ        0000 I 000004 IL
    0000   000232 INJP$     0000 I 000175 IP        0000 I 000176 IPG       0005 I 000000 IPT       0006 I 000000 IPTN
    0006   000120 IREAD     0000 I 000162 J         0000 I 000006 JL        0000 I 000201 K         0000 I 000204 K1
    0000 I 000205 K2        0000 I 000200 L         0000 I 000164 LA        0000 I 000010 LIML      0000 I 000073 LIMU
    0005 I 000120 LL        0000 I 000165 LO        0000 I 000202 L1        0000 I 000203 L2        0003 I 000040 NP
    0000 R 000167 PHI       0000 R 000156 PI        0000 R 000157 PI4       0000 R 000170 R         0004   000000 SCRCH1
    0004 I 000001 SCRCH2    0003 R 000000 XL        0000 R 000171 XX        0003 R 000020 YL        0000 R 000172 YY


00101      1*          SUBROUTINE SELEC4                                                    SEL00100
00103      2*          COMMON/C4/XL(16),YL(16),NP                                           SEL00200
00103      3*     C                                                                         SEL00300
00103      4*     C    SUBROUTINE TO SELECT POINTS FOR INTERPOLATION                        SEL00400
00103      5*     C                                                                         SEL00500
00104      6*          COMMON /IOTEMP/ SCRCH1,SCRCH2                                        SEL00600
00105      7*          COMMON /POINT/ IPT(16,5),LL(16),DXY(16,2)                            SEL00700
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00106      8*          COMMON /ORDER/ IPTN(16,5),IREAD(65,3)                                  SEL00800
00106      9*    C                                                                            SEL00900
00107     10*          DIMENSION              IC(4),IL(2),JL(2),LIML(51),LIMU(51)             SEL01000
00107     11*    C                                                                            SEL01100
00110     12*          DATA  LIML/15,14,13,12,11,10,9,8,7,6,5,4,3,2,23*1,2,3,4,5,6,7,8,9,     SEL01200
00110     13*         110,11,12,13,14,15/                                                     SEL01300
00112     14*          DATA  LIMU/33,34,35,36,37,38,39,40,41,42,43,44,45,46,23*47,46,45,      SEL01400
00112     15*         144,43,42,41,40,39,38,37,36,35,34,33/                                   SEL01500
00114     16*          DATA PI/3.14159/                                                       SEL01600
00114     17*    C                                                                            SEL01700
00116     18*          INTEGER SCRCH2                                                         SEL01800
00116     19*    C                                                                            SEL01900
00116     20*    C        INITIALIZE                                                          SEL02000
00116     21*    C                                                                            SEL02100
00117     22*          PI4=PI/4.                                                              SEL02200
00120     23*          DEGRAD=PI/180.                                                         SEL02300
00121     24*          DO 1 I=1,16                                                            SEL02400
00124     25*          DO 1 J=1,5                                                             SEL02500
00127     26*        1 IPT(I,J)=0                                                             SEL02600
00127     27*    C                                                                            SEL02700
00127     28*    C        MAJOR LOOP FOR POINTS                                               SEL02800
00127     29*    C                                                                            SEL02900
00132     30*          DO 100 II=1,NP                                                         SEL03000
00132     31*    C                                                                            SEL03100
00135     32*          LA=ABS(XL(II))*10.+.5                                                  SEL03200
00136     33*          LO=YL(II)*10.+.5                                                       SEL03300
00137     34*          LL(II)=LA*10000+LO                                                     SEL03400
00140     35*          IF (XL(II).LT.0.) LL(II)=-LL(II)                                       SEL03500
00140     36*    C                                                                            SEL03600
00142     37*          IF (XL(II)-15.1) 15,30,30                                              SEL03700
00145     38*       15 IF (XL(II)) 50,40,40                                                   SEL03800
00145     39*    C                                                                            SEL03900
00145     40*    C        NMC GRID                                                            SEL04000
00145     41*    C                                                                            SEL04100
00150     42*       30 IPT(II,5)=2                                                            SEL04200
00151     43*          EL=(350-YL(II))*DEGRAD                                                 SEL04300
00152     44*          PHI=XL(II)*DEGRAD                                                      SEL04400
00153     45*          R=31.204359052*(SIN(PI4-PHI/2.)/COS(PI4-PHI/2.))                       SEL04500
00154     46*          XX=R*COS(EL)+24.                                                       SEL04600
00155     47*          YY=R*SIN(EL)+26.                                                       SEL04700
00156     48*          I=XX                                                                   SEL04800
00157     49*          J=YY                                                                   SEL04900
00160     50*          DX=XX-I                                                                SEL05000
00161     51*          DY=YY-J                                                                SEL05100
00162     52*          DXY(II,1)=DX                                                           SEL05200
00163     53*          DXY(II,2)=DY                                                           SEL05300
00164     54*          IF (XL(II).GT.17.18) GO TO 31                                          SEL05400
00166     55*          IF ((J.LT.1).OR.(J.GT.51)) GO TO 70                                    SEL05500
00170     56*          IF ((I.LT.LIML(J)).OR.(I.GT.LIMU(J))) GO TO 70                         SEL05600
00172     57*       31 IC(1)=I*1000+J                                                         SEL05700
00173     58*          IF ((ABS(DX).GT..1).OR.(ABS(DY).GT..1)) GO TO 32                       SEL05800
00175     59*          IP=1                                                                   SEL05900
00176     60*          GO TO 35                                                               SEL06000
00177     61*       32 CONTINUE                                                               SEL06100
00200     62*          IF (XL(II).GT.17.18) GO TO 34                                          SEL06200
00202     63*          IF (((I.GT.(LIMU(J)-1)).AND.((J.GE.15).AND.(J.LE.37)))                 SEL06300
00202     64*         1 .OR.(J.GT.50)) GO TO 70                                               SEL06400
```

```
00204    65*          IF ((I+1.GT.LIMU(J+1)).OR.(I.LT.LIML(J+1))) GO TO 80                SEL06500
00206    66*          IF ((I.EQ.LIMU(J)).OR.(I.EQ.LIML(J))) GO TO 80                      SEL06600
00210    67*       34 IP=4                                                                SEL06700
00211    68*          IC(2)=(I+1)*1000+J                                                  SEL06800
00212    69*          IC(3)=I*1000+J+1                                                    SEL06900
00213    70*          IC(4)=(I+1)*1000+J+1                                                SEL07000
00214    71*       35 CONTINUE                                                            SEL07100
00215    72*          CALL NTRAN (SCRCH2,10)                                              SEL07200
00216    73*          CALL NTRAN (SCRCH2,22)                                              SEL07300
00217    74*          DO 38 IPG=1,1977                                                    SEL07400
00222    75*          CALL NTRAN (SCRCH2,2,1,IJ,L)                                        SEL07500
00223    76*          CALL NTRAN (SCRCH2,22)                                              SEL07600
00224    77*          DO 38 K=1,IP                                                        SEL07700
00227    78*       38 IF(IC(K).EQ.IJ) IPT(II,K)=IPG                                       SEL07800
00233    79*          GO TO 100                                                           SEL07900
00233    80*    C                                                                         SEL08000
00233    81*    C        EQUATORIAL GRID                                                  SEL08100
00233    82*    C                                                                         SEL08200
00234    83*       40 IPT(II,5)=1                                                         SEL08300
00235    84*          L1=XL(II)                                                           SEL08400
00236    85*          L2=YL(II)                                                           SEL08500
00237    86*          IL(1)=L1/5                                                          SEL08600
00240    87*          IL(2)=IL(1)+1                                                       SEL08700
00241    88*          JL(1)=(L2/5)+1                                                      SEL08800
00242    89*          JL(2)=JL(1)-1                                                       SEL08900
00243    90*          DO 45 K1=1,2                                                        SEL09000
00246    91*          DO 45 K2=1,2                                                        SEL09100
00251    92*          IF ((ABS(XL(II)-IL(K1)*5).GT.0.1).OR.(ABS(YL(II)-JL(K2)*5).GT.0.1)SEL09200
00251    93*         1 ) GO TO 45                                                         SEL09300
00253    94*          IF (JL(K2).EQ.72) JL(K2)=0                                          SEL09400
00255    95*          IPT(II,1)=JL(K2)*4+IL(K1)+1                                         SEL09500
00256    96*          GO TO 100                                                           SEL09600
00257    97*       45 CONTINUE                                                            SEL09700
00262    98*          IF (JL(1).EQ.72) JL(1)=0                                            SEL09800
00264    99*          IPT(II,1)=JL(1)*4+IL(1)+1                                           SEL09900
00265   100*          IPT(II,2)=JL(2)*4+IL(1)+1                                           SEL10000
00266   101*          IPT(II,3)=JL(1)*4+IL(2)+1                                           SEL10100
00267   102*          IPT(II,4)=JL(2)*4+IL(2)+1                                           SEL10200
00270   103*          GO TO 100                                                           SEL10300
00270   104*    C                                                                         SEL10400
00270   105*    C        SOUTHERN HEMISPHERE                                              SEL10500
00270   106*    C                                                                         SEL10600
00271   107*       50 IPT(II,5)=3                                                         SEL10700
00272   108*          L1=XL(II)                                                           SEL10800
00273   109*          L2=YL(II)                                                           SEL10900
00274   110*          IF (ABS(XL(II)).LT.85.0) GO TO 51                                   SEL11000
00276   111*          IPT(II,1)=1                                                         SEL11100
00277   112*          IF (ABS(XL(II)+90.).LT.0.11) GO TO 100                              SEL11200
00301   113*       51 CONTINUE                                                            SEL11300
00302   114*          IL(1)=(L1/5)-1                                                      SEL11400
00303   115*          JL(1)=(L2/5)+1                                                      SEL11500
00304   116*          IL(2)=IL(1)+1                                                       SEL11600
00305   117*          JL(2)=JL(1)-1                                                       SEL11700
00306   118*          DO 52 K1=1,2                                                        SEL11800
00311   119*          DO 52 K2=1,2                                                        SEL11900
00314   120*          IF ((ABS(XL(II)-IL(K1)*5).GT.0.1).OR.(ABS(YL(II)-JL(K2)*5).GT.0.1)SEL12000
00314   121*         1  ) GO TO 52                                                       SEL12100
```

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00316  122*          IF (JL(K2).EQ.72) JL(K2)=0
00320  123*          IPT(II,1)=JL(K2)*17-IL(K1)+1
00321  124*          IF (IL(K).NE.0) GO TO 100
00323  125*          IPT(II,1)=JL(K2)*4+1
00324  126*          IPT(II,5)=1
00325  127*          GO TO 100
00326  128*       52 CONTINUE
00331  129*          IF (JL(1).EQ.72) JL(1)=0
00333  130*          IF (IPT(II,1).EQ.1) GO TO 54
00335  131*          IPT(II,1)=JL(1)*17-IL(1)+1
00336  132*          IPT(II,2)=JL(2)*17-IL(1)+1
00337  133*          IF (IL(2)) 55,53,55
00342  134*       53 IPT(II,3)=JL(1)*4+1
00343  135*          IPT(II,4)=JL(2)*4+1
00344  136*          IPT(II,5)=1133
00345  137*          GO TO 100
00346  138*       54 IPT(II,2)=JL(1)*17-IL(2)+1
00347  139*          IPT(II,3)=JL(2)*17-IL(2)+1
00350  140*          IPT(II,5)=333
00351  141*          GO TO 100
00352  142*       55 CONTINUE
00353  143*          IPT(II,3)=JL(1)*17-IL(2)+1
00354  144*          IPT(II,4)=JL(2)*17-IL(2)+1
00355  145*          GO TO 100
00355  146*    C
00355  147*    C     BODERLINE POINTS
00355  148*    C
00356  149*       70 CONTINUE
00356  150*    C     TWO NMC, TWO EQUATORIAL
00357  151*          IPT(II,5)=2211
00360  152*          L=YL(II)
00361  153*          IPT(II,1)=((L/5)+2)*4
00362  154*          IPT(II,2)=IPT(II,1)-4
00363  155*          IF (L.GE.355) IPT(II,1)=4
00363  156*    C
00365  157*          IF (J.LT.1) J=1
00367  158*          IF (J.GT.51) J=51
00371  159*          IF (I.LT.LIML(J)) I=LIML(J)
00373  160*          IF (I.GT.LIMU(J)) I=LIMU(J)
00375  161*          IC(1)=I*1000+J
00376  162*          IF ((J.LT.15).OR.(J.GT.37)) GO TO 72
00400  163*          IC(2)=I*1000+J+1
00401  164*          GO TO 76
00402  165*       72 IF ((J.NE.1).AND.(J.NE.51)) GO TO 74
00404  166*          IF (I.EQ.LIMU(J)) GO TO 73
00406  167*          IC(2)=(I+1)*1000+J
00407  168*          GO TO 76
00410  169*       73 IC(2)=(I-1)*1000+J
00411  170*          GO TO 76
00412  171*       74 IF (I.EQ.LIML(J)) GO TO 75
00414  172*          IC(2)=LIMU(J+1)*1000+J+1
00415  173*          GO TO 76
00416  174*       75 IC(2)=LIML(J+1)*1000+J+1
00416  175*    C
00417  176*       76 CALL NTRAN (SCRCH2,10)
00420  177*          CALL NTRAN (SCRCH2,20)
00421  178*          DO 77 IPG=1,1977
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SEL12200
SEL12300
SEL12400
SEL12500
SEL12600
SEL12700
SEL12800
SEL12900
SEL13000
SEL13100
SEL13200
SEL13300
SEL13400
SEL13500
SEL13600
SEL13700
SEL13800
SEL13900
SEL14000
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SEL14700
SEL14800
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SEL15700
SEL15800
SEL15900
SEL16000
SEL16100
SEL16200
SEL16300
SEL16400
SEL16500
SEL16600
SEL16700
SEL16800
SEL16900
SEL17000
SEL17100
SEL17200
SEL17300
SEL17400
SEL17500
SEL17600
SEL17700
SEL17800
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00424   179*          CALL NTRAN (SCRCH2,2,1,IJ,L)                    SEL17900
00425   180*          CALL NTRAN (SCRCH2,22)                          SEL18000
00426   181*          DO 77 K=1,2                                     SEL18100
00431   182*       77 IF(IC(K).EQ.IJ) IPT(II,K+2)=IPG                 SEL18200
00435   183*          GO TO 100                                       SEL18300
00435   184*     C                                                    SEL18400
00436   185*       80 CONTINUE                                        SEL18500
00436   186*     C    THREE NMC, ONE EQUATORIAL                       SEL18600
00437   187*          IPT(II,5)=2212                                  SEL18700
00440   188*          IC(2) = 0                                       SEL18800
00441   189*          L=YL(II)                                        SEL18900
00442   190*          IPT(II,2)=((L/5)+1)*4                           SEL19000
00443   191*          IF (L.GE.355) IPT(II,2)=4                       SEL19100
00445   192*          IF (I.EQ.LIML(J)) GO TO 84                      SEL19200
00447   193*          IF (J.GT.37) GO TO 82                           SEL19300
00451   194*          IC(1)=I*1000+J                                  SEL19400
00452   195*          IC(3)=I*1000+J+1                                SEL19500
00453   196*          IC(4)=(I+1)*1000+J+1                            SEL19600
00454   197*          GO TO 88                                        SEL19700
00455   198*       82 IC(1)=(I+1)*1000+J                              SEL19800
00456   199*          IC(3)=I*1000+J                                  SEL19900
00457   200*          IC(4)=I*1000+J+1                                SEL20000
00460   201*          GO TO 88                                        SEL20100
00461   202*       84 IF (J.GT.37) GO TO 86                           SEL20200
00463   203*          IC(1)=(I-1)*1000+J+1                            SEL20300
00464   204*          IC(3)=I*1000+J+1                                SEL20400
00465   205*          IC(4)=I*1000+J                                  SEL20500
00466   206*          GO TO 88                                        SEL20600
00467   207*       86 IC(1)=(I+1)*1000+J+1                            SEL20700
00470   208*          IC(3)=(I+1)*1000+J                              SEL20800
00471   209*          IC(4)=I*1000+J                                  SEL20900
00471   210*     C                                                    SEL21000
00472   211*       88 CALL NTRAN (SCRCH2,10)                          SEL21100
00473   212*          CALL NTRAN (SCRCH2,22)                          SEL21200
00474   213*          DO 89 IPG=1,1977                                SEL21300
00477   214*          CALL NTRAN (SCRCH2,2,1,IJ,L)                    SEL21400
00500   215*          CALL NTRAN (SCRCH2,22)                          SEL21500
00501   216*          DO 89 K=1,4                                     SEL21600
00504   217*          IF(IC(K).EQ.0) GO TO 89                         SEL21700
00506   218*          IF(IC(K).EQ.IJ) IPT(II,K)=IPG                   SEL21800
00510   219*       89 CONTINUE                                        SEL21900
00510   220*     C                                                    SEL22000
00513   221*      100 CONTINUE                                        SEL22100
00515   222*          DO 150 I=1,16                                   SEL22200
00520   223*          DO 150 J=1,5                                    SEL22300
00523   224*      150 IPTN(I,J)=IPT(I,J)                              SEL22400
00526   225*          CALL SORT4(NP)                                  SEL22500
00527   226*          RETURN                                          SEL22600
00530   227*          END                                             SEL22700

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  ******  SETUP  ******
@FOR,S PROFAS,SETUP,SETUP
FOR S11E-02/04/74-18:55:02 (0,)
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SUBROUTINE SETUP ENTRY POINT 002274

STORAGE USED: CODE(1) 002306; DATA(0) 000527; BLANK COMMON(2) 000000

COMMON BLOCKS:

0003 COTRAN 000041
0004 IOTEMP 000030
0005 PDTCOM 012667

EXTERNAL REFERENCES (BLOCK, NAME)

0006 RAND
0007 GETNMC
0010 RTRAN1
0011 RTRAN
0012 NTRAN
0013 RTRAN2
0014 RTERP
0015 INTRUV
0016 NRDU$
0017 NIO2$
0020 NWDU$
0021 XPRI
0022 NERR2$
0023 NIO3$
0024 NIO1$
0025 NSTOP$
0026 NERR3$

STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

0001	000330 100L	0001	001707 1001G	0001	001747 1020G	0001	001764 1027G	0001	002024 1046G
0001	002042 1056G	0001	002043 1061G	0001	000231 12L	0001	000245 13L	0001	000354 130L
0001	000357 140L	0001	000361 150L	0001	000066 2L	0000	000070 20F	0001	000415 200L
0001	000247 216G	0001	000441 230L	0001	000310 236G	0001	000444 240L	0001	000334 246G
0001	000446 250L	0001	000375 266G	0001	000421 276G	0001	000267 30L	0001	000502 300L
0001	000542 308L	0000	000057 310F	0001	000462 316G	0001	000606 320L	0001	000514 330G
0001	000611 330L	0001	000517 333G	0001	000613 340L	0001	000544 345G	0001	000562 356G
0001	000711 360L	0001	000763 368L	0001	001003 370L	0001	001034 375L	0000	000064 380F
0001	001056 385L	0001	001073 390L	0001	000272 40L	0001	001076 400L	0001	000656 405G
0001	001100 410L	0001	000723 421G	0001	000726 424G	0001	000735 427G	0001	001165 430L
0001	001226 440L	0001	001005 445G	0001	001254 460L	0001	001302 462L	0000	000074 465F
0001	001322 467L	0001	001047 470G	0001	001337 470L	0001	001342 475L	0001	001344 480L
0001	001420 490L	0000	000056 5F	0001	000274 50L	0001	001456 500L	0001	001476 510L
0001	001133 516G	0000	000100 520F	0001	001520 525L	0001	001522 527L	0001	001177 532G
0001	001202 535G	0001	001575 535L	0001	001577 537L	0001	001652 545L	0001	001654 547L
0001	001230 550G	0001	001231 553G	0001	001727 555L	0001	001731 557L	0001	001243 563G
0001	002004 565L	0001	001244 566G	0001	002006 567L	0001	001756 576G	0001	002040 600L
0001	001315 620G	0001	002062 623L	0001	002072 621L	0001	002123 623L	0001	002140 626L
0000	000121 630F	0001	001377 640G	0001	001432 657G	0001	001435 662G	0001	002211 666L
0001	001500 676G	0001	000212 7L	0000	000104 700F	0001	001540 716G	0001	001555 725G
0001	001615 744G	0001	001632 753G	0001	001672 772G	0000	000162 9000F	0000	000355 9001F
0005 R	007625 DAQ	0004 R	000004 DD	0005 R	010205 DDQ	0005 R	001257 DG	0005 R	010755 DR

0005 R 003705 DSP	0004 R 000026 H1	0000 I 000043 I	0003 I 000023 IC	0000 I 000005 ID
0000 I 000033 IDA	0000 I 000017 IDAY	0004 I 000024 IDD	0003 I 000040 IEX	0003 I 000025 IH
0000 I 000055 IHR	0000 000506 INJP$	0000 I 000036 IOPQ	0005 I 000002 IOPR	0004 I 000000 IOTEM1
0004 I 000001 IOTEM2	0000 I 000000 IP	0000 I 000052 ISH	0000 I 000012 IT	0004 I 000002 IUG
0000 I 000035 IUQ	0000 I 000034 IUR	0005 I 000000 IU4	0003 I 000026 IX	0004 I 000025 IYR
0000 I 000046 J	0000 I 000054 J10	0000 I 000050 J20	0000 I 000047 K	0000 I 000044 KS
0000 I 000053 L	0000 I 000051 LON	0003 I 000024 MI	0004 I 000023 MN	0005 I 000001 MONTH
0000 I 000041 M1	0000 I 000042 M2	0003 I 000000 NDATA	0004 I 000003 NMCOP	0000 I 000037 NR1
0004 I 000010 NSAME	0005 R 007505 PAQ	0005 R 010065 PDQ	0005 R 000003 PG	0004 000007 PHI
0004 R 000006 PHI1	0004 000027 PHI1R	0005 R 010445 PR	0005 R 002005 PSP	0000 R 000040 R
0006 R 000000 RAND	0004 R 000012 RD1	0004 R 000011 RP1	0004 R 000013 RT1	0004 R 000017 RU1
0004 R 000020 RV1	0004 R 000015 SD1	0004 R 000014 SP1	0004 R 000016 ST1	0004 R 000021 SU1
0004 R 000022 SV1	0005 R 007745 TAQ	0005 R 010325 TDQ	0000 R 000045 TENX	0005 R 000531 TG
0005 R 011265 TR	0005 R 005605 TSP	0005 R 011575 UAQ	0005 R 012035 UDQ	0005 R 012275 UR
0005 R 011715 VAQ	0005 R 012155 VDQ	0005 R 012275 VR	0004 R 000005 XMJD	

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00101     1*          SUBROUTINE SETUP                                                SET00100
00103     2*          COMMON/COTRAN/NDATA(19),IC,MI,IH,IX(10),IEX                     SET00200
00104     3*          DIMENSION IP(5),ID(5),IT(5),IDAY(12)                            SET00300
00105     4*          COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,         SET00400
00105     5*         .          NSAME,RP1, RD1, RT1, SP1, SD1, ST1, RU1, RV1, SU1, SV1,SET00500
00105     6*         $ MN, IDD, IYR, H1, PHI1R                                        SET00600
00106     7*          COMMON/PDTCOM/IU4,MONTH,IOPR,PG(18,19),TG(18,19),DG(18,19)      SET00700
00106     8*         . ,PSP(8,10,12)                                                  SET00800
00106     9*         1,DSP(8,10,12),TSP(8,10,12),PAQ(16,5),DAQ(16,5),TAQ(16,5),PDQ(16,5)SET00900
00106    10*         2 ,DDQ(16,5),TDQ(16,5),PR(20,10),DR(20,10),TR(20,10),UAQ(16,5)  SET01000
00106    11*         3 ,VAQ(16,5),UDQ(16,5),VDQ(16,5),UR(25,10)                      SET01100
00107    12*          DIMENSION VR(25,10)                                            SET01200
00110    13*          EQUIVALENCE (UR(1,1),VR(1,1))                                  SET01300
00111    14*          DATA IDAY/0,31,59,90,120,151,181,212,243,273,304,334/          SET01400
00113    15*          XMJD = 0.                                                      SET01500
00114    16*          IF (MN.GT.12) GO TO 2                                          SET01600
00116    17*          IDA = IDAY(MN) + IDD                                           SET01700
00117    18*          DD = IDA                                                       SET01800
00120    19*          IF (MOD(IYR,4).EQ.0.AND.MN.GT.2) IDA = IDA + 1                 SET01900
00122    20*          XMJD = 2439856. + 365. * (IYR -   68.) + IDA + INT((IYR -   65.)SET02000
00122    21*         $ / 4.)                                                         SET02100
00122    22*     C.....SECOND DATA CARD READS, FREE FIELD, THE FOLLOWING DATA:       SET02200
00122    23*     C         IUG = UNIT NUMBER FOR GROVES DATA TAPE                    SET02300
00122    24*     C         IUR = UNIT NUMBER FOR RANDOM SIGMA DATA                   SET02400
00122    25*     C                (IF IUR=IUG UNIT IUG WILL BE READ)                 SET02500
00122    26*     C         IUQ = UNIT NUMBER FOR QBO DATA                            SET02600
00122    27*     C                (IF IUQ=IUG DATA ON TAPE ON UNIT IUG WILL BE READ) SET02700
00122    28*     C         IU4 = UNIT FOR 4-D INPUT P,D,T 0-25KM DATA                SET02800
00122    29*     C         IOPR = RANDOM OUTPUT OPTION                               SET02900
00122    30*     C.....IOPR=1 RANDOM OUTPUT              IOPR=2 NO RANDOM OUTPUT     SET03000
00122    31*     C         IOPQ = QBO OUTPUT OPTION                                  SET03100
00122    32*     C.....IOPQ=1 QBO OUTPUT                 IOPQ=2 NO QBO OUTPUT        SET03200
00122    33*     C         NR1 = STARTING RANDOM NUMBER                              SET03300
00122    34*     C         NMCOP = NMC GRID DATA READ OPTION                         SET03400
00122    35*     C.....NMCOP=0  READS NMC GRID DATA FROM UNIT IUG, OTHERWISE READS FORMSET03500
00122    36*     C         CARDS                                                     SET03600
00122    37*     C.....IOTEM1=UNIT FOR 4-D P, D, T DATA (SCRATCH FILE, DOES NOT NEED TO SET03700
00122    38*     C         BE ASSIGNED)                                              SET03800
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00122    39*     C.....IOTEM2=UNIT FOR NMC GRID POINTS (SCRATCH FILE, DOES NOT NEED TO   SET03900
00122    40*     C          BE ASSIGNED)                                                 SET04000
00123    41*       2   READ(5,5) IUG,IUR,IUQ,IU4,IOPR,IOPQ,NR1,NMCOP,IOTEM1,IOTEM2      SET04100
00137    42*           WRITE(6,9000) IUG,IUR,IUQ,IU4,IOPR,IOPQ,NR1,NMCOP,IOTEM1,IOTEM2  SET04200
00137    43*          $ ,XMUD                                                           SET04300
00154    44*         5 FORMAT()                                                         SET04400
00155    45*           IF (IOPR.LT.1.OR.IOPR.GT.2) GO TO 666                            SET04500
00157    46*           IF (IOPQ.LT.1.OR.IOPQ.GT.2) GO TO 666                            SET04600
00161    47*           MONTH=MN                                                         SET04700
00162    48*           IF (IOPR.EQ.2) GO TO 7                                           SET04800
00164    49*           R=RAND(NR1)                                                      SET04900
00164    50*     C.....THIRD DATA CARD READS FREE FIELD, THE FOLLOWING DATA:            SET05000
00164    51*     C          RP1 = INITIAL RANDOM PRESSURE PERTURBAIIONS, PERCENT        SET05100
00164    52*     C          RD1 = INITIAL RANDOM DENSITY PERTURBATION, PERCENT          SET05200
00164    53*     C          RT1 = INITIAL RANDOM TEMPERATURE PERTURBATION, PERCENT      SET05300
00164    54*     C          SD1 = INITIAL STANDARD DEVIATION FOR RANDOM DENSITY         SET05400
00164    55*     C                PERTURBATION, PERCENT                                SET05500
00164    56*     C          RU1 = INITIAL EASTWARD WIND PERTURBATION, M/S               SET05600
00164    57*     C          RV1 = INITIAL NORTHWARD WIND PERTURBATION, M/S              SET05700
00164    58*     C          SU1 = INITIAL STANDARD DEVIATION FOR RANDOM EASTWARD WIND, M/S SET05800
00164    59*     C          SV1 = INITIAL STANDARD DEVIATION FOR RANDOM NORTHWARD WIND, M/SSET05900
00165    60*           READ(5,5)  RP1,RD1,RT1,SP1,SD1,ST1,RU1,RV1,SU1,SV1               SET06000
00201    61*         7 IF (NSAME.EQ.1) GO TO 621 Q AVOIDS TAPE SEARCH IF CURRENT MONTH  SET06100
00201    62*     C                               IS SAME AS PREVIOUS MONTH            SET06200
00203    63*           CALL GETNMC                                                      SET06300
00203    64*     C.....LOADS NMC GRID DATA FROM INPUT UNIT TO SCRATCHFILE UNIT IOTEM2    SET06400
00204    65*           IF (MONTH.LT.13) GO TO 12                                        SET06500
00206    66*           M1=13                                                            SET06600
00207    67*           M2=13                                                            SET06700
00207    68*     C.....MONTH=13 IS ANNUAL AVERAGE CASE                                  SET06800
00210    69*           GO TO 13                                                         SET06900
00211    70*        12 M1=MONTH                                                         SET07000
00212    71*           M2=MONTH + 6                                                     SET07100
00212    72*     C.....SOUTHERN HEMISPHERE DATA IS 6 MONTHS DISPLACED FOR GROVES,       SET07200
00212    73*     C          STATIONARY PERTURBATIONS, AND RANDOM PERTURBATIONS         SET07300
00213    74*           IF (M2.GT.12) M2=M2 - 12                                         SET07400
00215    75*        13 DO 100 I=1,234                                                   SET07500
00220    76*        15 CALL RTRAN1                                                      SET07600
00220    77*     C.....READS GROVES PRESSURE DATA                                       SET07700
00221    78*           IF (IC.NE.'P') GO TO 666                                         SET07800
00223    79*           IF (MI.EQ.M1) GO TO 30                                           SET07900
00225    80*           IF (MI.EQ.M2) GO TO 40                                           SET08000
00227    81*           GO TO 100                                                        SET08100
00230    82*        30 KS=1                                                             SET08200
00231    83*           GO TO 50                                                         SET08300
00232    84*        40 KS=-1                                                            SET08400
00233    85*        50 IH=(IH-20)/5                                                     SET08500
00234    86*           TENX=10.**IEX                                                    SET08600
00235    87*           DO 60 J=1,10                                                     SET08700
00240    88*           K=10+KS*(J-1)                                                    SET08800
00241    89*        60 PG(IH,K) = IX(J)*TENX                                            SET08900
00241    90*     C.....CONVERSION TO REAL AND STORAGE IN ARRAY COMPLETE                 SET09000
00243    91*       100 CONTINUE                                                        SET09100
00245    92*           DO 200 I=1,234                                                   SET09200
00250    93*       115 CALL RTRAN1                                                     SET09300
00250    94*     C.....READS GROVES DENSITY DATA                                        SET09400
00251    95*           IF(IC.NE.'D') GO TO 666                                          SET09500
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00253    96*          IF (MI.EQ.M1) GO TO 130                                    SET09600
00255    97*          IF (MI.EQ.M2) GO TO 140                                    SET09700
00257    98*          GO TO 200                                                  SET09800
00260    99*      130 KS=1                                                       SET09900
00261   100*          GO TO 150                                                  SET10000
00262   101*      140 KS=-1                                                      SET10100
00263   102*      150 IH=(IH-20)/5                                               SET10200
00264   103*          TENX=10.**IEX                                              SET10300
00265   104*          DO 160 J=1,10                                              SET10400
00270   105*          K=10+KS*(J-1)                                              SET10500
00271   106*      160 DG(IH,K) = IX(J)*TENX                                      SET10600
00271   107*    C.....CONVERSION TO REAL AND STORAGE IN ARRAY COMPLETE           SET10700
00273   108*      200 CONTINUE                                                   SET10800
00275   109*          DO 300 I=1,234                                             SET10900
00300   110*      215 CALL RTRAN1                                                SET11000
00300   111*    C.....READS GROVES TEMPERATURE DATA                              SET11100
00301   112*          IF (IC.NE.'T') GO TO 666                                   SET11200
00303   113*          IF (MI.EQ.M1) GO TO 230                                    SET11300
00305   114*          IF (MI.EQ.M2) GO TO 240                                    SET11400
00307   115*          GO TO 300                                                  SET11500
00310   116*      230 KS=1                                                       SET11600
00311   117*          GO TO 250                                                  SET11700
00312   118*      240 KS=-1                                                      SET11800
00313   119*      250 IH=(IH-20)/5                                               SET11900
00314   120*          TENX=10.**IEX                                              SET12000
00315   121*          DO 260 J=1,10                                              SET12100
00320   122*          K=10+KS*(J-1)                                              SET12200
00321   123*      260 TG(IH,K) = IX(J)*TENX                                      SET12300
00321   124*    C.....CONVERSION TO REAL AND STORAGE IN ARRAY COMPLETE           SET12400
00323   125*      300 CONTINUE                                                   SET12500
00325   126*          IF (MONTH.LT.13) GO TO 308                                 SET12600
00325   127*    C.....ANNUAL MEAN CASE - BOTH HEMISPHERES EQUAL                  SET12700
00327   128*          DO 304 I=1,18                                              SET12800
00332   129*          DO 304 J=1,9                                               SET12900
00335   130*          J20=20-J                                                   SET13000
00336   131*          PG(I,J)=PG(I,J20)                                          SET13100
00337   132*          DG(I,J)=DG(I,J20)                                          SET13200
00340   133*          TG(I,J)=TG(I,J20)                                          SET13300
00341   134*      304 CONTINUE                                                   SET13400
00344   135*      308 DO 360 I=1,1248                                            SET13500
00347   136*      310 FORMAT (1X,A1,I2,I3,I5,2(5I4,4X),5I4)                      SET13600
00350   137*          CALL RTRAN(19)                                             SET13700
00350   138*    C.....READS STATIONARY PERTURBATIONS DATA (TO BE STORED IN PSP, DSP, ANDSET13800
00350   139*    C         TSP ARRAYS)                                            SET13900
00351   140*          IC=NDATA(1)                                                SET14000
00352   141*          MI=NDATA(2)                                                SET14100
00353   142*          IH=NDATA(3)                                                SET14200
00354   143*          LON=NDATA(4)                                               SET14300
00355   144*          DO 311 K=1,5                                               SET14400
00360   145*          IP(K)=NDATA(4+K)                                           SET14500
00361   146*          ID(K)=NDATA(9+K)                                           SET14600
00362   147*      311 IT(K)=NDATA(14+K)                                          SET14700
00364   148*          IF (IC.NE.'S') GO TO 666                                   SET14800
00366   149*          IF (MI.EQ.M1) GO TO 320                                    SET14900
00370   150*          IF (MI.EQ.M2) GO TO 330                                    SET15000
00372   151*          GO TO 360                                                  SET15100
00373   152*      320 KS=1                                                       SET15200
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00374   153*          GO TO 340                                                    SET15300
00375   154*      330 KS=-1                                                        SET15400
00376   155*      340 ISH=2+(IH-44)/8                                              SET15500
00377   156*          L=(LON+20)/30                                                SET15600
00400   157*          IF(IH.LT.52) ISH = (IH-20)/10                                SET15700
00402   158*          IF (IH.GT.84) ISH=8                                          SET15800
00404   159*          DO 350 J=1,5                                                 SET15900
00407   160*          K=5+KS*(J+(KS-1)/2)                                          SET16000
00410   161*          PSP(ISH,K,L) = IP(J)/1000.                                   SET16100
00411   162*          DSP(ISH,K,L) = ID(J)/1000.                                   SET16200
00412   163*      350 TSP(ISH,K,L) = IT(J)/1000.                                   SET16300
00412   164*    C.....CONVERSION TO REAL AND STORAGE IN ARRAYS COMPLETE            SET16400
00414   165*      360 CONTINUE                                                     SET16500
00416   166*          IF (MONTH.LT.13) GO TO 368                                   SET16600
00416   167*    C.....ANNUAL MEAN CASE - BOTH HEMISPHERES EQUAL                    SET16700
00420   168*          DO 364 I=1,8                                                 SET16800
00423   169*          DO 364 K=1,12                                                SET16900
00426   170*          DO 364 J=1,5                                                 SET17000
00431   171*          J10=11-J                                                     SET17100
00432   172*          PSP(I,J,K)=PSP(I,J10,K)                                      SET17200
00433   173*          DSP(I,J,K)=DSP(I,J10,K)                                      SET17300
00434   174*          TSP(I,J,K)=TSP(I,J10,K)                                      SET17400
00435   175*      364 CONTINUE                                                     SET17500
00441   176*      368 CALL NTRAN(IUG,8,1)     @.....,MOVES PAST 2ND EOF ON UNIT IUG SET17600
00442   177*          CALL NTRAN(IUG,22)                                           SET17700
00443   178*          GO TO (370,440),IOPR                                         SET17800
00443   179*    C.....IOPR=1 READS RANDOM SIGMAS,  IOPR=2 ZEROS RANDOM SIGMAS      SET17900
00444   180*      370 DO 430 I=1,260                                               SET18000
00447   181*          IF (IUR.EQ.IUG) GO TO 375                                    SET18100
00451   182*          READ (IUR,380) IC,MI,IH,IP,ID,IT                             SET18200
00451   183*    C.....USES FORTRAN READ ON UNIT IUR IF IUR NEQ IUG                 SET18300
00461   184*      380 FORMAT (1X,A1,I2,I4,3(1X,5I4))                               SET18400
00462   185*          GO TO 385                                                    SET18500
00463   186*      375 CALL RTRAN(18)                                               SET18600
00463   187*    C.....USES NTRAN READ ON UNIT IUG IF IUR = IUG                     SET18700
00464   188*          IC=NDATA(1)                                                  SET18800
00465   189*          MI=NDATA(2)                                                  SET18900
00466   190*          IH=NDATA(3)                                                  SET19000
00467   191*          DO 381 K=1,5                                                 SET19100
00472   192*          IP(K)=NDATA(3+K)                                             SET19200
00473   193*          ID(K)=NDATA(8+K)                                             SET19300
00474   194*      381 IT(K)=NDATA(13+K)                                            SET19400
00476   195*      385 IF (IC.NE.'R') GO TO 666                                     SET19500
00500   196*       20 FORMAT (1X,A1,I3,I4,1X,11I5)                                 SET19600
00501   197*          IF (MI.EQ.M1) GO TO 390     @.....M1 = NORTHERN HEMISPHERE MONTH SET19700
00503   198*          IF (MI.EQ.M2) GO TO 400     @.....M2 = SOUTHERN HEMISPHERE MONTH SET19800
00503   199*    C.....M2 = M1 + 6   UNLESS M1 = M2 = 13                            SET19900
00505   200*          GO TO 430                                                    SET20000
00506   201*      390 KS=1                                                         SET20100
00507   202*          GO TO 410                                                    SET20200
00510   203*      400 KS=-1                                                        SET20300
00511   204*      410  IF (IH.LT.95) IHR=(IH-20)/5                                SET20400
00513   205*          IF (IH.GE.95) IHR = 14 + (IH - 80) / 20 @.....IHR = HEIGHT INDEX SET20500
00515   206*          DO 420 J=1,5                                                 SET20600
00520   207*          K = 5 + KS * (J + (KS - 1) / 2)                              SET20700
00520   208*    C.....K = LATITUDE INDEX 1-5 = LAT -90 TO -10, 6-10 = LAT +10 TO +90 SET20800
00521   209*          PR(IHR,K) = IP(J)/1000.                                      SET20900
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00522  210*          DR(IHR,K) = ID(J)/1000.                                  SET21000
00523  211*      420 TR(IHR,K) = IT(J)/1000.                                  SET21100
00525  212*      430 CONTINUE                                                 SET21200
00527  213*          IF (MONTH.LT.13) GO TO 460                               SET21300
00527  214*     C.....ANNUAL MEAN CASE - BOTH HEMISPHERES EQUAL               SET21400
00531  215*          DO 435 I=1,20                                            SET21500
00534  216*          DO 435 J=1,5                                             SET21600
00537  217*          J10=11-J                                                 SET21700
00540  218*          PR(I,J)=PR(I,J10)                                        SET21800
00541  219*          DR(I,J)=DR(I,J10)                                        SET21900
00542  220*          TR(I,J)=TR(I,J10)                                        SET22000
00543  221*      435 CONTINUE                                                 SET22100
00546  222*          GO TO 460                                                SET22200
00547  223*      440 DO 450 I=1,20                                            SET22300
00552  224*          DO 450 J=1,10                                            SET22400
00555  225*          PR(I,J) = 0.                                             SET22500
00556  226*          DR(I,J) = 0.                                             SET22600
00557  227*      450 TR(I,J) = 0.                                             SET22700
00557  228*     C.....RANDOM SIGMAS ARE ZEROED IF IOPR=2                      SET22800
00562  229*          DO 455 I=1,25                                            SET22900
00565  230*          DO 455 J=1,10                                            SET23000
00570  231*          UR(I,J)=0.                                               SET23100
00571  232*      455 VR(I,J) = 0.                                             SET23200
00574  233*          GO TO 500                                                SET23300
00575  234*      460 DO 490 I=1,325                                           SET23400
00600  235*          IF (IUR.EQ.IUG) GO TO 462                                SET23500
00602  236*          READ(IUR,465) IC,MI,IH,IP,ID                             SET23600
00602  237*     C.....READS RANDOM WIND STANDARD DEVIATIONS WITH FORTRAN READ FROM SET23700
00602  238*     C         UNIT IUR IF IUR NEQ IUG                             SET23800
00611  239*      465 FORMAT(1X,A2,I2,I4,2(1X,5I4))                            SET23900
00612  240*          GO TO 467                                                SET24000
00613  241*      462 CALL RTRAN(13)                                           SET24100
00613  242*     C.....USES NTRAN READ FROM UNIT IUG IF IUR = IUG              SET24200
00614  243*          IC=NDATA(1)                                              SET24300
00615  244*          MI=NDATA(2)                                              SET24400
00616  245*          IH=NDATA(3)                                              SET24500
00617  246*          DO 461 K=1,5                                             SET24600
00622  247*          IP(K)=NDATA(3+K)                                         SET24700
00623  248*      461 ID(K)=NDATA(8+K)                                         SET24800
00625  249*      467 IF (IC.NE.'RW') GO TO 666                                SET24900
00627  250*          IF (MI.EQ.M1) GO TO 470      @.....NORTHERN HEMISPHERE MONTH SET25000
00631  251*          IF (MI.EQ.M2) GO TO 475      @.....SOUTHERN HEMISPHERE MONTH SET25100
00633  252*          GO TO 490                                                SET25200
00634  253*      470 KS=1                                                     SET25300
00635  254*          GO TO 480                                                SET25400
00636  255*      475 KS=-1                                                    SET25500
00637  256*      480 IF (IH.LT.95) IHR=1+IH/5                                 SET25600
00641  257*          IF (IH.GE.95) IHR=19+(IH-80)/20  @.....HEIGHT INDEX      SET25700
00643  258*          DO 485 J=1,5                                             SET25800
00646  259*          K=5+KS*(J+(KS-1)/2)     @.....LATITUDE INDEX             SET25900
00647  260*          UR(IHR,K)=IP(J)*1.                                       SET26000
00650  261*      485 VR(IHR,K)=ID(J)*1.                                       SET26100
00652  262*      490 CONTINUE                                                 SET26200
00654  263*          IF (MONTH.LT.13) GO TO 500                               SET26300
00654  264*     C.....ANNUAL MEAN CASE - BOTH HEMISPHERES EQUAL               SET26400
00656  265*          DO 495 I=1,25                                            SET26500
00661  266*          DO 495 J=1,5                                             SET26600
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00664   267*          J10=11-J                                                  SET26700
00665   268*          UR(I,J)=UR(I,J10)                                         SET26800
00666   269*          VR(I,J)=VR(I,J10)                                         SET26900
00667   270*        495 CONTINUE                                                SET27000
00672   271*        500 CALL NTRAN(IUG,8,1)     S.....VE ES PAST 3RD EOF ON UNIT IUG  SET27100
00673   272*          CALL NTRAN(IUG,22)                                        SET27200
00674   273*          GO TO (510,600),IOPQ                                      SET27300
00674   274*      C.....IOPQ=1 READS QBO PARAMETERS,  IOPQ=2 ZEROS THESE PARAMETERS  SET27400
00675   275*        510 DO 530 I=1,16                                           SET27500
00700   276*          IF (IUQ.EQ.IUG) GO TO 525                                 SET27600
00702   277*          READ(IUQ,520) IC,IH,IX                                    SET27700
00702   278*      C.....READS WITH FORTRAN FROM UNIT IUQ IF IUQ NEQ IUG         SET27800
00707   279*        520 FORMAT (1X,A2,I3,5(I4,I5))                              SET27900
00710   280*          GO TO 527                                                 SET28000
00711   281*        525 CALL RTRAN2                                             SET28100
00711   282*      C.....READS WITH NTRAN FROM UNIT IUG IF IUQ = IUG             SET28200
00712   283*        527 IF (IC.NE.'QP') GO TO 666                               SET28300
00714   284*          IH = (IH-10)/5                                            SET28400
00715   285*          DO 530 J=1,5                                              SET28500
00715   286*      C.....CONVERT FROM INTEGER PER MIL - QBO PRESSURE AMPLITUDE   SET28600
00720   287*          PAQ(IH,J) = IX(2*J-1)/1000.                               SET28700
00720   288*      C.....QBO PRESSURE PHASE (DAYS PAST JAN 0, 1966)              SET28800
00721   289*        530 PDQ(IH,J) = IX(2*J)*1.                                  SET28900
00724   290*          DO 540 I=1,16                                             SET29000
00727   291*          IF (IUQ.EQ.IUG) GO TO 535                                 SET29100
00731   292*          READ (IUQ,520) IC,IH,IX                                   SET29200
00736   293*          GO TO 537                                                 SET29300
00737   294*        535 CALL RTRAN2                                             SET29400
00740   295*        537 IF (IC.NE.'QD') GO TO 666                               SET29500
00742   296*          IH=(IH-10)/5                                              SET29600
00743   297*          DO 540 J=1,5                                              SET29700
00743   298*      C...CONVERT FROM INTEGER PER MIL - QBO DENSITY AMPLITUDE      SET29800
00746   299*          DAQ(IH,J) = IX(2*J-1)/1000.                               SET29900
00746   300*      C.....QBO DENSITY PHASE (DAYS PAST JAN 0, 1966)               SET30000
00747   301*        540 DDQ(IH,J)=IX(2*J)*1.                                    SET30100
00752   302*          DO 550 I=1,16                                             SET30200
00755   303*          IF (IUQ.EQ.IUG) GO TO 545                                 SET30300
00757   304*          READ (IUQ,520) IC,IH,IX                                   SET30400
00764   305*          GO TO 547                                                 SET30500
00765   306*        545 CALL RTRAN2                                             SET30600
00766   307*        547 IF (IC.NE.'QT') GO TO 666                               SET30700
00770   308*          IH = (IH-10)/5                                            SET30800
00771   309*          DO 550 J=1,5                                              SET30900
00771   310*      C.....CONVERTS FROM INTEGER PER MIL - QBO TEMPERATURE AMPLITUDE  SET31000
00774   311*          TAQ(IH,J) = IX(2*J-1)/1000.                               SET31100
00774   312*      C.....QBO TEMPERATURE PHASE                                   SET31200
00775   313*        550 TDQ(IH,J) = IX(2*J)*1.                                  SET31300
01000   314*          DO 560 I=1,16                                             SET31400
01003   315*          IF (IUQ.EQ.IUG) GO TO 555                                 SET31500
01003   316*      C.....READS WITH FORTRAN IF IUQ NEQ IUG                       SET31600
01005   317*          READ(IUQ,520) IC,IH,IX                                    SET31700
01012   318*          GO TO 557                                                 SET31800
01013   319*        555 CALL RTRAN2                                             SET31900
01013   320*      C.....READS WITH NTRAN IF IUQ = IUG                           SET32000
01014   321*        557 IF (IC.NE.'QU') GO TO 666                               SET32100
01016   322*          IH=(IH-10)/5                                              SET32200
01017   323*          DO 560 J=1,5                                              SET32300
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01017   324*     C.....EASTWARD WIND QBO AMPLITUDE - CONVERTED TO M/S                  SET32400
01022   325*          UAQ(IH,J) = IX(2 * J - 1) / 10.                                  SET32500
01022   326*     C.....EASTWARD WIND QBO PHASE (DAYS PAST JAN 0, 1966)                 SET32600
01023   327*       560 UDQ(IH,J)=IX(2*J)*1.                                           SET32700
01026   328*          DO 570 I=1,16                                                    SET32800
01031   329*           IF (IUQ.EQ.IUG) GO TO 565                                       SET32900
01033   330*          READ(IUQ,520) IC,IH,IX                                           SET33000
01040   331*          GO TO 567                                                        SET33100
01041   332*       565 CALL RTRAN2                                                     SET33200
01042   333*       567 IF (IC.NE.'QV') GO TO 666                                       SET33300
01044   334*          IH=(IH-10)/5                                                     SET33400
01045   335*          DO 570 J=1,5                                                     SET33500
01045   336*     C.....NORTHWARD WIND QBO AMPLITUDE - CONVERTED TO M/S                 SET33600
01050   337*          VAQ(IH,J) = IX(2 * J - 1) / 10.                                  SET33700
01050   338*     C.....NORTHWARD WIND QBO PHASE (DAYS PAST JAN 0,1966)                 SET33800
01051   339*       570 VDQ(IH,J)=IX(2*J)*1.                                           SET33900
01054   340*          GO TO 620                                                        SET34000
01055   341*       600 DO 610 I=1,16                                                   SET34100
01060   342*          DO 610 J=1,5                                                     SET34200
01063   343*          PAQ(I,J) = 0.                                                    SET34300
01064   344*          DAQ(I,J) = 0.                                                    SET34400
01065   345*          TAQ(I,J) = 0.                                                    SET34500
01066   346*          PDQ(I,J) = 0.                                                    SET34600
01067   347*          DDQ(I,J) = 0.                                                    SET34700
01070   348*          TDQ(I,J) = 0.                                                    SET34800
01071   349*          UAQ(I,J)=0.                                                      SET34900
01072   350*          UDQ(I,J)=0.                                                      SET35000
01073   351*          VAQ(I,J)=0.                                                      SET35100
01074   352*          VDQ(I,J)=0.                                                      SET35200
01075   353*       610 CONTINUE                                                        SET35300
01075   354*     C.....ZEROS QBO PARAMETERS IF IOPQ = 2                                SET35400
01100   355*       620 CALL NTRAN(IUG,10)     Q.....REWINDS TAPE UNIT IUG             SET35500
01101   356*          CALL NTRAN(IUG,22)                                               SET35600
01102   357*        621 IF (SP1*SD1*ST1.GT.0.) GO TO 623                               SET35700
01104   358*          CALL RTERP(H1,PHI1,PR,DR,TR,SP1,SD1,ST1)                         SET35800
01105   359*          SP1 = SP1 * 100.                                                 SET35900
01106   360*          SD1 = SD1 * 100.                                                 SET36000
01107   361*          ST1 = ST1 * 100.                                                 SET36100
01110   362*        623 IF (SU1*SV1.GT.0.) GO TO 626                                   SET36200
01112   363*          CALL INTRUV(UR,VR,H1,PHI1,SU1,SV1)                               SET36300
01113   364*        626 WRITE(6,9001) RP1,RD1,RT1,SP1,SD1,ST1,RU1,RV1,SU1,SV1          SET36400
01127   365*          RP1=RP1/100.                                                     SET36500
01130   366*          RD1=RD1/100.                                                     SET36600
01131   367*          RT1=RT1/100.                                                     SET36700
01132   368*          SP1=SP1/100.                                                     SET36800
01133   369*          SD1=SD1/100.                                                     SET36900
01134   370*          ST1=ST1/100.                                                     SET37000
01135   371*          WRITE(6,630)                                                     SET37100
01137   372*          RETURN                                                           SET37200
01140   373*        666 WRITE(6,700) IUG,IUR,IUQ,IOPR,IOPQ,NR1,NMCOP,IOTEM1,IOTEM2,    SET37300
01140   374*           $MONTH,IC,MI,IH,IX,IEX,IP,ID,IT,SD1                           SET37400
01165   375*        700 FORMAT(' ERROR IN SETUP INPUT',/,1X,5I3,I10,4I3,A2,I3,I4,/,11I4,SET37500
01165   376*           $/,15I4,/,F10.1)                                              SET37600
01166   377*          STOP                                                           SET37700
01167   378*        630 FORMAT(27X,'UNPERTURBED (MONTHLY MEAN)',9X,'MEAN PLUS PERTURBATIONSET37800
01167   379*           1S',8X,'THERMAL',/,24X,2(32('-'),2X),3X,'WIND',7X,'PERTURBATION VALSET37900
01167   380*           2UES',/,'  HEIGHT   LAT    WEST   PRES,  DENS,   TEMP  GEOSTROPH.  SET38000
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01167    381*          3 PRES.  DENS.   TEMP      TOTAL      SHEAR',/,3X,'(KM)',11X,'LON', SET38050
01167    382*          44X,'(NT/   (KG/    (DEG  WIND (M/S)    (NT/   (KG/    (DEG  WIND (MSET38100
01167    383*          5/S)  (M/S/KM)  ',28('-'),/,'  TIME     (DEG)  (DEG)',2('   N**2)  MSET38200
01167    384*          6**3)   KEL-  ',10('-')),2X,8('-'),'   P     D     T     U     V',/,' SET38300
01167    385*          7(SEC)',33X,'VIN)   E-W   N-S',18X,'VIN)   E-W   N-S   E-W   N-S  (%)SET38400
01167    386*          8  (%)  (%)  M/S  M/S'/)                                            SET38500
01170    387*     9000 FORMAT('  GROVES INPUT UNIT = ',I2,T43,'RANDOM INPUT UNIT = ',I2, SET38600
01170    388*          1T83,'Q80 INPUT UNIT = ',I2,/,'  4-D INPUT UNIT = ',I2,T43,'RANDOM SET38700
01170    389*          2OPTION = ',I2,T83,'Q80 OPTION = ',I2,/,'  FIRST RANDOM NUMBER = ',SET38800
01170    390*          2I5,                                                               SET38900
01170    391*          3/,'  NMC READ OPTION = ',I2,T43,'4-D P,D,T DATA SCRATCH UNIT = ', SET39000
01170    392*          4I2,/,'  NMC GRID POINTS SCRATCH UNIT = ',I2,T43,'JULIAN DATE = ', SET39100
01170    393*          5F9.1,/)                                                           SET39200
01171    394*     9001 FORMAT('  INITIAL P,D,T = ',3(F6.2,' %   '),T60,'SIGMA P,D,T = ', SET39300
01171    395*          13(F6.2,' %   '),/,'  INITIAL U,V = ',2(F7.2,' M/S   '),T60,'SIGMA SET39400
01171    396*          2U,V = ',2(F7.2,' M/S   '),///'  ** PERCENT DEVIATIONS FROM 1962 US SET39450
01171    397*          3STANDARD ATMOSPHERE APPEAR BELOW PRESSURE, DENSITY, AND TEMPERATURSET39500
01171    398*          4E VALUES **'///)                                                  SET39550
01172    399*           END                                                               SET39600

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  ******  SORT4  ******
@FOR,S PROFAS.SORT4,SORT4
FOR S11E-02/04/74-18:55:17 (0,)

   SUBROUTINE SORT4     ENTRY POINT 000354

   STORAGE USED: CODE(1) 000370; DATA(0) 000035; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   ORDER  000423

   EXTERNAL REFERENCES (BLOCK, NAME)

    0004   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000204 10L      0001   000005 105G     0001   000225 11L      0001   000006 110G     0001   000016 116G
    0001   000265 12L      0001   000326 13L      0001   000333 14L      0001   000065 142G     0001   000104 153G
    0001   000061 2L       0001   000207 207G     0001   000216 212G     0001   000234 222G     0001   000237 225G
    0001   000075 3L       0001   000100 4L       0001   000114 5L       0001   000117 6L       0001   000136 7L
    0001   000155 8L       0001   000202 9L       0000 I 000000 I        0000 I 000006 II       0000   000011 INJP$
    0003 I 000000 IPT      0000 I 000002 IR       0003 I 000120 IREAD    0000 I 000001 J        0000 I 000007 JJ
    0000 I 000003 K        0000 I 000004 L        0000 I 000005 P


00101      1*          SUBROUTINE SORT4(NP)                                    SOR00100
00101      2*     C                                                            SOR00200
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00101     3*     C            SORTS POINTS FOR SEQUENTIAL TAPE READING                SOR00300
00101     4*     C                                                                    SOR00400
00101     5*     C       ASSIGNS POINT NUMBERS BY ORDER ON TAPE, NOT BY GRID          SOR00500
00101     6*     C                                                                    SOR00600
00103     7*           COMMON /ORDER/ IPT (16,5),IREAD(65,3)                          SOR00700
00103     8*     C                                                                    SOR00800
00104     9*           DO 1 I=1,65                                                    SOR00900
00107    10*           DO 1 J=1,3                                                     SOR01000
00112    11*         1 IREAD(I,J)=0                                                   SOR01100
00115    12*           DO 9 I=1,NP                                                    SOR01200
00120    13*           IF(IPT(I,5).LT.1) GO TO 10                                     SOR01300
00122    14*           IF(IPT(I,5).EQ.1) GO TO 9                                      SOR01400
00124    15*           IF(IPT(I,5).EQ.2) GO TO 2                                      SOR01500
00126    16*           IF(IPT(I,5).EQ.3) GO TO 4                                      SOR01600
00130    17*           IF(IPT(I,5).EQ.1133)GO TO 6                                    SOR01700
00132    18*           IF(IPT(I,5).EQ.2211) GO TO 7                                   SOR01800
00134    19*           IF(IPT(I,5).EQ.2212)GO TO 8                                    SOR01900
00136    20*           IF (IPT(I,5).EQ.333) GO TO 4                                   SOR02000
00140    21*           GO TO 10                                                       SOR02100
00141    22*         2 DO 3 J=1,4                                                     SOR02200
00144    23*           IF(IPT(I,J).LT.1) GO TO 3                                      SOR02300
00146    24*           IPT(I,J)=IPT(I,J)+288                                          SOR02400
00147    25*         3 CONTINUE                                                       SOR02500
00151    26*           GO TO 9                                                        SOR02600
00152    27*         4 DO 5 J=1,4                                                     SOR02700
00155    28*           IF(IPT(I,J).LT.1) GO TO 5                                      SOR02800
00157    29*           IPT(I,J)=IPT(I,J)+2265                                         SOR02900
00160    30*         5 CONTINUE                                                       SOR03000
00162    31*           GO TO 9                                                        SOR03100
00163    32*         6 IF(IPT(I,1).GT.0)IPT(I,1)=IPT(I,1)+2265                        SOR03200
00165    33*           IF(IPT(I,2).GT.0)IPT(I,2)=IPT(I,2)+2265                        SOR03300
00167    34*           GO TO 9                                                        SOR03400
00170    35*         7 IF(IPT(I,3).GT.0)IPT(I,3)=IPT(I,3)+288                         SOR03500
00172    36*           IF(IPT(I,4).GT.0)IPT(I,4)=IPT(I,4)+288                         SOR03600
00174    37*           GO TO 9                                                        SOR03700
00175    38*         8 IF(IPT(I,1).GT.0)IPT(I,1)=IPT(I,1)+288                         SOR03800
00177    39*           IF(IPT(I,3).GT.0)IPT(I,3)=IPT(I,3)+288                         SOR03900
00201    40*           IF(IPT(I,4).GT.0)IPT(I,4)=IPT(I,4)+288                         SOR04000
00203    41*         9 CONTINUE                                                       SOR04100
00203    42*     C                                                                    SOR04200
00203    43*     C       REORDERS POINT NUMBERS FOR READ                              SOR04300
00203    44*     C                                                                    SOR04400
00205    45*        10 IR=0                                                           SOR04500
00206    46*           DO 13 K=1,NP                                                   SOR04600
00211    47*           DO 13 L=1,4                                                    SOR04700
00214    48*           MP=IPT(K,L)                                                    SOR04800
00215    49*           IF(MP.LT.1) GO TO 13                                           SOR04900
00217    50*        11 II=K                                                           SOR05000
00220    51*           JJ=L                                                           SOR05100
00221    52*           DO 12 I=1,NP                                                   SOR05200
00224    53*           DO 12 J=1,4                                                    SOR05300
00227    54*           IF (IPT(I,J).LT.1) GO TO 12                                    SOR05400
00231    55*           IF(IPT(I,J).GT.3490) GO TO 12                                  SOR05500
00233    56*           IF(IPT(I,J).GE.MP) GO TO 12                                    SOR05600
00235    57*           II=I                                                           SOR05700
00236    58*           JJ=J                                                           SOR05800
00237    59*           MP=IPT(I,J)                                                    SOR05900
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00240     60*        12 CONTINUE                                          S0R06000
00243     61*           IF(IPT(II,JJ),GT,3490) GO T  14                   S0R06100
00245     62*           IR=IR+1                                           S0R06200
00246     63*           IREAD(IR,1)=II                                    S0R06300
00247     64*           IREAD(IR,2)=JJ                                    S0R06400
00250     65*           IREAD(IR,3)=IPT(II,JJ)                            S0R06500
00251     66*           IPT(II,JJ)=IPT(II,JJ)+9000                        S0R06600
00252     67*           MP=IPT(K,L)                                       S0R06700
00253     68*           IF(MP,GT,3490) GO  O 13                           S0R06800
00255     69*           GO TO 11                                          S0R06900
00256     70*        13 CONTINUE                                          S0R07000
00261     71*        14 RETURN                                            S0R07100
00262     72*           END                                               S0R07200

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  ******  STDATM  ******
@FOR,S PROFAS.STDATM,STDATM
FOR S11E-02/04/74-18:55:31 (0,)

   SUBROUTINE STDATM    ENTRY POINT 000452

   STORAGE USED: CODE(1) 000502; DATA(0) 000327; BLANK COMMON(2) 000000

   EXTERNAL REFERENCES (BLOCK, NAME)

    0003   EXP
    0004   XPRR
    0005   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001   000167 12L      0001   000214 13L      0001   000030 131G     0001   000225 162G     0001   000427 25L
    0001   000051 5L       0001   000223 6L       0001   000254 8L       0001   000246 81L      0000 R 000266 A
    0000 R 000261 AO       0000 R 000263 A1       0000 R 000262 A2       0000 R 000267 B        0000 R 000256 G
    0000 R 000257 GM       0000 R 000242 GO       0000 R 000255 HM       0000 R 000254 HT       0000 I 000240 I
    0000   000305 INJP$    0000 R 000170 PS       0000 R 000241 RO       0000 R 000246 ROM      0000 R 000244 RS
    0000 R 000265 S        0000 R 000264 TK       0000 R 000270 TM       0000 R 000250 TMS      0000 R 000253 WM
    0000 R 000243 WMO      0000 R 000120 WMS      0000 R 000247 ZL       0000 R 000251 ZLM      0000 R 000245 ZM
    0000 R 000260 ZMID     0000 R 000000 ZS       0000 R 000250 ZU       0000 R 000252 ZUM

00101      1*          SUBROUTINE STDATM(Z,T,P,D)                         STD001
00103      2*          DIMENSION ZS(40),TMS(40),WMS(40),PS(40)            STD005
00104      3*          DATA(ZS(I),TMS(I),WMS(I),PS(I),I=1,18)/            STD009
00104      4*         10.,288.15,28.9644,1.01325E+3,                      STD015
00104      5*         111.019,216.65,28.964,2.26320E+2,                   STD020
00104      6*         120.063,216.65,28.9644,5.47487E+1,                  STD025
00104      7*         132.162,228.65,28.9644,8.68014,                     STD030
00104      8*         147.35,270.65,28.9644,1.10905,                      STD035
00104      9*         152.429,270.65,28.9644,5.90005E-1,                  STD040
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00104    10*      161.591,252.65,28.9644,1.82099E-1,                                STD045
00104    11*      179.944,180.65,28.9644,1.0377E-2,                                 STD050
00104    12*      190.,180.65,28.9644,1.6438E-3,                                    STD055
00104    13*      195.,0.,    28.94,     0.,                                        STD060
00104    14*      1100.,210.65,28.88,3.0075E-4,                                     STD065
00104    15*      1105.,  0. , 28.75,    0.,                                        STD070
00104    16*      1110.,260.65,28.56,7.3544E-5,                                     STD075
00104    17*      1115.,  0.,  28.32,    0.,                                        STD080
00104    18*      1120.,360.65,29.07,2.5217E-5,                                     STD085
00104    19*      1135.,  0.,  27.37,    0.,                                        STD090
00104    20*      1150.,960.65,26.92,5.0617E-6,                                     STD095
00104    21*      1155.,   0.,  26.79,    0./                                       STD100
00111    22*       DATA(ZS(I),TMS(I),WMS(I),PS(I),I=19,35)/                         STD105
00111    23*      1160.,1110.65,26.66,3.6943E-6,                                    STD110
00111    24*      1165.,    0.,26.52,   0.,                                         STD115
00111    25*      1170.,1210.65,26.45,2.7926E-6,                                    STD120
00111    26*      1180.,    0.,  26.15,    0.,                                      STD125
00111    27*      1190.,1350.65,25.85,1.6852E-6,                                    STD130
00111    28*      1210.,   0.,  25.27,    0.,                                       STD135
00111    29*      1230.,1550.65,24.69,6.9604E-7,                                    STD140
00111    30*      1265.,   0.,  23.67,    0.,                                       STD145
00111    31*      1300.,1830.65,22.66,1.8838E-7,                                    STD150
00111    32*      1350.,   0.,  21.24,   0.,                                        STD155
00111    33*      1400.,2160.65,19.94,4.0304E-8,                                    STD160
00111    34*      1450.,   0.,  18.82,   0.,                                        STD165
00111    35*      1500.,2420.65,17.94,1.0957E-8,                                    STD170
00111    36*      1550.,   0.,  17.29,    0.,                                       STD175
00111    37*      1600.,2590.65,16.84,3.4502E-9,                                    STD180
00111    38*      1650.,   0.,  16.50,    0.,                                       STD185
00111    39*      1700.,2700.65,16.17,1.1918E-9/                                    STD190
00116    40*        IF(Z.LT.0.) GO TO 81                                            STD195
00120    41*        RO=6356.36                                                      STD200
00121    42*        GO=9.8066                                                       STD205
00122    43*        WMO=28.9644                                                     STD210
00123    44*        RS=8314.32                                                      STD215
00124    45*        ZM=Z*1000.                                                      STD220
00125    46*        ROM=6356360.                                                    STD225
00126    47*        IF(Z.GT.90.) GO TO 6                                            STD230
00130    48*        DO 3 I=1,8                                                      STD235
00133    49*        IF(ZS(I).LE.Z.AND.Z.LT.ZS(I+1)) GO TO 5                         STD240
00135    50*      3 CONTINUE                                                        STD245
00137    51*      5 ZL=INT(ZS(I))*1.                                                STD250
00140    52*        ZU=INT(ZS(I+1))*1.                                              STD255
00141    53*        ZLM=ZL*1000.                                                    STD260
00142    54*        ZUM=ZU*1000.                                                    STD265
00143    55*        IF(I.EQ.8) ZU=88.743                                            STD270
00145    56*        WM=WMO                                                          STD275
00146    57*        HT=(RO*Z)/(RO+Z)                                                STD280
00147    58*        HM=HT*1000.                                                     STD285
00150    59*        G=(TMS(I+1)-TMS(I))/(ZU-ZL)                                     STD290
00151    60*        GM=G*.001                                                       STD295
00152    61*        IF(G.LT.0..OR.G.GT.0.) GO TO 12                                 STD300
00154    62*        P=PS(I)*EXP(-(GO*WMO*(HM-ZLM))/(RS*TMS(I)))*100.                STD305
00155    63*        GO TO 13                                                        STD310
00156    64*       12 P=PS(I)*((TMS(I)/(TMS(I)+G*(HT-ZL)))**((GO*WMO)/(RS*GM)))*100. STD315
00157    65*       13 T=TMS(I)+G*(HT-ZL)                                            STD320
00160    66*          GO TO 25                                                     STD325
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00161     67*          6 DO 7 I=9,33,2                                          STD330
00164     68*            IF(ZS(I).LE.Z.AND.Z.LT.ZS(I+2)) GO TO 8                STD335
00166     69*          7 CONTINUE                                               STD340
00170     70*         81 T=0.                                                   STD345
00171     71*            P=0.                                                   STD350
00172     72*            D=0.                                                   STD355
00173     73*            RETURN                                                 STD360
00174     74*          8 ZL=ZS(I)                                               STD365
00175     75*            ZU=ZS(I+2)                                             STD370
00176     76*            ZLM=ZL*1000.                                           STD375
00177     77*            ZUM=ZU*1000.                                           STD380
00200     78*            ZMID=ZS(I+1)                                           STD385
00201     79*            A0=WMS(I)                                              STD390
00202     80*            A2=-2.*(2.*WMS(I+1)-WMS(I+2)-A0)/((ZU-ZL)**2.)         STD395
00203     81*            A1=(WMS(I+2)-A0-A2*((ZU-ZL)**2.))/(ZU-ZL)              STD400
00204     82*            WM=A0+A1*(Z-ZL)+A2*((Z-ZL)**2.)                        STD405
00205     83*            G=(TMS(I+2)-TMS(I))/(ZS(I+2)-ZS(I))                    STD410
00206     84*            GM=G*.001                                              STD415
00207     85*            TK=ZLM-(TMS(I)/GM)                                     STD420
00210     86*            S=(WMO*GO*ROM*ROM)/(RS*GM)                             STD425
00211     87*            A=((ROM+ZM)*(ZLM-TK)/((ZM-TK)*(ROM+ZLM)))              STD430
00212     88*            B=(S/((TK+ROM)**2.))                                   STD435
00213     89*            P=PS(I)*(((ROM+ZM)*(ZLM-TK)/((ZM-TK)*(ROM+ZLM)))**(S/((TK+ROM)  STD440
00213     90*           1**2.)))*EXP((-S*(ZLM-ZM))/((TK+ROM)*(ZM+ROM)*(ZLM+ROM)))*100.  STD445
00214     91*            TM=TMS(I)+G*(Z-ZS(I))                                  STD450
00215     92*            T=(WM/WMO)*TM                                          STD460
00216     93*         25 D=(WM*P)/(RS*T)                                        STD465
00217     94*         26 RETURN                                                 STD470
00220     95*            END                                                    STD480
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END OF COMPILATION: NO DIAGNOSTICS.

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@HDG,P ******  TINF  ******
@FOR,S PROFAS,TINF,TINF
FOR S11E-02/04/74-18:55:51 (0,)

   SUBROUTINE TINF      ENTRY POINT 000340

   STORAGE USED: CODE(1) 000347; DATA(0) 000127; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   IOTEMP 000050
    0004   COMJAC 000010

   EXTERNAL REFERENCES (BLOCK, NAME)

    0005   SIN
    0006   XPRR
    0007   COS
    0010   EXP
    0011   NERR3$
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STORAGE ASSIGNMENT (BLOCK, TYPE, RELATIVE LOCATION, NAME)

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0001   000136 210L      0001   000146 230L      0001   000156 250L      0000 R 000040 A1        0000 R 000041 A2
0000 R 000042 A3        0000 R 000005 BETA      0000 R 000043 B1        0000 R 000044 B2        0000 R 000004 CON
0000 R 000000 C1        0000 R 000001 C2        0000 R 000002 C3        0003   000004 DD        0003   000044 DX
0004 R 000004 DY        0003   000047 DZ        0000 R 000012 D1        0000 R 000013 D2        0000 R 000014 D3
0000 R 000015 D4        0000 R 000016 D5        0004   000007 EM        0000 R 000034 ETA       0000 R 000017 E1
0000 R 000030 E10       0000 R 000031 E11       0000 R 000032 E12       0000 R 000020 E2        0000 R 000021 E3
0000 R 000022 E4        0000 R 000023 E5        0000 R 000024 E6        0000 R 000025 E7        0000 R 000026 E8
0000 R 000027 E9        0003 R 000036 F10       0003 R 000037 F10B      0003   000031 G         0000 R 000006 GAMMA
0003 R 000040 GI        0000 R 000052 G1        0000 R 000053 G2        0000 R 000050 G3        0003   000033 H
0003   000045 HL        0003   000026 H1        0003   000024 IDA       0003   000041 IHR       0000   000110 INJP$
0003   000000 IOTEM1    0003   000001 IOTEM2    0003   000002 IUG       0003   000025 IYR       0003   000042 MIN
0003   000023 MN        0003   000003 NMCOP     0003   000043 NMORE     0003   000010 NSAME     0000 R 000007 P
0003   000007 PHI       0003   000034 PHIR      0003   000006 PHI1      0003   000027 PHI1R     0000 R 000003 PI
0004 R 000005 R         0003   000012 RD1       0003   000032 RI        0003   000011 RP1       0003   000013 RT1
0003   000017 RU1       0003   000020 RV1       0004 R 000002 SDA       0003   000015 SD1       0004 R 000003 SHA
0003   000014 SP1       0003   000016 ST1       0003   000021 SU1       0003   000022 SV1       0000 R 000036 TAU
0000 R 000051 TAU1      0000 R 000033 TC        0004 R 000006 TE        0000 R 000047 TG        0000 R 000035 THETA
0003   000035 THETR     0003   000030 THET1R    0000 R 000046 TL        0000 R 000037 TPI       0000 R 000054 TS
0000 R 000045 TV        0003   000046 VL        0004 R 000000 XLAT      0004   000001 XLONG     0000 R 000010 XM
0003   000005 XMJD      0000 R 000011 XNN
```

```
00101     1*          SUBROUTINE TINF                                                    TIN00100
00103     2*          COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,            TIN00200
00103     3*         .          NSAME,RP1, RD1, RT1, SP1, SD1, ST1, RU1, RV1, SU1, SV1,TIN00300
00103     4*         $ MN, IDA, IYR, H1, PHI1R,THET1R,G,RI,H,PHIR,THETR,F10,F10B,GI,     TIN00400
00103     5*         .   IHR,MIN,NMORE,DX,HL,VL,DZ                                      TIN00500
00104     6*          COMMON/COMJAC/XLAT,XLONG,SDA,SHA,DY,R,TE,EM                        TIN00600
00104     7*     C                                                                       TIN00700
00104     8*     C   SUROUTINE TINF CALCULATES THE EXOSPHERIC TEMPERATURE ACCORDING TO JATIN00800
00104     9*     C     SAO NO. 313 ,1970.                                                TIN00900
00104    10*     C                                                                       TIN01000
00104    11*     C LIST                                                                  TIN01100
00104    12*     C     F10 = SOLAR RADIO NOISE FLUX (XE-22 WATTS/M**2)                   TIN01200
00104    13*     C     F10B= 81-DAY AVERAGE F10                                          TIN01300
00104    14*     C     GI  = GEOMAGNETIC ACTIVITY INDEX,AP                               TIN01400
00104    15*     C     LAT = GEOGRAPHIC LATITUDE AT PERIGEE  (IN RAD)                    TIN01500
00104    16*     C     SDA = SOLAR DECLINATION ANGLE         (IN RAD)                    TIN01600
00104    17*     C     SHA = SOLAR HOUR ANGLE                                            TIN01700
00104    18*     C     DY  = D/Y (DAY NUMBER/TROPICAL YEAR)' 1                           TIN01800
00104    19*     C     R = 0.31  (DIURNAL FACTOR)                                        TIN01900
00104    20*     C                                                                       TIN02000
00104    21*     C   CONSTANTS -- C=SOLAR ACTIVITY VARIATION, BETA,ETC. = DIURNAL VARIATITIN02100
00104    22*     C                D=GEOMAGNETIC VARIATION, E=SIMIANNUAL VARIATION.       TIN02200
00104    23*     C                                                                       TIN02300
00105    24*          C1 = 383.0                                                         TIN02400
00106    25*          C2 =   3.32                                                        TIN02500
00107    26*          C3 =   1.80                                                        TIN02600
00107    27*     C                                                                       TIN02700
00110    28*          PI = 3.14159265                                                    TIN02800
00111    29*          CON = 0.01745329252                                                TIN02900
00112    30*          BETA= -37.0*CON                                                    TIN03000
00113    31*          GAMMA= 43.0*CON                                                    TIN03100
```

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00114   32*           P   =   6.0*CON                                    TIN03200
00115   33*           XM  =   2.5                                        TIN03300
00116   34*           XNN =   3.0                                        TIN03400
00116   35*     C                                                        TIN03500
00117   36*           D1 =  28.0                                         TIN03600
00120   37*           D2 =   0.03                                        TIN03700
00121   38*           D3 =   1.0                                         TIN03800
00122   39*           D4 = 100.0                                         TIN03900
00123   40*           D5 =  -0.08                                        TIN04000
00123   41*     C                                                        TIN04100
00124   42*           E1 =   2.41                                        TIN04200
00125   43*           E2 =   0.349                                       TIN04300
00126   44*           E3 =   0.206                                       TIN04400
00127   45*           E4 = 360.*CON                                      TIN04500
00130   46*           E5 = 226.5*CON                                     TIN04600
00131   47*           E6 = 720.*CON                                      TIN04700
00132   48*           E7 = 247.6*CON                                     TIN04800
00133   49*           E8 =   0.1145                                      TIN04900
00134   50*           E9 =   0.5                                         TIN05000
00135   51*           E10= E4                                            TIN05100
00136   52*           E11= 342.3*CON                                     TIN05200
00137   53*           E12=  2.16                                         TIN05300
00137   54*     C                                                        TIN05400
00137   55*     C SOLAR ACTIVITY VARIATION                               TIN05500
00137   56*     C                                                        TIN05600
00140   57*           TC = C1 + C2*F10B + C3*(F10 - F10B)                TIN05700
00140   58*     C                                                        TIN05800
00140   59*     C DIURNAL VARIATION                                      TIN05900
00140   60*     C                                                        TIN06000
00141   61*           ETA    = 0.5*ABS(XLAT - SDA)                       TIN06100
00142   62*           THETA  = 0.5*ABS(XLAT + SDA)                       TIN06200
00143   63*           TAU    = SHA + BETA + P*SIN(SHA + GAMMA)           TIN06300
00144   64*           TPI=2*PI                                           TIN06400
00145   65*           IF(TAU) 210,230,230                                TIN06500
00150   66*       210 IF(TAU+PI) 220,250,250                             TIN06600
00153   67*       220 TAU=TAU+TPI                                        TIN06700
00154   68*           GO TO 210                                          TIN06800
00155   69*       230 IF(TAU-PI) 250,250,240                             TIN06900
00160   70*       240 TAU=TAU-TPI                                        TIN07000
00161   71*           GO TO 230                                          TIN07100
00162   72*       250 CONTINUE                                           TIN07200
00163   73*           A1 =(SIN(THETA))**XM                               TIN07300
00164   74*           A2 =(COS(ETA))**XM                                 TIN07400
00165   75*           A3 =(COS(TAU/2.))**XNN                             TIN07500
00166   76*           B1 = 1.0 + P*A1                                    TIN07600
00167   77*           B2 =(A2-A1)/B1                                     TIN07700
00170   78*           TV = B1*( 1. + R*B2*A3)                            TIN07800
00171   79*           TL = TC*TV                                         TIN07900
00171   80*     C                                                        TIN08000
00171   81*     C GEOMAGNETIC VARIATION                                  TIN08100
00171   82*     C                                                        TIN08200
00172   83*           TG = D3*GI + D4*(1-EXP(D5*GI))                     TIN08300
00172   84*     C                                                        TIN08400
00172   85*     C SEMIANNUAL VARIATION                                   TIN08500
00172   86*     C                                                        TIN08600
00173   87*           G3 = 0.5*(1.0 + SIN(E10*DY +E11) )                 TIN08700
00174   88*           G3 = G3**E12                                       TIN08800
```

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00175     89*          TAU1 = DY + E8*(G3 - E9)                                TIN08900
00176     90*          G1 = E2 + E3*(SIN(E4*TAU1 + E5))                        TIN09000
00177     91*          G2 = SIN(E6*TAU1+ E7)                                   TIN09100
00200     92*          TS = E1 + F10B*G1*G2                                    TIN09200
00200     93*     C                                                            TIN09300
00200     94*     C EXOSPHERIC TEMPERATURE                                     TIN09400
00200     95*     C                                                            TIN09500
00201     96*          TE = TL + TG + TS                                       TIN09600
00202     97*          RETURN                                                  TIN09700
00203     98*          END                                                     TIN09800

      END OF COMPILATION:        NO  DIAGNOSTICS.
@HDG,P  *****  TME  *****
@FOR,S PROFAS,TME,TME
FOR S11E-02/04/74-18:55:54 (0,)

   SUBROUTINE TME       ENTRY POINT 000335

   STORAGE USED: CODE(1) 000344; DATA(0) 000101; BLANK COMMON(2) 000000

    COMMON BLOCKS:

    0003   COMJAC 000010
    0004   IOTEMP 000050

   EXTERNAL REFERENCES (BLOCK, NAME)

    0005   SIN
    0006   ASIN
    0007   TAN
    0010   NERR3$

   STORAGE ASSIGNMENT  (BLOCK, TYPE, RELATIVE LOCATION, NAME)

    0001    000253 110L      0001    000263 120L      0001    000266 130L      0001    000272 140L      0001    000301 210L
    0001    000311 230L      0001    000321 250L      0004    000040 AP        0000 R  000007 A1        0000 R  000010 A2
    0000 R  000011 A3        0000 R  000012 A4        0000 R  000021 B1        0000 R  000022 B2        0000 R  000023 B3
    0000 R  000027 B4        0004 R  000004 DD        0004    000044 DX        0003 R  000004 DY        0004    000047 DZ
    0003    000007 EM        0000 R  000002 FMJD      0004    000036 F10       0004    000037 F10B      0004    000031 G
    0000 R  000005 GMT       0000 R  000013 GP        0004    000033 H         0004    000045 HL        0004    000026 H1
    0004    000024 IDA       0000 I  000016 IFACT     0004 I  000041 IHR       0000    000062 INJP$     0004    000000 IOTEM1
    0004    000001 IOTEM2    0004    000002 ING       0004 I  000025 IYR       0004 I  000042 MIN       0004    000023 MN
    0000 I  000014 N         0004    000003 NVCOP     0004    000043 NMORE     0004    000010 NSAME     0004    000007 PHI
    0004    000034 PHIR      0004    000006 PHI1      0004    000027 PHI1R     0000 R  000031 PI        0000 R  000032 PI2
    0000 R  000033 PI32      0003    000005 R         0000 R  000020 RAP       0000 R  000030 RAS       0004    000012 RD1
    0004    000032 RI        0004    000011 RP1       0004    000013 RT1       0004    000017 RU1       0004    000020 RV1
    0003 R  000002 SDA       0004    000015 SD1       0003 R  000003 SHA       0004    000014 SP1       0004    000016 ST1
    0004    000021 SU1       0004    000022 SV1       0003    000006 T         0000 R  000034 TEMP      0004    000035 THETR
    0004    000030 THET1R    0000 R  000026 TPI       0004    000046 VL        0000 R  000017 XFACT     0000 R  000003 XHR
    0000 R  000006 XJ        0003    000000 XLAT      0003 R  000001 XLONG     0000 R  000025 XLS       0000 R  000004 XMIN
    0004 R  000005 XMJD      0000 R  000015 XN        0000 R  000000 YEAR      0000 R  000001 YR        0000 R  000024 Y1
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00101     1*          SUBROUTINE TME                                                    TME00100
00103     2*          COMMON/CONJAC/XLAT,XLONG,SDA,SHA,DY,R,T,EM                        TME00200
00104     3*          COMMON/IOTEMP/IOTEM1,IOTEM2,IUG,NMCOP,DD,XMJD,PHI1,PHI,           TME00300
00104     4*         .          NSAME,R[illegible],RT1,SP1,SD1,ST1,RV1,SV1,SV1,TME00400
00104     5*         $ MN, IDA, IYR, H1, PHI1R,THET1R,G,R1,H,PHIR,THETR,F10,F108,AP,    TME00500
00104     6*         .    IHR,MIN,NMORE,DX,HL,VL,DZ                                    TME00600
00104     7*     C                                                                     TME00700
00104     8*     C LIST                                                                TME00800
00104     9*     C INPUT                                                               TME00900
00104    10*     C    MN=MONTH,  IDA=DAY, IYR=YEAR, HR = HOUR,  MIN = MINUTE           TME01000
00104    11*     C    XLAT = LATITUDE (INPUT-GEOCENTRIC LATITUDE.)                     TME01100
00104    12*     C    XLONG= LONGITUDE(INPUT-GEOCENTRIC LONGITUDE, OUTPUT  -180 TO + 180)TME01200
00104    13*     C OUTPUT                                                              TME01300
00104    14*     C    SDA = SOLAR DECLINATION ANGLE (IN RAD)                           TME01400
00104    15*     C    SHA = SOLAR HOUR ANGLE (IN RAD)                                  TME01500
00104    16*     C    DD  = DAY NUMBER FROM 1JAN.                                      TME01600
00104    17*     C    DY  = DD/TROPICAL YEAR                                           TME01700
00104    18*     C                                                                     TME01800
00104    19*     C                                                                     TME01900
00104    20*     C SET CONSTANTS                                                       TME02000
00104    21*     C                                                                     TME02100
00105    22*          YEAR = 365.2422                                                  TME02200
00106    23*          YR=IYR                                                           TME02300
00107    24*        6 DY = DD/YEAR                                                     TME02400
00110    25*       30 FMJD = XMJD - 2435839.                                           TME02500
00110    26*     C                                                                     TME02600
00110    27*     C  COMPUTE GREENWICH MEAN TIME IN MINUTES GMT                         TME02700
00110    28*     C                                                                     TME02800
00111    29*          XHR =IHR                                                         TME02900
00112    30*          XMIN = MIN                                                       TME03000
00113    31*          GMT = 60*XHR + XMIN                                              TME03100
00113    32*     C                                                                     TME03200
00113    33*     C  COMPUTE GREENWICH MEAN POSITION - GP (IN DEG)                      TME03300
00113    34*     C                                                                     TME03400
00114    35*          XJ = (XMJD - 2415020.0)/(36525.0)                                TME03500
00115    36*          A1=99.6909833                                                    TME03600
00116    37*          A2 = 36000.76854                                                 TME03700
00117    38*          A3 = 0.00038708                                                  TME03800
00120    39*          A4 = 0.25068447                                                  TME03900
00121    40*          GP = A1 + A2*XJ + A3*XJ*XJ + A4*GMT                              TME04000
00122    41*          N = GP/360.                                                      TME04100
00123    42*          XN = N                                                           TME04200
00124    43*          GP = GP - XN*360.                                                TME04300
00124    44*     C                                                                     TME04400
00124    45*     C  COMPUTE RIGHT ASCENSION POINT - RAP (IN DEG)                       TME04500
00124    46*     C                                                                     TME04600
00124    47*     C     1ST CONVERT GEOCENTRIC LONGITUDE TO DEG LONGITUDE - WEST NEG $ EASTTME04700
00124    48*     C                                                                     TME04800
00125    49*          IFACT = XLONG/180.                                               TME04900
00126    50*          XFACT = IFACT                                                    TME05000
00127    51*          XLONG = 360. * XFACT - XLONG                                     TME05100
00127    52*     C                                                                     TME05200
00130    53*          RAP = GP + XLONG                                                 TME05300
00131    54*          N = RAP/360.                                                     TME05400
00132    55*          XN = N                                                           TME05500
00133    56*          RAP = RAP - XN*360.                                              TME05600
```

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00133     57*     C                                                                    TME05700
00133     58*     C  COMPUTE CELESTIAL LONGITUDE - XLS (IN RAD) - -PI/2 TO +PI/2       TME05800
00133     59*     C                                                                    TME05900
00134     60*           B1 = 0.017203                                                  TME06000
00135     61*           B2 = 0.0335                                                    TME06100
00136     62*           B3 = 1.410                                                     TME06200
00137     63*           Y1 = B1*FMJD                                                   TME06300
00140     64*           XLS = Y1 + B2*SIN(Y1) - B3                                     TME06400
00141     65*           TPI = 6.28318                                                  TME06500
00142     66*           N = XLS/TPI                                                    TME06600
00143     67*           XN = N                                                         TME06700
00144     68*           XLS = XLS - XN*TPI                                             TME06800
00144     69*     C                                                                    TME06900
00144     70*     C  COMPUTE SOLAR DECLINATION ANGLE - SDA (IN RAD)                    TME07000
00144     71*     C                                                                    TME07100
00145     72*           B4 = (TPI/360.)*23.45                                          TME07200
00146     73*           SDA = ASIN(SIN(XLS)*SIN(B4))                                   TME07300
00146     74*     C                                                                    TME07400
00146     75*     C  COMPUTE RIGHT ASCENSION OF SUN - RAS (IN RAD) - -PI/2 TO +PI/2    TME07500
00146     76*     C                                                                    TME07600
00147     77*           RAS = ASIN(TAN(SDA)/TAN(B4))                                   TME07700
00147     78*     C                                                                    TME07800
00147     79*     C  PUT RAS IN SAME QUADRANT AS XLS                                   TME07900
00147     80*     C                                                                    TME08000
00150     81*           PI = 3.14159265                                                TME08100
00151     82*           PI2 = PI/2.                                                    TME08200
00152     83*           PI32= 3.*PI2                                                   TME08300
00153     84*           RAS = ABS(RAS)                                                 TME08400
00154     85*           TEMP = ABS(XLS)                                                TME08500
00155     86*           IF(TEMP - PI2) 130,130,100                                     TME08600
00160     87*       100 IF(TEMP - PI) 105,105,110                                      TME08700
00163     88*       105 RAS = PI - RAS                                                 TME08800
00164     89*           GO TO 130                                                      TME08900
00165     90*       110 IF(TEMP - PI32) 115,115,120                                    TME09000
00170     91*       115 RAS = PI + RAS                                                 TME09100
00171     92*           GO TO 130                                                      TME09200
00172     93*       120 RAS = TPI - RAS                                                TME09300
00173     94*       130 IF (RAS) 135,140,140                                           TME09400
00176     95*       135 RAS = -RAS                                                     TME09500
00177     96*       140 CONTINUE                                                       TME09600
00177     97*     C                                                                    TME09700
00177     98*     C  COMPUTE SOLAR HOUR ANGLE - SHA (IN DEG) - -                       TME09800
00177     99*     C                                                                    TME09900
00200    100*           SHA = RAP*(PI/180.) - RAS                                      TME10000
00201    101*           IF(SHA) 210,230,230                                            TME10100
00204    102*       210 IF(SHA+PI) 220,250,250                                         TME10200
00207    103*       220 SHA=SHA+TPI                                                    TME10300
00210    104*           GO TO 210                                                      TME10400
00211    105*       230 IF(SHA-PI) 250,250,240                                         TME10500
00214    106*       240 SHA=SHA-TPI                                                    TME10600
00215    107*           GO TO 230                                                      TME10700
00216    108*       250 CONTINUE                                                       TME10800
00216    109*     C                                                                    TME10900
00217    110*           RETURN                                                         TME11000
00220    111*           END                                                            TME11100
```

APPENDIX D - SUMMARY OF PROGRAM CHARACTERISTICS

(Program Operating Environment)

1. Hardware

   a. Computer - Univac 1108

   b. Core Requirements - slightly under 32 K words

   c. Magnetic Tapes - All tapes are 7 tracks. Tapes required are: 1 program tape, 1 "SCIDAT" data tape (see pages 7-10 and 51-106), from 1 to 4 4-D data tapes, depending on the number of months to be used under control of one run card (see pages 4-6).

   d. Card Punch - Standard card punch required if optional card output is selected (see page 108).

   e. Plotter - None required

   f. Drum or Disk - 2 temporary drum files are required. No permanent drum or disk files are created by a program run. Optional punch output could easily be converted to come out on permanent drum or disk file instead.

   g. Other Hardware - None

2. Software

   a. Operating System - EXEC 8

   b. Language - FORTRAN IV (UNIVAC FORTRAN V)

   c. Type of Run - Batch

   d. Library Subroutines - None

   e. Program Overlays - (Optional) see page 39

3. Program Specifications

a. Common - See pages 40-44

b. Program Segments - See pages 39-50

c. Program Subroutines - See pages 32-36

d. Listing - See pages 126-202

e. Flow Charts - See pages 3, 33, 37, and 38

f. Sample Input - See pages 107-110, and 11-21

g. Sample Output - See pages 111-125, and 22-27

h. Diagnostic Messages - See pages 28-31

REFERENCES

Fowler, Mary G., and J. H. Willard, (1972): "Users Manual for Four-Dimensional Models", Contract No. NAS 8-28720, June, 1972 Environmental Research and Technology.

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Jacchia, L. G., (1970); "New Static Models of the Thermosphere and Exosphere with Empirical Temperature Profiles", Smithsonian Astrophysical Observatory, Special Report 313.

Spiegler, D. B., and Mary G. Fowler, (1972); "Four-Dimensional World-Wide Atmospheric Models (Surface to 25 Km Altitude)", NASA CR-2082.

APPROVAL

FOUR-D GLOBAL REFERENCE ATMOSPHERE USERS MANUAL AND PROGRAMMERS MANUAL PART II

By C. G. Justus, Arthur Woodrum, R. G. Roper and O. E. Smith

The information in this report has been reviewed for security classification. Review of any information concerning Department of Defense or Atomic Energy Commission programs has been made by the MSFC Security Classification Officer. This report, in its entirety, has been determined to be unclassified.

This document has also been reviewed and approved for technical accuracy.

for W. W. VAUGHAN
Chief, Aerospace Environment Division

for CHARLES A. LUNDQUIST
Director, Space Sciences Laboratory