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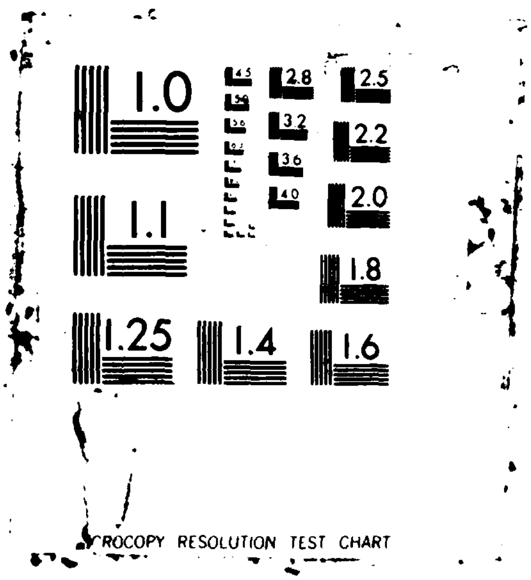
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AFGL-TR-86-0213

Investigate and Verify the Validity of Mathematical Formulas and Procedures in Relation to Data Obtained From Theoretical Investigations and Experimental Observations

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30 September 1986

Final Report
Sept. 1983 - Sept. 1986

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This report presents a summary of the support done for various Divisions at the Air Force Geophysics Laboratory (AFGL).

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CALCULATION AND PLOTTING OF CLOUD-COVER STATISTICS

1. INTRODUCTION

The purpose of this project was to provide mathematical analysis that would produce real-time simulation techniques for cloud cover. BEDFORD RESEARCH was presented with three large sets of fractional probabilities for visibility from various stations around the globe. The data sources were RUSSWO, OCEAN atlases, and NIS. From these data sets, values for single-point probabilities (PØ) were extracted and scale-distance values (R) were calculated according to written specifications. These PØ and R values were then plotted on polar equal-area maps of the world. The coding for these tasks was done in FORTRAN IV.

2. DATA PROCESSING

2.1 Overview

Lengthy sets of data cards with station code, station name, location in longitude and latitude, elevation, fractional codes, point and cumulative probabilities of visibility for month (and, if applicable, hour) were grouped into files. The data was rearranged station by station instead of by month or hour. Flag values were inserted for the detection of data with improper probability values.

2.2 Data Description

In general, the RUSSWC data was collected hourly: that is, four times a day for each mid-season month (January, April, July, October). The OCEAN atlas data was collected once during each mid-season month. The NIS data contained a mixture of both hourly and monthly data.

2.3 Calculations

For each station, an R value was calculated from the fractional probabilities if those probabilities passed the test criteria in the calculation algorithm. So, up to 16 R values could be computed for an hourly station and up to 4 R values could be computed for a monthly station.

Using a weighted sum of exponential functions on the fractional probability limits and the point-probability values, intermediate Y test values were calculated. Interpolating and then taking the mean of these y values and finally exponentiating them, BEDFORD RESEARCH arrived at the R value for that set of probabilities for the month (or hour) of the present station.

2.4 Plotting

Plots were created for each month (and hour if applicable) of R and PØ. For hourly data, this resulted in 16 R plots and 16 PØ plots. For monthly data, 4 R plots were created. (The 4 PØ plots had already been created by the Initiator.)

The full range of R (or PØ) values was divided up into intervals with each interval denoted by a color and a symbol. These colored symbols were printed on 3Ø-inch sheets to be overlaid on top of polar equal-area maps. To correlate the latitude and longitude of each station with inch measures on the map, code was written to transform degree values to plotting inches using trigonometric transformations and an interpolation table.

2.5 Archiving

The corrected original data and the calculated R values will be filed on tape for future use.

COMPUTATION OF ENERGIES ASSOCIATED WITH METEOROLOGICAL CIRCULATION

The purpose of this project is to take existing FORTRAN programs for the calculation of various forms of energy associated with the general meteorological circulation and to streamline them so that they run using less core memory on the CYBER 170. Also, several programs needed to be consolidated into single routines that performed the same tasks.

Overview of Existing Programs

The code reads in global data of East-West wind (u), North-South wind (v), temperature (t), pressure (p), and relative humidity (rh) taken on a grid of 2 and 1/2 degrees width in latitude and longitude on the earth's surface and at various pressure-related height levels above the earth's surface. From this analysis grid, a linear interpolation along the North-South direction is performed to get estimates for a set of Gaussian latitudes, using a Gauss-Legendre quadrature. This is done on each of 12 pressure levels. Using a Fast-Fourier Transform, these analysis grid values are transformed into spectral values. These are then transformed into vorticity and divergence values. It is the divergence and vorticity that are the primary functions in the meteorological prediction portion of the program. Once the prediction is done in the spectral domain, we transfer back to the analysis grid to interpret the prediction results. This involves using the inverse Fourier transform.

In the analysis grid, several different types of energy calculations can be performed, either before or after prediction. These production programs include the calculation of standard kinetic and potential energy and layer kinetic and potential energy. The standard kinetic energy program uses wind inputs to calculate the produced kinetic energy on mandatory pressure levels. Standard potential energy is calculated from temperature to give the total and available potential energy at mandatory pressure levels. The layer programs, however, account for the surface distribution of the earth rather than simply following grid lines. So, taking into account information about the contours of the earth's terrain, layer kinetic energy is calculated from wind and modified pressure and height values; layer potential energy is calculated from pressure and height values.

Code Modification

Our work has been concentrated on the energy calculation routines and on the transformation from the analysis grid to the model grid using the Fourier transform. The principal idea was to change the four energy programs (STKE, STPAE, LAYERKE, and LAYERPE — standard and layer kinetic and potential energy respectively) into subroutines that would link with the initial data-reading program. Storage restrictions on the CYBER 170, however, did not permit the running of a consolidated version of all four programs. Instead, the standard routines were combined and the layer routines were kept separate because of their large data arrays. Within this framework, other programs were consolidated such as the routine for computing Gaussian latitudes, for computing temperature from pressure values, and for rearranging the initial grid of values to be read by the energy routines in a more efficient manner. For this last aspect, the programs were altered so that the necessary grid of 144 longitude values by 76 latitude values by 12 pressure levels could be read in at separate pressure levels, cutting down storage from 144 x 76 x 12 to 144 x 76. Other unnecessary arrays were eliminated by overwriting arrays not being concurrently used (e.g., writing one wind array over another) and by writing arrays to tape to be read from later in the processing.

After these storage modifications were done for the four energy calculations, we were given ten data sets of wind, temperature, pressure, and relative humidity to test the new programs. The resultant 40 sets of output (4 types of energy for 10 data sets) agreed with previous calculations from the former versions of the programs.

Similar work combining routines to perform Gauss-Legendre interpolation, the Fast Fourier Transform, and the calculation of divergence and vorticity was completed on programs for energy transfer and the calculation of zonal and eddy waves. These programs, as well as the previously altered kinetic and potential energy programs described above, were then run on eight sets of analyzed and forecast data to create files of kinetic, potential, and transfer energies for use by the Initiator in plotting and analysis. These files were then put on an archive tape that can be accessed on the Cyber at AFGL.

THE CONTRIBUTIONS OF ATMOSPHERIC DENSITY ON THE DROP-OFF RATE OF C_n^2

1. INTRODUCTION

The refractive index structure parameter (C_n^2) is relevant in determining the degradation of optical beam propagation through turbulent, clear air. A number of methods exist for obtaining altitude profiles of C_n^2. These include thermosonde, radar, and stellar scintillometers. Since C_n^2 normally varies over several orders of magnitude depending on time of day or night, local meteorological conditions and the altitude range, statistics on C_n^2 are usually provided using log averages or median values. Further information on atmospheric optical effects can be found in Hufnagel (1978). In the higher troposphere and above, the average decrease in log $[C_n^2]$ is found to be nearly linear.

Following Balsley and Peterson (1981), we define the drop-off rate of C_n^2 by

$$DR(C_n^2) = -\,[10/(Z_2 - Z_1)]\ \mathrm{Log}\ [C_n^2\ (Z_2)/C_n^2\ (Z_1)] \tag{1}$$

where $C_n^2(z_i)$ is the value of C_n^2 at altitude (z_i). They conclude from a survey of time-averaged values obtained by Doppler-radar that, for altitudes above about 10 km, the above-defined drop-off rate is approximately constant, is a decreasing function of latitude, and is independent of longitude. The averaging time varied from 34 minutes to 21 days. They obtain a value of 1.3 $dBkm^{-1}$ at 65^{o} N; other measurements quoted suggest a systematic rise to about 3 $dBkm^{-1}$ at the equator. The upper limit of these measurements is about 25 km. The radar C_n^2 drop-off rates are shown in Figure 1 where the sites are: A (Arecibo), C (Chatanika), J (Jicamarca), PF (Poker Flat), PL (Platteville) and S (SOUSY).

It has been pointed out by Smith et al [1983] that the primary cause for the drop-off of C_n^2 with altitude is due to decreasing density in the region from 7 km to 50 km. This is based on the observation that n-1 is proportional to the density for this region, suggesting a density squared

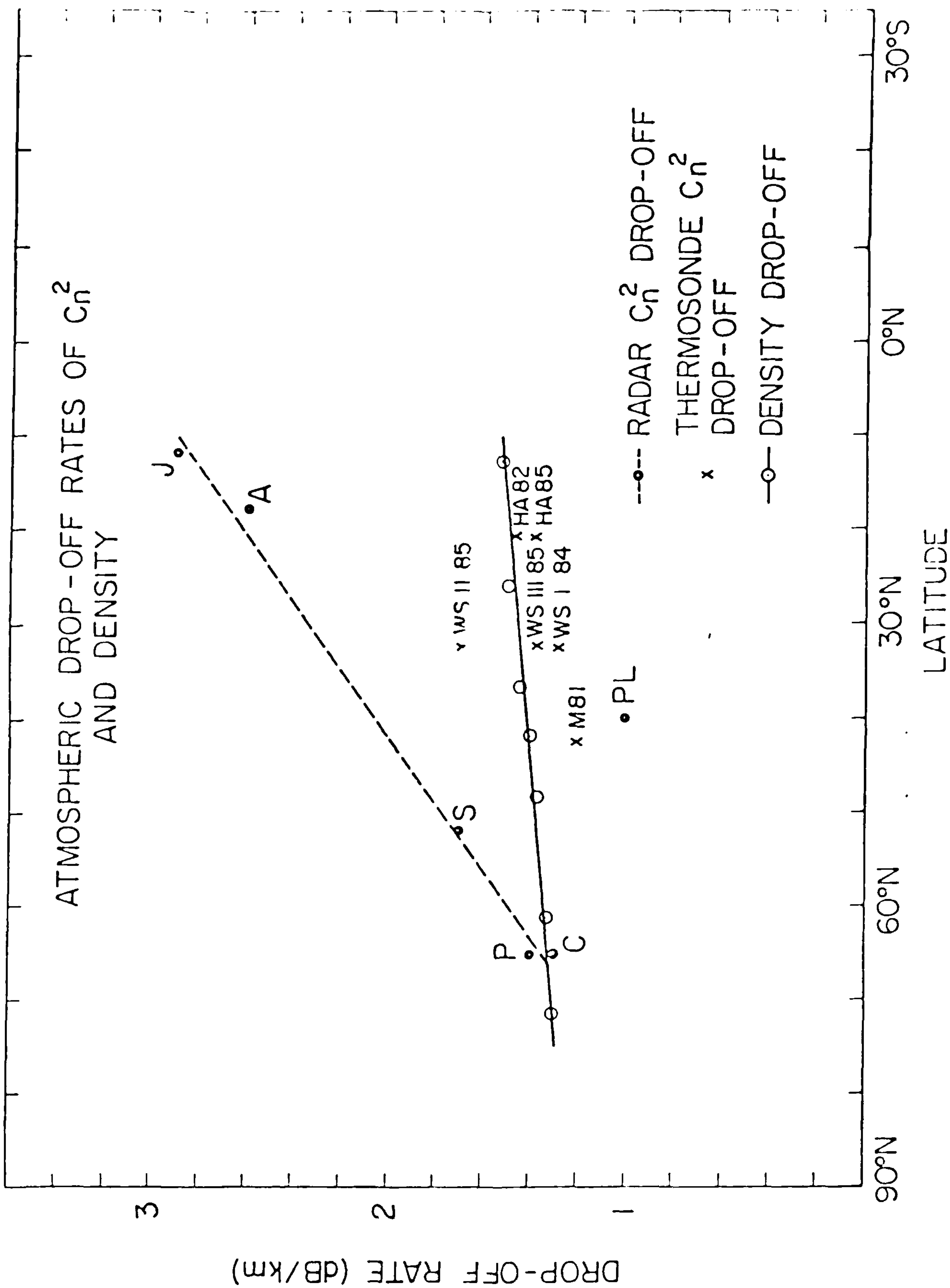

Figure 1

Radar, thermosonde and density drop-off rates vs. latitude for the upper troposphere and lower stratosphere.

variation for C_n^2. Furthermore, VanZandt *et al* (1978), regarding C_n^2 model comparisons to C_n^2 radar, have used a modified form of Tatarski's expression for the radio refractivity

$$C_n^2 = a^2 \alpha L_o^{4/3} M^2 F \tag{2}$$

where a^2 is a constant; α is the ratio of eddy diffusivities, taken to be unity; L_o, the outer scale length, is assigned a fixed length of 10m; and M is the refractive index gradient. F is that fraction of the sampled layer that is actually mechanically turbulent. This is determined by a probalistic model. F is strongly dependent on $\overline{Ri}$, the value of the Richardson number obtained by dividing the square of the Brunt-Vaisalla frequency by the square of the wind shear for the layer sampled. The variation of F with altitude is unknown. Above 10 km, humidity can be considered negligible and M can then be expressed as

$$M = -79 \times 10^{-6} (P/T) [(1/\theta) (d\theta/dZ)] \tag{3}$$

where P is the pressure in milibars, T is the temperature in ^oK and θ is the potential temperature. Since M is proportional to the product of (P/T), or density, and the potential temperature term, we can then investigate the average contribution of these two terms to M and hence to C_n^2 through equation 2. We will do this by using rawinsonde measurements of density to obtain the ρ^2 drop-off rates and will use thermosonde measurements to obtain values of the potential temperature-dependent term in Eq (3) and also to obtain drop-off rates of thermosonde measured C_n^2.

2. DENSITY CONTRIBUTION TO DROP-OFF RATE OF C_n^2

Except for humidity in the lower troposphere and the transition region near the tropopause, drop-off rates of averaged C_n^2 should be close to the drop-off rates of averaged density in the lower atmosphere. We have investigated this quantitatively by defining a density drop-off rate as

$$DR(\rho^2) = -[10/(Z_2 - Z_1)] \, Log \, [\rho^2 (Z_2)/\rho^2 (Z_1)] \qquad (4)$$

where (Z_i) is the density at altitude Z_i.

To evaluate DR (ρ^2), we made use of U.S. Weather Bureau rawinsonde data. We used data from a set of six stations of varying latitude and a set of four stations of comparable latitude but varying longitude. The measured values of pressure and temperature for 1974 were fitted using a cubic spline fit (Murphy et al, 1982) for interpolation purposes. For each of the four seasons as defined by the solstice and equinox, an average density profile was calculated. For various altitude ranges, we then fit log ρ^2 to a linear form. For ranges comparable to the radar measurements of DR (C_n^2), values of the Pearson correlation coefficient quite close to unity were obtained. For comparison purposes, we present our results for the range 15 km to 25 km. The lower limit is chosen to ensure that the data used were obtained above the jet stream. The upper limit is due to the upper bound of Rawinsonde reliability.

We first looked at DR (ρ^2) for each of the four seasons and found little variation at each of the sites studied. Thus, in Table I, we present results averaged over one year. As latitude decreases, both DR (C_n^2) radar and DR (ρ^2) each increase systematically, but the former more quickly than the latter, resulting in an approximate factor of 2 difference at the equator. This may possibly be due to the increase in the height of the tropopause or coriolis force decrease as the equator is neared.

In Table II, we present results for four stations of approximately the same latitude, but of differing longitude. No difference for the yearly average of DR (ρ^2) is observed for the four stations.

The drop-off rates of ρ^2 from Table I are also plotted in Figure 1.

TABLE I: DROP-OFF RATE OF DENSITY AS A FUNCTION OF LATITUDE

Station	Latitude/Longitude	Drop-Off Rate of Density ($dBkm^{-1}$)
Barrow, AK	71°18'N / 156°47'W	1.30
Anchorage, AK	61°10'N / 150°01'W	1.33
International Falls, MN	48°34'N / 93°23'W	1.37
Chatham, MA	41°40'N / 69°58'W	1.40
Pt. Mugo, CA	35°41'N / 117°41'W	1.44
Brownsville, TX	25°54'N / 97°26'W	1.49
San Andres, Columbia	12°35'N / 81°42'W	1.52

TABLE II: DROP-OFF RATE OF DENSITY AS A FUNCTION OF LONGITUDE

Station	Latitude/Longitude	Drop-Off Rate of Density ($dBkm^{-1}$)
Caribou, ME	46°52'N / 68°01'W	1.37
Sault Ste Marie, MI	46°28'N / 84°22'W	1.37
International Falls, MN	48°34'N / 93°23'W	1.37
Great Falls, MT	47°29'N / 111°21'W	1.37

3. THERMOSONDE DERIVED DROP-OFF RATES OF C_n^2

An experimental technique employing balloon-borne thermosondes to obtain C_n^2 measurements is reported by Brown et al (1982). Brunt-Vaisalla frequencies can also be calculated from the balloon measurements. A typical height profile of Brunt-Vaisalla frequency calculated from the balloon measurements is shown in Figure 2. Typical mean values of frequency have been found, as in this case, to be approximately .01/sec in the troposphere and .025/sec in the stratosphere. There is a transition region centered near the tropopause that is shown in Figure 2 to be about 2.5 km; this can occur over a smaller altitude change depending on the height of the tropopause region. The values of Brunt-Vaisalla frequency plotted in Figure 2 can be scaled to obtain the expression involving potential temperature in Eq. (3). Then

$$(1/\theta)\ (d\,\theta/dZ) = N^2\ (1/g) \qquad (5)$$

where N is the Brunt-Vaisalla frequency. The effect of the transition region will be discussed further; it is emphasized here that outside of the transition region, in the troposphere and stratosphere, as evidenced by thermosonde results, the average value of the term on the left of Equation 5 is approximately constant. We have also plotted with an "X" in Figure 1 the C_n^2 average drop-off rates from several series of thermosonde measurements of C_n^2. We have used the altitude range 15 to 25 km for the drop-off rate of C_n^2 thermosonde in order to be consistent with the range chosen for density. Information on the thermosonde measurements is provided in Table III. For example, the M81 point on the graph in Figure 1 was obtained from 29 sets of measurements obtained at Westford, MA over the period February to August 1981.

4. COMPARISONS AND CONCLUSIONS

Thermosonde-derived values for $DR(C_n^2)$ and $DR(\rho^2)$ agree fairly well for all comparable latitudes. These also agree well with radar results at

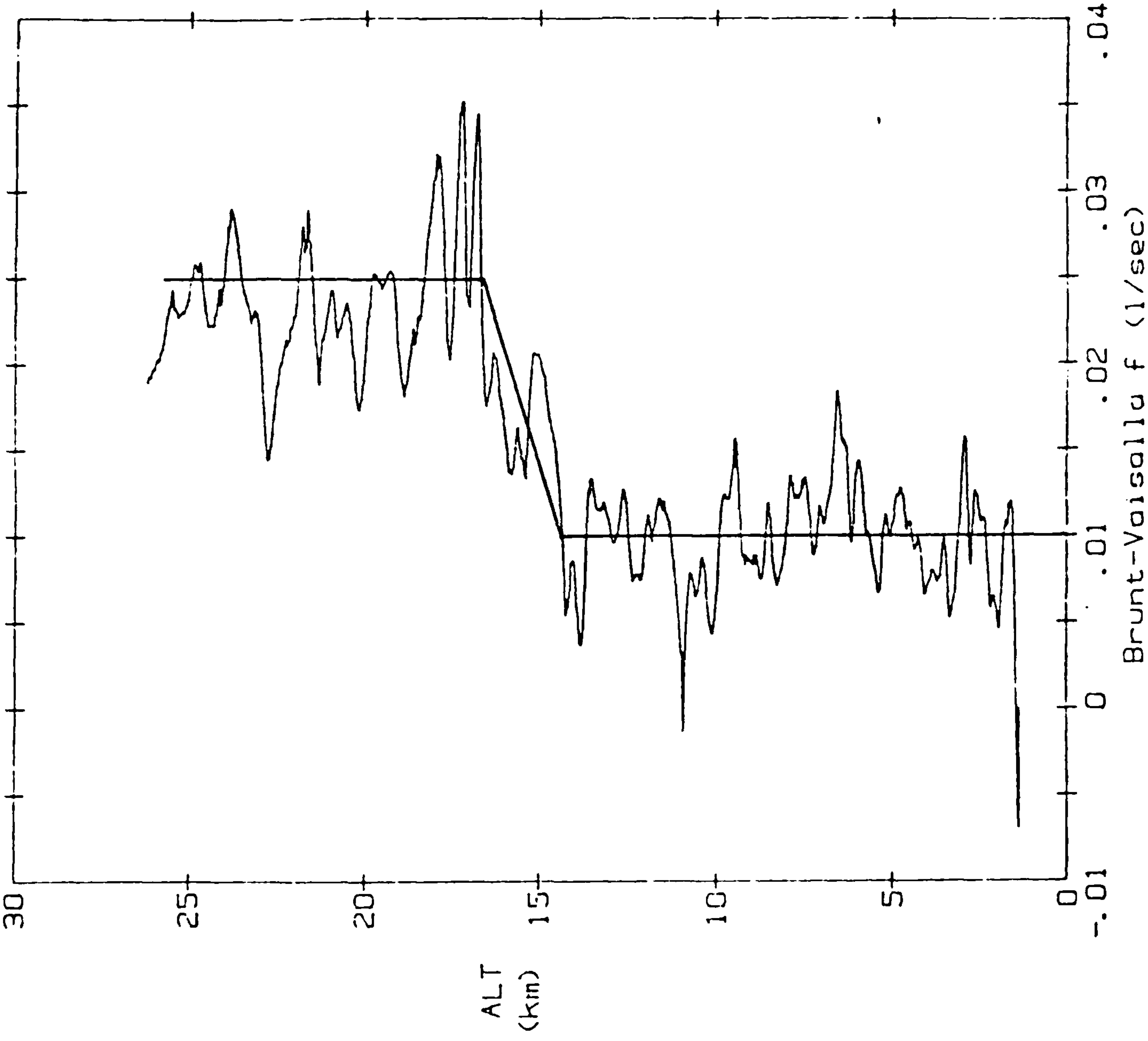

Figure 2

Results from thermosonde data obtained during 2 Aug 85 flight showing typical transition in Brunt-Vaisalla frequency from troposphere to stratosphere.

TABLE III: THERMOSONDE MEASUREMENTS

Code	Location	Latitude	Period	Data Sets	Drop-Off Rate of C_n^2
M81	Westford, MA	42.4°N	Feb-Aug 81	29	1.20
HA82	Maui, HA	20.7°N	Aug 82	8	1.47
HA85	Maui, HA	20.7°N	Sep-Oct 85	12	1.28
WSI84	WSMR, NM	32.0°N	Sep 84	18	1.68
WSII85	WSMR, NM	32.0°N	Feb-Mar 85	8	1.31
WSIII85	WSMR, NM	32.0°N	Jul-Aug 85	2	1.36

high to middle latitudes but are significantly lower at middle to low latitudes. This discrepancy could be due to various reasons, which we list below.

At high latitudes, radar values are obtained by fitting C_n^2 values completely above the average troposphere height. As latitude decreases, the radar sampled region includes the transition region (see Figure 2) due to the well-known increase in the height of the tropopause with decreasing latitude.

The averaging times are quite different. As noted, $DR(\rho^2)$ is obtained over one year, while $DR(C_n^2)$ from both radar and thermosonde are over much shorter time periods.

When we assume that in Equation 2 the major effect of increasing altitude is the decrease in ρ^2, we are assuming that the effects of increasing altitude on other factors (L_o, Brunt-Vaisalla frequency, and F) are less important. Although order of magnitude calculations indicate this assumption to be correct, further effort into this area is needed.

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THE IDENTIFICATION OF FACTORS INFLUENCING TURBOPAUSE HEIGHT

1. INTRODUCTION

1.1 Overview

This report summarizes ADP support services that BEDFORD RESEARCH Associates has provided the Atmospheric Optics Branch (OPA) of the Air Force Geophysics Laboratory (AFGL), Hanscom AFB, Bedford, Massachusetts. It describes the analytic and programming activites performed during this investigation.

1.2 Background

Turbulence in the mesosphere and lower thermosphere are considered to provide major influences on the thermospheric species (Zimmerman 1980). For example, turbulence has been shown to directly enhance or deplete the atomic-oxygen flow in lower thermospheric regions and indirectly alter the pressure gradient and [0] motion (Keneshea and Zimmerman 1970).

Unfortunately, the properties of turbulence at certain levels of the thermosphere remain obscure. This problem is due in part to the paucity of recorded data (Izakov 1978; Zimmerman and Murphy 1977) as well as the contamination of turbulence measurements by other factors (e.g., local time, solar cycle, season, and altitude). Thus, a clearer understanding of turbulence can be obtained by examining those factors that affect it.

In the present investigation, the principal measure of turbulence is turbopause height. Turbopause height is defined as the altitude where fluctuations in turbulence cease to exist. Readings of turbopause were obtained through Ar/N_2 ratios or chemical trails.

1.3 Objectives

The primary objective of this study is to evaluate the relationship between turbopause height and associated turbulence parameters. This evaluation will examine the inter-relationship between these parameters in an effort to identify the subset of variables that have the most influence on turbopause height.

2. METHODS AND PROCEDURES

2.1 Overview

This section presents the approach taken to achieve the above-stated objectives. First, the data base used in this analysis is reviewed. This review includes a description of the names and format of the variables employed. Next, the statistical methods used to explore the relationship of these variables with turbulence is outlined.

2.2 Data Base

Data was collected from two different sites, Eglin AFB and Heiss Island, between 1962 and 1977. Eglin AFB is located at the 30° N latitude, while Heiss Island is at the 80° N latitude. A total of 70 observations were gathered throughout this 15-year period. This data was partitioned by location and season. The seasons were defined as Winter (Dec 1 - Mar 15: N=26), Spring/Summer (Mar 16 - Sep 15: N=25), and Fall (Sep 16 - Nov 30: N=19). Variables that measured cosine and sine annual, semi-annual, triannual, diurnal, and triurnal variations were collected. Measures of solar flux and solar rotation were included.

The files containing this information were downloaded from magnetic tape to disk files on the AFGL Control Data Corporation (CDC) 170/750 CYBER mainframe. Software was developed and executed on this system to analyze the data. All source code was written in ANSI Standard FORTRAN (Version 5.0). Plots were generated on the AFGL VAX 11/780 using NCAR software.

2.3 Analytical Approach

Multivariate statistical methods provide the most appropriate way to examine the inter-relationship of variables present in this situation (Harris 1975). Using the technique defined as step-wise multiple regression, the correlation and relative influence of each variable on turbopause height was identified.

The following statistics were computed:

- Means and Variances
- Correlation Matrix of all Factors

- Step-wise Multiple Regression Analysis of Orthogonal Factors
- Bivariate Correlation of Significant Factors with Turbopause Height
- Graphic Displays of the Relationship of Significant factors with Turbopause Height

Inspection of the means and variances provides an overall representation of each variable. The correlation analysis helps determine if there is any multi-collinearity between variables in the data sets. The variables that show a high degree of cross-correlation are removed from further analyses. The step-wise multiple regression computed on the remaining variables identified the variables that contribute most in predicting turbopause height, the relative influence of each of these variables, and the amount of total variation accounted for by this group of variables.

As a follow-up to the multiple regression analysis, bivariate correlations were calculated between turbopause and variables to identify any significant predictors. Due to the small sample size, a Spearman Rho correlation coefficient was recommended (Winer 1971) and was used.

Graphic display of the relationship between turbopause and the significant variables was the final analysis performed. Since the time of year had an effect on turbopause height, three-dimensional plots using time scores on the third axis were plotted.

3. DATA ANALYSIS

3.1 Overview

This section describes the results of the analyses outlined in Section 2.2. It is divided into three parts. The first part reviews the descriptive statistics collected on each data set. The second part examines the multivariate analyses that were performed. The final part presents the graphs between turbopause height and significant variables identified through the multivariate procedures.

3.2 Descriptive Statistics

The means and standard deviations of the variables in the winter, spring/summer, and fall data sets are presented in Tables 1 - 3, respectively. Standard deviations are shown in parentheses. These statistics were computed independently for both middle and upper latitudes.

Table 4 shows the groups of variables that displayed high (.5 or higher) correlations. The variables listed in this table were too strongly correlated to be considered independent measurements and were discarded in subsequent analyses.

3.3 Multivariate Anaylses

Table 5 summarizes the results of the regression performed on each of the seasonal data sets by latitude. It is interesting to note the shift in significant multiple correlation throughout the year. Specifically, the best association between turbopause and the measurements taken during the winter months is found at mid-latitude. Through the spring and summer months, this association is seen equally at both latitudes, and moves to the upper latitudes during fall.

The variables included in the regression equation are presented in Table 6. They are arranged in order of rank from strongest to weakest, according to their relative contribution in predicting turbopause scores.

3.4 Bivariate Correlations

Tables 7 - 9 report the results of the Spearman Rho correlations between turbopause height and the variables in each data set. The variables that were identified as salient variables in the previous analysis showed high correlations with turbopause height.

Inspection of these tables revealed significant correlations between turbopause height and some variables in the winter and spring/summer data sets that merited further consideration. To observe these relationships more closely, plots of the data were made.

TABLE 1

MEANS AND STANDARD DEVIATIONS FOR SELECTED VARIABLES IN (WINTER) DATA SET

VARIABLE	MIDDLE LATITUDE	HIGH LATITUDE
COSVD	-.09 (.68)	.66 (.53)
SINVD	-.16 (.78)	.02 (.88)
COS2VD	-.15 (.54)	-.46 (.74)
SIN2VD	.39 (.79)	-.25 (.47)
COS3VD	.07 (.90)	-.10 (.68)
SIN3VD	.38 (.37)	-.32 (.69)
COSWL	.27 (.62)	-.08 (.73)
SINWL	-.12 (.79)	.11 (.71)
COS2WL	-.15 (.85)	.02 (.73)
SIN2WL	.09 (.59)	-.08 (.72)
COS3WL	.30 (.67)	.22 (.77)
SIN3WL	.38 (.62)	.10 (.63)
KP1	1.90 (1.20)	2.57 (1.30)
AP2	4.40 (6.15)	21.00 (21.26)
AP3	5.80 (8.12)	14.71 (12.18)
FIAU	92.08 (27.86)	97.05 (37.49)
FEAR	94.27 (29.33)	99.08 (38.15)
COSXS	.99 (.004)	1.00 (.01)
SINXS	.10 (.04)	.08 (.06)
TURBO	105.50 (7.66)	109.30 (5.4)

TABLE 2

MEANS AND STANDARD DEVIATIONS FOR SELECTED VARIABLES IN (SPRING/SUMMER) DATA SET

VARIABLES	MIDDLE LATITUDES	HIGH LATITUDES
COSVD	.19 (.63)	.06 (.79)
SINVD	-.33 (.73)	.12 (.66)
COS2VD	-.20 (.41)	.16 (.50)
SIN2VD	-.61 (.69)	-.29 (.84)
COS3VD	-.22 (.72)	.11 (.72)
SIN3VD	.15 (.70)	.41 (.60)
COSWL	-.18 (.69)	-.15 (.71)
SINWL	.23 (.72)	.18 (.72)
COS2WL	-.06 (.67)	-.28 (.74)
SIN2WL	-.23 (.76)	.28 (.74)
COS3WL	.20 (.64)	.32 (.52)
SIN3WL	-.08 (.79)	-.47 (.68)
KP1	2.11 (1.57)	2.56 (1.33)
AP2	3.50 (4.46)	22.33 (18.66)
AP3	3.33 (6.02)	19.77 (13.68)
FIAU	108.20 (17.28)	109.50 (42.42)
FEAR	106.70 (17.01)	110.02 (42.61)
COSKS	.99 (.01)	.99 (.01)
SINXS	.10 (.05)	.11 (.06)
TURBC	104.70 (7.18)	99.46 (7.04)

TABLE 3

MEANS AND STANDARD DEVIATIONS FOR SELECTED VARIABLES IN (FALL) DATA SET

VARIABLES	MIDDLE LATITUDE	HIGH LATITUDE
COSVD	-.38 (.77)	-.46 (.72)
SINVD	.03 (.58)	-.40 (.48)
COS2VD	.39 (.77)	.29 (.72)
SIN2VD	.50 (.23)	.20 (.73)
COS3VD	-.25 (.60)	.14 (.83)
SIN3VD	-.64 (.46)	-.11 (.64)
COSWL	-.43 (.73)	.16 (.75)
SINWL	.15 (.57)	-.54 (.51)
COS2WL	.35 (.77)	-.02 (1.07)
SIN2WL	.04 (.59)	-.08 (.20)
COS3WL	-.43 (.65)	.12 (.70)
SIN3WL	-.16 (.66)	.38 (.72)
KP1	2.82 (1.06)	3.50 (1.31)
AP2	14.00 (13.45)	21.83 (14.99)
AP3	20.69 (21.75)	16.33 (10.82)
FIAU	82.98 (8.95)	93.47 (14.42)
FEAR	83.51 (8.91)	91.48 (13.80)
COSKS	.99 (.01)	.99 (.01)
SINXS	.11 (.06)	.12 (.06)
TURBO	105.50 (4.59)	108.20 (4.79)

TABLE 4

CLUSTERS OF VARIABLES WITH HIGH CORRELATIONS

DATA SET	VARIABLES
WINTER	
	JULIAN DAY W/ lat.(.59),cosvd(.55),sinvd(.51)
	LAT. W/ sin3vd(-.51),kp1(.52)
	COSVD W/ cos3wl(-.55)
	COS2VD W/ kp1(-.53),ap2(-.62)
	SIN2VD W/ fiau(-.61),fear(-.61)
	SIN3VD W/ ap1(-.52)
	KP1 W/ kp2(.54),ap1(.76),ap2(.59),ap3(.50)
	KP2 w/ kp3(.80),ap1(.74),ap2(.91),ap3(.83)
	KP3 W/ ap1(.61),ap2(.72),ap3(.96)
	AP1 W/ ap2(.78),ap3(.73)
	AP2 W/ ap3(.82)
	FIAU W/ fear(1.0)
	COSXS W/ sinxs(-.96)
SPRING/SUMMER	
	JULIAN DAY W/ lat.(.61),cos3vd(.50)
	LAT W/ kp2(.65),kp3(.73),ap1(.55),ap2(.58),ap3(.63)
	COSVD W/ cos3vd(-.55)
	SINVD W/ cos2vd(.56),cos3vd(.59),sin3vd(.65)
	COS3VD W/ sin3vd(.55)
	SIN3VD W/ coswl(.50)
	SINWL W/ coswl(-.51)
	KP1 W/ ap1(.58)
	KP2 W/ kp3(.88),ap3(.83)
	KP3 W/ ap1(.74)
	FIAU W/ fear(1.0),cosxs(.50),sinxs(-.53)
	FEAR W/ sinxs(-.52)
	COSXS W/ sinxs(-.97)
FALL	
	JULIAN DAY W/ lat.(.96),sin3vd(.54)
	LAT. W/ sinwl(-.52)
	COSVD W/ cos3vd(.56),kp2(-.53)
	SINVD W/ coswl(.52)
	COS2VD W/ coswl(-.57),sinwl(-.64),sin3wl(-.52)
	SIN2VD W/ cos2wl(.67),sin3wl(-.51)
	COSWL W/ cos3wl(.63)
	KP1 W/ kp2(.80),ap1(.95)
	KP2 W/ kp3(.53),ap1(.77)
	FIAU W/ fear(1.0)
	COSXS W/ sinxs(-.96)

TABLE 5

SUMMARY OF REGRESSION ANALYSES FOR DATA SETS PARTITIONED BY LATITUDE

DATA SET	ANNUAL	1/2 ANNUAL	DAILY	1/2 DAILY
WINTER				
MID LAT. (N=10)				
R^2	.7310	.9589 **	.9999 **	.9999 **
HIGH LAT. (N=17)				
R^2	.3962	.3784	.4319	.3920
SPRING/SUMMER				
MID LAT. (N=12)				
R^2	.8807 **	.9396 **	.8774 *	.9572 **
HIGH LAT. (N=13)				
R^2	.7984 *	.7868 *	.6982 *	.4985
FALL				
MID LAT. (N=13)				
R^2	.4992	.2275	.1574	.1202
HIGH LAT. (N=6)				
R^2	.9992 **	.9992 **	.9995 **	.9999 **

Note: * = $p < .05$
** = $p < .01$

TABLE 6

VARIABLES ASSOCIATED WITH SIGNIFICANT MULTIPLE R CORRELATIONS

DATA SET	ANNUAL	1/2 ANNUAL	DAILY	1/2 DAILY
WINTER				
MID LAT. (N=10)		COS2VD	COSWL	COS2WL
		SIN2VD	SINWL	SIN2WL
		FIAU	FIAU	FIAU
		SIN3WL	SIN3WL	SIN3WL
		AP3	COS2WL	COSWL
			KP2	DAY
			COSVD	SIN3VD
SPRING/SUMMER				
MID. LAT. (N=12)				
	COSVD	COS2VD	COSWL	COS2WL
	SINVD	SIN2VD	SINWL	SIN2WL
	FIAU	FIAU	FIAU	FIAU
	COS2VD	COSXS	COSXS	COSXS
		SINXS	SINXS	SINXS
HIGH LAT. (N=13)				
	COSVD	COS2VD	COSWL	
	SINVD	SIN2VD	SINWL	
	FIAU	FIAU	FIAU	
	COS2VD	COSXS	COSXS	
		SINXS	SINXS	
FALL				
HIGH LAT. (N=6)				
	COSVD	COS2VD	COSWL	COS2WL
	SINVD	SIN2VD	SINWL	SIN2WL
	FIAU	FIAU	FIAU	FIAU
	KP1		AP2	AP2

TABLE 7

SPEARMAN RHO CORRELATION OF VARIABLES WITH TURBOPAUSE HEIGHTS FOR WINTER DATA SET

VARIABLES	MIDDLE LATITUDE N = 10	HIGH LATITUDE N = 17
COSVD	-.04	-.25
SINVD	-.19	.11
COS2VD	.09	-.50*
SIN2VD	.07	.16
COS3VD	.41	.24
SIN3VD	.18	.08
COSWL	.10	-.12
SINWL	-.15	.24
COS2WL	.29	.02
SIN2WL	-.22	-.07
COS3WL	.10	.05
SIN3WL	.67*	.05
KP1	-.14	.18
KP2	-.25	.35
KP3	.28	.41*
AP1	.06	.18
AP2	-.25	.35
AP3	.28	.40
FIAU	.15	-.16
FEAR	.15	-.16
COSXS	.44	-.13
SINXS	-.38	.13

Note: * = $p < .05$

TABLE 8

SPEARMAN RHO CORRELATION OF VARIABLES WITH TURBOPAUSE HEIGHTS FOR SPRING/SUMMER DATA SET

VARIABLES	MIDDLE LATITUDE N = 12	HIGH LATITUDE N = 13
COSVD	.05	.20
SINVD	-.32	.20
COS2VD	.17	-.19
SIN2VD	-.09	-.36
COS3VD	-.46	.23
SIN3VD	-.22	-.02
COSWL	.03	.55*
SINWL	-.39	-.12
COS2WL	.63*	.14
SIN2WL	.20	-.21
COS3WL	.13	.66*
SIN3WL	.01	.33
KP1	-.34	.41
KP2	.15	.18
KP3	.33	.17
AP1	.16	.41
AP2	.15	.18
AP3	.33	.17
FIAU	.21	-.14
FEAR	.19	-.14
COSXS	.56*	-.38
SINXS	-.56*	.39

Note: * = $p < .05$

TABLE 9

SPEARMAN RHO CORRELATION OF VARIABLES WITH TURBOPAUSE HEIGHTS FOR FALL DATA SET

VARIABLES	MIDDLE LATITUDE N = 13	HIGH LATITUDE N = 6
COSVD	.09	-.04
SINVD	.51*	-.04
COS2VD	.12	-.19
SIN2VD	-.51*	.50*
COS3VD	-.11	-.04
SIN3VD	.33	.07
COSWL	.09	-.21
SINWL	.27	.56*
COS2WL	.01	.56*
SIN2WL	-.31	.79**
COS3WL	-.27	-.21
SIN3WL	-.25	-.13
KP1	-.14	.14
KP2	.03	.43
KP3	-.13	-.07
AP1	-.14	.14
AP2	.03	.43
AP3	-.13	-.07
FIAU	.01	.50*
FEAR	-.04	.50*
COSXS	-.07	-.27
SINXS	.10	.41

Note: * = $p < .05$
** = $p < .01$

3.5 Three-Dimensional Plots

Three-dimensional plots of the data were drawn using turbopause height, selected factors, and time of year on the X, Y, and Z axes. The time of year was included to observe, and control, the possible influences of this variable.

The 3-D plots are shown in Figures 1 - 5. A review of these figures reveals a circular pattern of scores. This result indicates that the relationship between turbopause height and other measures is affected by the time of year.

4. CONCLUSIONS

The outcome of this investigation demonstrates that measurements significantly associated with turbopause height do exist. This evidence is seen best when the data sets are divided into seasons. Moreover, these relationships also depict a circular profile that suggests a solar rotation effect.

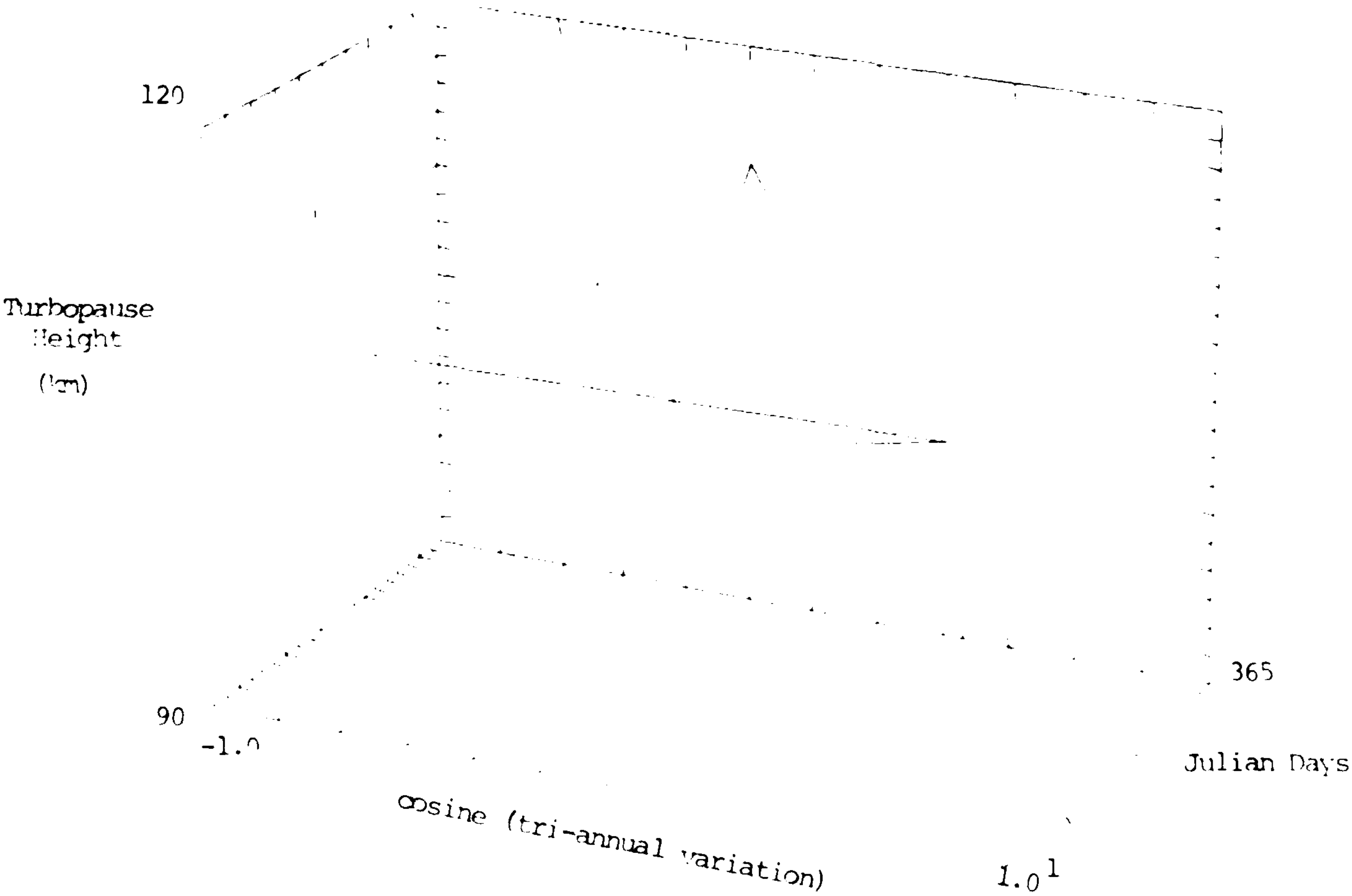

120
Turbopause
Height
(km)
90
-1.0
cosine (tri-annual variation)
1.0
1
365
Julian Days

FIGURE 1

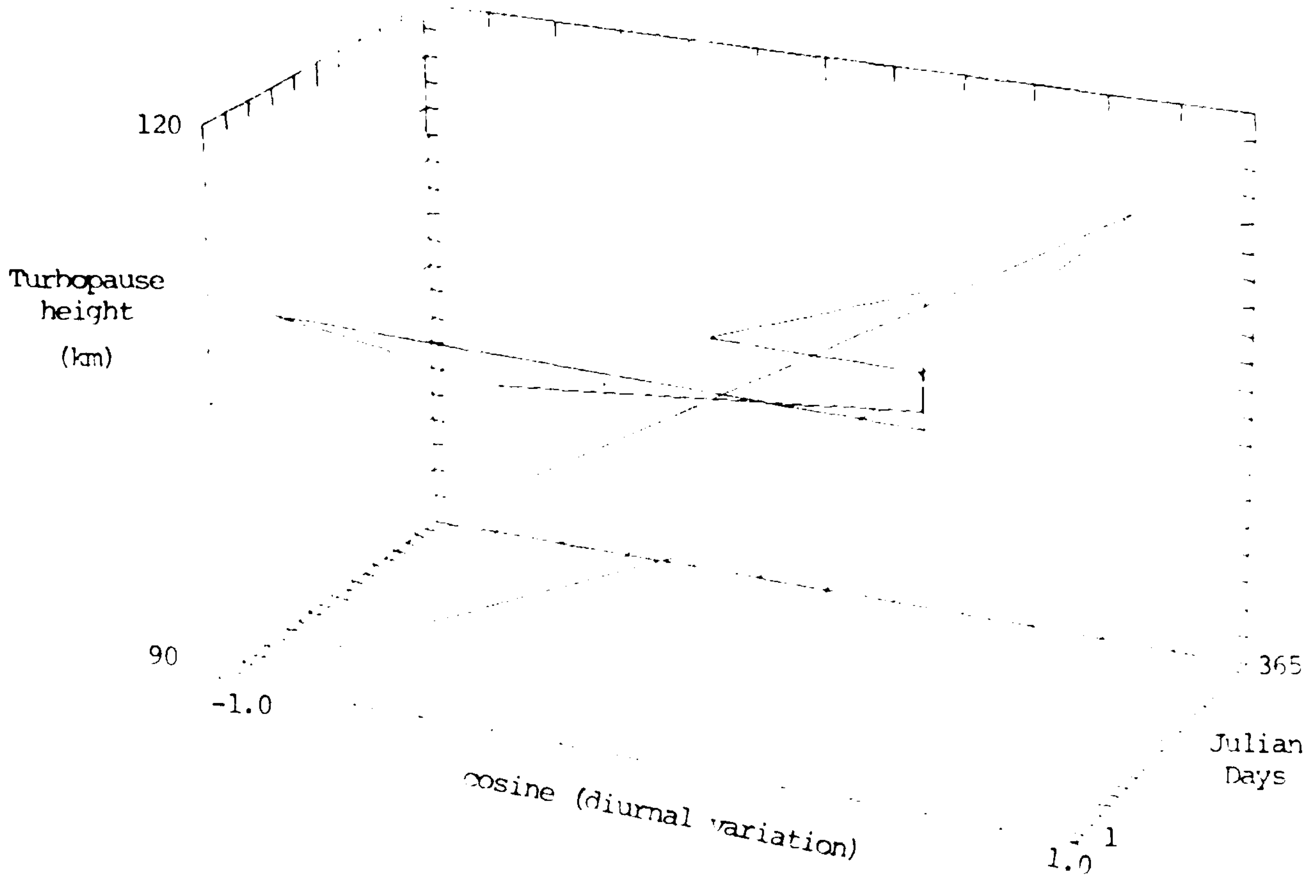
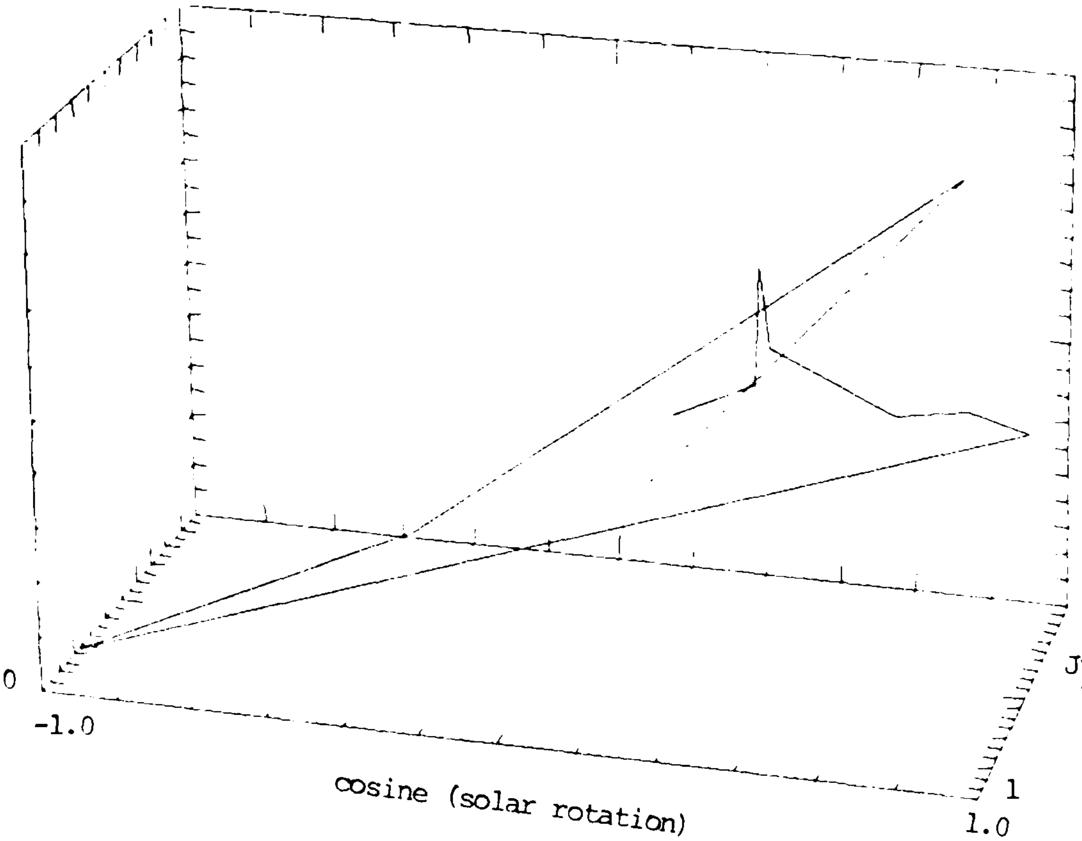
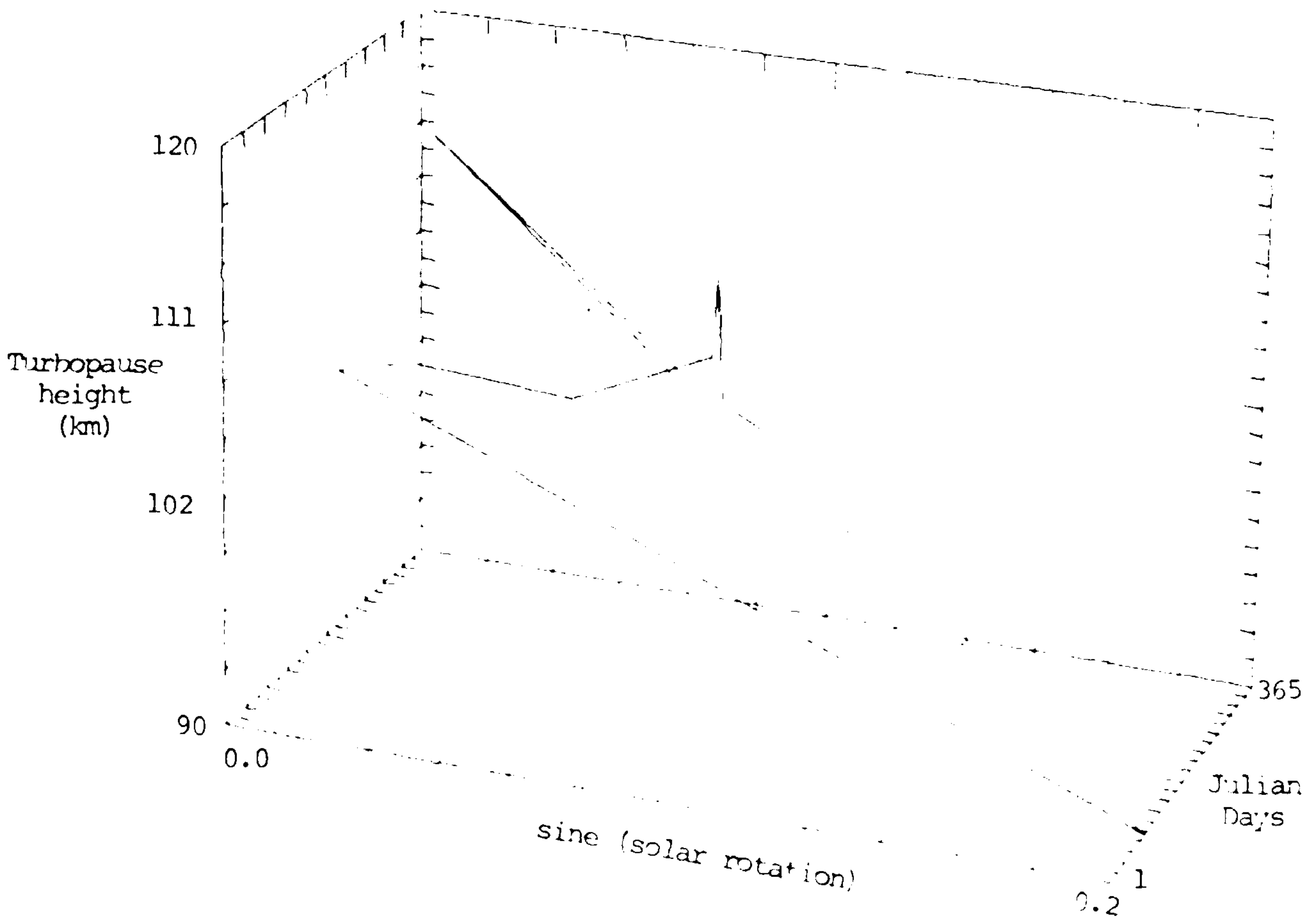

120
Turbopause
height
(km)
90
-1.0
cosine (diurnal variation)
1.0
1
365
Julian
Days

FIGURE 2



120
Turbopause
Height
(km)
90
-1.0
cosine (solar rotation)
1.0
365
Julian
Days
1

FIGURE 3



120
111
Turbopause
height
(km)
102
90
0.0
sine (solar rotation)
0.2
1
Julian
Days
365

FIGURE 4

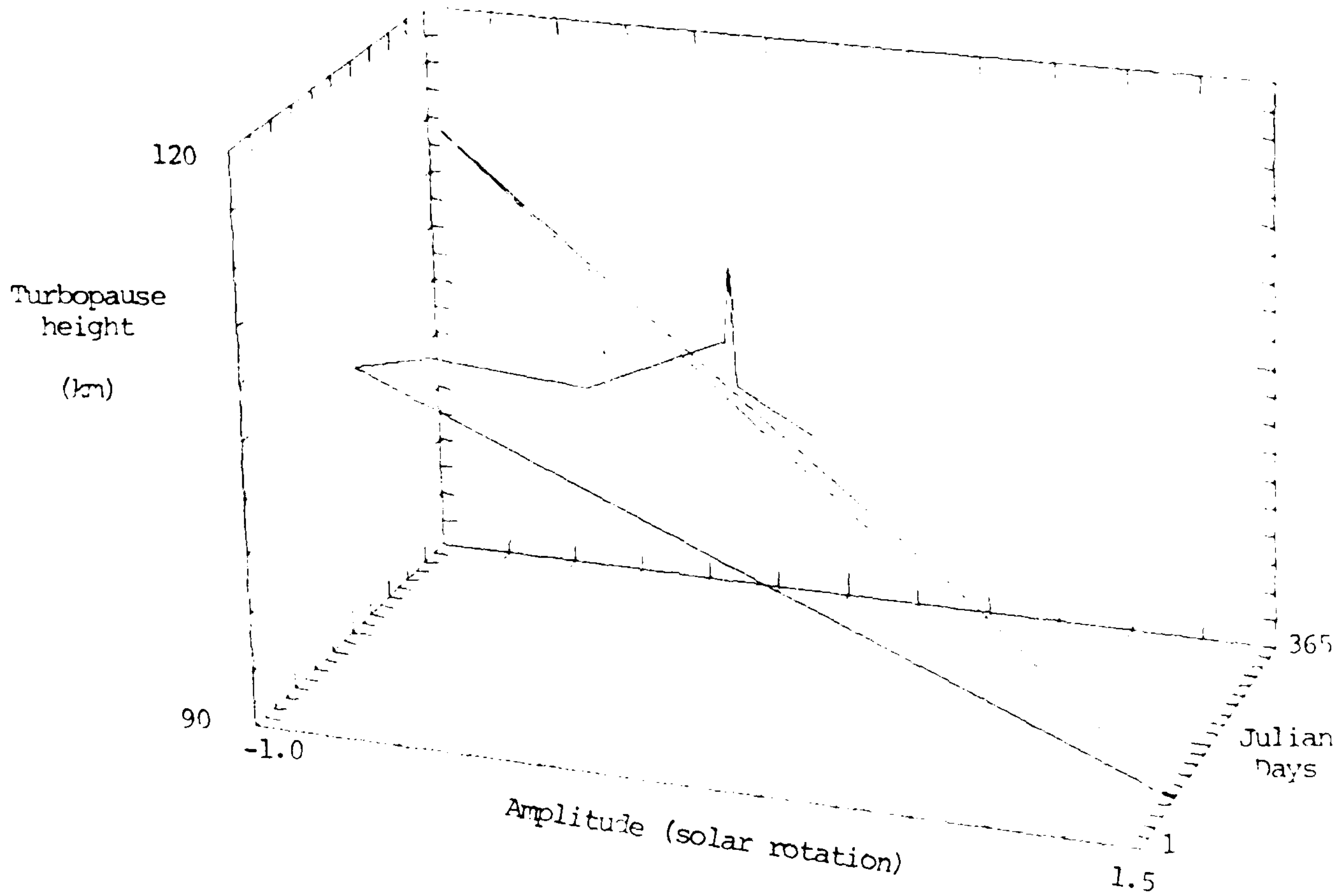

120
Turbopause
height
(km)
90
-1.0
Amplitude (solar rotation)
1.5
1
365
Julian
Days

FIGURE 5

REFERENCES

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THEMIS USER GUIDE FOR THE PURCHASE REQUEST SYSTEM

I. INTRODUCTION

THEMIS is a software product that aims to answer ordinary English language requests for information in the database. Its strength lies in its ability to interpret and respond to your queries, and sometimes even correct your errors!

This guide introduces you to THEMIS in a step-by-step fashion. It is written for people with little or no experience with computers. We have tried to explain what THEMIS can do and what its limitations are.

THEMIS has been customized for the AWUPS, the PRS, and the FAS databases, and all the examples used in this Guide have been drawn from them. We hope the Guide will be a valuable learning experience for you and would appreciate receiving ideas and suggestions for corrections or changes from all THEMIS users.

We are deeply indebted to the THEMIS Test & Evaluation Group and to the others who took the time to read through the draft and give us their valuable comments.

II. LOGGING IN

Each user is assigned a USERNAME and a PASSWORD upon receipt of an account. To log into the VAX, please type the following:

Username
Password

III. STARTING A THEMIS SESSION

Once you have logged in, you will automatically enter the MAIN MENU. To access THEMIS, choose Option {*} on the Main Menu of the PRS or Option 4 in the Main Menu of the Funding System.

You will then see the following screen:

```
*****************************************************************************
                Welcome to THEMIS Management Information System

                           by FREY ASSOCIATES, INC.
                        Artificial Intelligence Division

                 TM THEMIS is a trademark of FREY ASSOCIATES, INC.

                  THEMIS server version 1.1.08.BAC 07-May-1985

                  THEMIS driver version 1.1.07.SQL 10-May-1985

I am designed to answer queries about the contents of your database.  To
ask a question, just enter it in ordinary English, terminating your
question with a period, a question mark, or exclamation point.  To find out
about the kinds of information in your database, just ask me:

WHAT DO YOU KNOW ABOUT ?

Enter your request:
*****************************************************************************
```

You might want to ask THEMIS what it knows about - i.e., what tables it can access to answer your questions. To do that, type:

```
*---------------------------------*
*    WHAT DO YOU KNOW ABOUT ?     *
*---------------------------------*
                OR
*---------------------------------*
* WHAT TABLES DO YOU KNOW ABOUT?  *
*---------------------------------*
                OR
*---------------------------------*
*          SHOW TABLES.           *
*---------------------------------*
                OR
*---------------------------------*
*            PERFORM.             *
*---------------------------------*
```

A list of table names will be displayed. If you wish to know what information a certain table has, e.g., the PR-TRACKING table, type:

```
*--------------------------------------*
*  WHAT DO YOU KNOW ABOUT PR-TRACKING?  *
*--------------------------------------*
                  OR
*--------------------------------------*
*          PERFORM PR-TRACKING.         *
*--------------------------------------*
```

Some categories of information will be displayed and THEMIS will await an input from you. If you wish to be informed about TRACKING, choose Option 1 and hit RETURN.

```
*--------------------------------------*
*         1.  TRACKING                  *
*         2.  OTHER INFORMATION         *
*--------------------------------------*
```

A list of field names will be shown, e.g., PR LOCATION, PR STATUS, OBLIGATION ROUTE, etc.

If you wish to see information about a particular field, say:

```
*--------------------------------------*
*          SHOW PR LOCATION.            *
*--------------------------------------*
                  OR
*--------------------------------------*
*        SHOW DECISION ON TE.           *
*--------------------------------------*
```

IV. DEFINITIONS

Sometimes you may want to make your own definitions. Each THEMIS user will have personal and temporary definition privileges. While personal definitions are permanent in nature, temporary definitions get deleted whenever the Server is stopped, e.g., before an LVOCAB or a random interruption.

If you wish to make personal definitions, type:

```
*------------------------------------------*
*  THEMIS, SET PERSONAL DEFINITION MODE.   *
*------------------------------------------*
```

You can then make your own definitions that will become activated whenever you enter THEMIS under your THEMIS username. This will result in the creation of a file, USERNAME.DEF. For example, REBELLODB.DEF contains only the definitions made by username REBELLODB during a THEMIS session. If you wish to get rid of some of your personal definitions, please contact your THEMIS Manager. The following shows a typical situation that might induce you to create personal definitions:

```
*-------------------------------------------------------------------*
*   USER     :  LIST PRS FOR FY 86                                  *
*                                                                   *
*   THEMIS   :  In your last request I couldn't understand PRS.     *
*               Unable to process that query.                       *
*-------------------------------------------------------------------*
```

If you are already in personal definition mode, you might wish to define "PR". Referring to the Appendix, you'll find the database name PR_NUMBER for PR NUMBER. Using the database name, do the following:

```
*------------------------------------------------*
*          PR MEANS FIELD PR NUMBER.             *
*------------------------------------------------*
```

THEMIS still remembers your query "LIST PRS FOR FY86" and will respond to it once you have made the definition. The word "MEANS" implies that you are making a definition that THEMIS will understand.

If you wish to make a temporary definition, type:

```
*------------------------------------------------*
*     THEMIS, SET TEMPORARY DEFINITION MODE.     *
*------------------------------------------------*
```

You can make as many temporary definitions as you wish, but it is important to bear in mind that these definitions are not documented. If you forget what definitions were made, neither you nor your THEMIS Manager can track them down. Also, these definitions will cease to exist if and when the Server is stopped.

If you forget what definition mode you are currently in, type:

```
*------------------------------------------------*
*         THEMIS, SHOW DEFINITION MODE.          *
*------------------------------------------------*
```

N.B. You can customize your own headings through the use of one of the above definition modes, e.g.:

```
*-----------------------------------------------*
*  PR AM IS THE HEADING FOR FIELD PR AMENDMENT.  *
*-----------------------------------------------*
```

V. REPORT GENERATION

THEMIS can print out the results of any successful query. After the results are displayed on the screen, type:

```
*-----------------------------------------------*
*                  PRINT THAT.                  *
*-----------------------------------------------*
```

If you wish to generate multiple copies of the query result, e.g., five copies, type:

```
*-----------------------------------------------*
*              PRINT THAT 5 TIMES.              *
*-----------------------------------------------*
```

Both of these PRINT statements will send a printout of the entire response (not just a single screen) to the default printer. This statement can be used to tailor reports as well. When the results are displayed on the screen, type:

```
*-----------------------------------------------*
*       {reportname}  MEANS PRINT THAT.         *
*-----------------------------------------------*
```

To send the report to the printer in the future, type:

```
*-----------------------------------------------*
*                 {reportname}.                 *
*-----------------------------------------------*
```

EXAMPLE

STEP 1:

SHOW PR NUMBERS WITH DIRECT SUPPORT TO AWS FOR LY.

The above query will generate all PR's for LY Work Unit Numbers with direct support to AWS.

STEP 2:

You might want to keep this permanently as a report to be viewed from time to time. To do that, give your report a name, e.g., AWS REPORT OF DIRECT SUPPORT FOR LY.

AWS REPORT OF DIRECT SUPPORT FOR LY MEANS PRINT THAT.

STEP 3:

The next time you wish to produce the report, simply type the report name at the "Enter your request", namely:

AWS REPORT OF DIRECT SUPPORT FOR LY.

VI. PLOTTING GRAPHS

THEMIS can plot the results of SOME successful queries on GRAPHIC TERMINALS ONLY. After the query results have appeared on the screen, type:

```
*------------------------------------*
*             PLOT THAT.             *
*------------------------------------*
```

Try not to ask for a great many fields on your graph, since this will unnecessarily delay THEMIS' response time. Ask for information relating to only a few (1 or 2) items at a time.

Several plotting options are available. Depending on your needs, type one of the following at the "Enter your request":

*** BAR
*** LINE
*** PIE
*** STACKED BAR
*** LINEAR REGRESSION

VII. COMPLAINTS & SUGGESTIONS

If you wish to communicate your concerns or suggestions to your THEMIS Manager, you can use the GRIPE Facility. Its format is as follows:

```
*---------------------------------*
*          GRIPE {your comment}.   *
*---------------------------------*
```

EXAMPLE

```
*----------------------------------------------------------*
*  GRIPE THEMIS DID NOT SHOW ME THE COLUMN THAT I ASKED FOR.  *
*----------------------------------------------------------*
```

THEMIS assumes that you are griping about the last query you made and documents your query and your comment in the GRIPE.DAT file. In other words, you need not type out the query you are complaining about.

Please note: the presence of a period in the GRIPE comment tells THEMIS that you have completed your sentence and comment. So, avoid periods if you can, or else put the text in quotes as shown below.

```
*----------------------------------------------------------------*
* GRIPE "THEMIS DID NOT SHOW ME THE COL I ASKED FOR. THAT MAKES ME MAD.".*
*----------------------------------------------------------------*
```

The GRIPE facility provides valuable feedback to your THEMIS Manager; therefore, we suggest that you use it whenever possible.

Please note that if you had to cancel a procedure via a CTRL C, you may still gripe your comment. THEMIS remembers your query prior to the interruption.

VIII. ARITHMETIC & LOGICAL OPERATIONS

THEMIS can perform certain types of calculations on the information in its database. In general, THEMIS cannot make more than one computation per query. If you need multiple calculations, you are advised to split the query into component queries.

EXAMPLES

```
*----------------------------------------------------------------*
*        WHAT IS THE TOTAL NUMBER OF PR'S FOR FY 86 ?              *
*                                                                  *
*        COUNT THE PR'S WITH SOLE SOURCE.                          *
*                                                                  *
*        SHOW THE INITIATOR WITH THE HIGHEST ITEM AMOUNT.          *
*                                                                  *
*        SORT PREPARERS IN DESCENDING SEQUENCE.                    *
*----------------------------------------------------------------*
```

In general, THEMIS can do the following mathematical operations:

*** ADDITION

*** SUBTRACTION

*** MULTIPLICATION

*** DIVISION

*** PERCENTAGES

*** COUNT

*** TOTAL

*** AVERAGE

*** MAXIMUM (highest, largest, most)

*** MINIMUM (lowest, smallest, least)

*** EQUAL TO (same as)

*** GREATER THAN (higher than, larger than, more than)

*** LESS THAN (lower than, smaller than)

*** ALPHABETIC/NUMERIC SORTING (ascending/descending order)

IX. CREATING VOCABULARY

To create vocabulary, you must be in one of the definition modes - temporary or personal.

A. MEANS STATEMENT

```
    *----------------------------------------------------*
1.  *     {synonym} MEANS FIELD {field name} [IN {table}]. *
    *----------------------------------------------------*
```

The word "synonym" here refers to a word or a group of words you have chosen to designate to a field name. A phrase will prompt THEMIS to go through a grammar session with you, whereby you will have to answer in the affirmative or in the negative as to whether a word/phrase is a noun or an adjective. The [IN {table}] is optional.

EXAMPLES:

MONITOR MEANS FIELD PREPARER_NAME IN TABLE PRTITLE.

MONITOR MEANS FIELD PREPARER_NAME.

```
    *----------------------------------------------------*
2.  *              {phrase} MEANS {meaning}                *
    *----------------------------------------------------*
```

```
     *-----------------------------------------------------*
3.   *             {phrase} MEANS TABLE {table}.           *
     *-----------------------------------------------------*
```

Example (2) tells THEMIS about the noun phrases that refer to items in your database or to other phrases that have already been defined. Example (3) teaches THEMIS that the meaning of the phrase is a table in the database.

EXAMPLES:

PERFORM MEANS WHAT DO YOU KNOW ABOUT.

PURCHASE REQUEST ITEMS MEANS TABLE PRITEMS.

```
     *-----------------------------------------------------*
4.   *             {phrase} MEANS FIELD = {"value"}        *
     *-----------------------------------------------------*
```

This teaches THEMIS that the meaning of the phrase is a value in the database.

EXAMPLES:

PRIORITY IS URGENT MEANS PRIORITY = "U".

BASIC VERSION MEANS PR_AMENDMENT = 0.

```
     *-----------------------------------------------------*
5.   *             {phrase} MEANS {formula}.               *
     *-----------------------------------------------------*
```

This tells THEMIS that the phrase refers to an arithmetic function involving two or more fields, or one field and a constant.

EXAMPLE:

FUTURE FUNDS MEANS FY_PLUS_1 + FY_PLUS_2.+

B. HEADINGS

```
     *-----------------------------------------------------*
     *  {heading} IS THE HEADING FOR FIELD {field name}.   *
     *-----------------------------------------------------*
```

This defines a heading to be displayed for a field and also defines the heading to be a synonym for the field.

+Please refer to the Appendix for information about fieldname or database name.

EXAMPLE:

PURCHASE REQUEST NUMBER IS THE HEADING FOR FIELD PR_NUMBER.[+]

C. SINGULAR AND PLURAL FORMS

```
*--------------------------------------------------------*
*        {singular} IS THE SINGULAR OF {plural}.         *
*--------------------------------------------------------*
                           OR
*--------------------------------------------------------*
*        {plural} IS THE PLURAL OF {singular}.           *
*--------------------------------------------------------*
```

D. VERBS

```
   *--------------------------------------------------------*
1. *        {verb} IS A VERB REFERRING TO {field}.          *
   *--------------------------------------------------------*
```

EXAMPLE:

APPROVE IS A VERB REFERRING TO APPROVER_NAME.

```
   *--------------------------------------------------------*
2. *        THE VERB {verb} TESTS FOR {field}.              *
   *--------------------------------------------------------*
```

EXAMPLE:

THE VERB OBLIGATE TESTS FOR OBLIGATION_DATE.[+]

E. MEASUREMENTS

```
*--------------------------------------------------------*
*        {field} IS MEASURED IN {unit}.                  *
*--------------------------------------------------------*
```

EXAMPLE:

ITEM_AMOUNT IS MEASURED IN DOLLARS.[+]

[+]Please refer to the Appendix for information about fieldname or database name.

F. FORMATTING STATEMENTS

```
   *-----------------------------------------------------*
1. *          PUT A DOLLAR SIGN IN {field}.              *
   *-----------------------------------------------------*
```

EXAMPLE:

PUT A DOLLAR SIGN IN ITEM_AMOUNT.

2. OTHER FORMATTING STATEMENTS

```
*-----------------------------------------------------*
*      a. DISPLAY {n} DECIMAL PLACES FOR {field}.     *
*      b. PUT COMMAS IN {field}.                      *
*      c. DISPLAY {n} DIGITS FOR {field}.             *
*-----------------------------------------------------*
```

EXAMPLES

a. DISPLAY 2 DECIMAL PLACES FOR ITEM_AMOUNT.

b. PUT COMMAS IN ITEM_AMOUNT.

c. DISPLAY 11 DIGITS FOR ITEM_AMOUNT.

G. COMMANDS

THEMIS has been taught to execute several specific functions when instructed to do so. The following commands must begin with the word "THEMIS"; commas are optional. For additional commands, please refer to the THEMIS Manager's Guide.

<u>THEMIS, SET {personal/temporary} DEFINITION MODE.</u>

This sets you up in a definition mode, thereby enabling you to make personal or temporary definitions.

<u>THEMIS, SHOW DEFINITION MODE.</u>

THEMIS tells you what definition mode you are in.

<u>THEMIS, SET CLEAR SCREEN {on/off}.</u>

This determines whether THEMIS automatically clears the screen before displaying the response to your query.

WHAT DID YOU DO ? or SHOW WHAT YOU DID.

This displays THEMIS' English rephrasing of the last request you entered.

EXPLAIN {word/phrase}.

THEMIS will tell you how it interprets words that have been defined from the tables. It will not explain parts of words and/or phrases that you have defined or which are contained in its reserved or standard vocabulary set.

REPEAT.

This command will repeat THEMIS' response after a successful query. You can ask for additional fields as shown below.

EXAMPLES:

1. SHOW URGENT PR'S.
2. REPEAT AND SHOW PREPARERS.

While (1) will show you a list of urgent Purchase Requests, (2) will display those same Purchase Requests along with Preparers. The repeat command economizes on typing.

XI. WHEN IS THEMIS UNAVAILABLE ?

You will not be able to access THEMIS during any one of the following situations:

*** IVOCAB - i.e., THEMIS or the THEMIS Manager loading new vocabulary. Sometimes this function is automatic.

*** LVOCAB - i.e., your THEMIS Manager is loading the entire vocabulary.

*** MAKE REMOTE IMAGE - i.e., your THEMIS manager is making a copy of the executable file.

*** MEMORY COMPRESSION - THEMIS is performing a memory allocation function for efficiency purposes. This always follows an LVOCAB.

*** THEMIS STOPPED - THEMIS needs to be stopped sometimes to perform certain operations. At other times, it can stop due to random system interruptions.

*** ACCESS DISABLED - Your THEMIS manager may periodically have to disable your access to THEMIS during some types of testing. You will be notified in advance, if possible.

*** SYSTEM PROBLEMS - THEMIS will be unavailable during maintenance work on the VAX.

XII. TERMINATING A SESSION

You can terminate a THEMIS session by entering "BYE" at the "Enter your request". In addition to "BYE", any of the following terms can be used to exit from THEMIS.

* LO.
* LOGOUT.
* LOGOFF.
* GOODBYE.
* GET LOST.

Using one of the above terms will bring you back to the MAIN MENU of PRS.

You may also customize your own term for exiting from THEMIS, e.g.,

```
*-----------------------------------------------------*
*            UNTIL NEXT TIME MEANS BYE.               *
*-----------------------------------------------------*
```

We strongly recommend that you DO NOT use the CTRL Y key. We cannot emphasize this enough. Exiting with a CTRL Y will disable you from accessing THEMIS later. THEMIS tends to think that you are still on and will tell you that "someone else is currently using your VMS username".

If THEMIS takes unduly long to respond to a query, do a CTRL C.

XIII. POINTS TO REMEMBER

Last, but not least, remember T H E M I S !

T - TIME is an important issue. Rephrasing your queries will affect response time. If problems arise, make use of the GRIPE facility.

H - Use the HELP facility whenever you run into a problem. Simply type HELP at the "Enter your request" statement.

E - Before you END a THEMIS session, make sure that you have a list of all the important Temporary Definitions that you made and which you would like to make permanent when you access THEMIS next time.

M - THEMIS can process only one MATH request at a time. So do not ask for three column totals simultaneously!

I - THEMIS is an INTERACTIVE query processor, not a report or a graph generator. Please note that these capabilities are limited. You might want to use a separate software for your report and graphics needs.

S - Keep your queries SIMPLE and direct. The kind of phraseology you use is important for the efficient performance of THEMIS.

* * * *

A P P E N D I X

ADDITION OF PURCHASE REQUEST NUMBERS

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	INITIATOR	INITIATOR	INITIATOR	
3.	ORG_SYM	ORG_SYM	ORG_SYM	
4.	ASSIGNED ON	ASSIGNED ON	DATE_ASSIGNED	

CHANGE/DELETION/DISPLAY OF PURCHASE REQUEST NUMBER

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	INITIATOR	INITIATOR	INITIATOR	
3.	ORG_SYM	ORG_SYM	ORG_SYM	
4.	ASSIGNED ON	ASSIGNED ON	DATE_ASSIGNED	
5.	RECEIVED ON	RECEIVED ON	DATE_RECEIVED	
6.	CONTRACT NUMBER	CONTRACT NUMBER	CONTRACT_NUMBER	CONTRACT NO
7.	WU NUMBER	WOK UNIT NUMBER	WU_NUMBER	JON, WU, JOCAS, WORK UNIT NUMBER
8.	FUNDED PR	FUNDED PR	FUNDED PR	
9.	PR FUNDS	PR FUNDS	PR FUNDS	

RECEIPT OF A PURCHASE REQUEST

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	RECEIVED ON	RECEIVED ON	DATE_RECEIVED	
3.	WU NUMBER	WU NUMBER	WU_NUMBER	JON, WU, JOCAS, WORK UNIT NUMBER
4.	CONTRACTOR ORGANIZATION	CONTRACTOR ORGANIZATION	CONTRACT_ORG	
5.	SOURCE	SOURCE	SOURCE	
			SOURCE = "1"	SOLE SOUCE
			SOURCE = "2"	COMPETITIVE
			SOURCE = "3"	TO BE DETERMINED

ADDITION OF A PURCHASE REQUEST (SCREEN 1 of 3)

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	ASSIGNED ON	ASSIGNED ON	DATE_ASSIGNED	
3.	ORG_SYM	ORG_SYM	ORG_SYM	
4.	INITIATOR	INITIATOR	INITIATOR	
5.	COSATI	COSATI	COSATI	
6.	SATFOI	SATFOI	SATFOI	
7.	PROCUREMENT ACTIVITY	PROCUREMENT ACTIVITY	PROCUREMENT_ACTIVITY	
8.	PROCUREMENT TYPE	PROCUREMENT TYPE	TYPE_PROCUREMENT	
9.	PRIORITY	PRIORITY	PRIORITY	
			PRIORITY = "R"	ROUTINE
			PRIORITY = "U"	URGENT
10.	PREPARED ON	PREPARED ON	DATE_PREPARED_PR	
11.	DATE RECEIVED	DATE RECEIVED	DATE_RECEIVED_PR	
12.	TITLE CODE	TITLE CODE	TITLE_CODE(1,1)	
13.	TITLE CODE	TITLE CODE	TITLE_CODE(3,20)	

ADDITION OF A PURCHASE REQUEST (SCREEN 2 of 3)

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	PR AMENDMENT	PR AMENDMENT	PR_AMENDMENT	
3.	LINE ITEM	LINE ITEM	LINE_ITEM	
4.	ITEM DESCRIPTION	ITEM DESCRIPTION	ITEM_DESCRIPTION	
5.	DELIVERY ON	DELIVERY ON	DELIVERY_DATE	
6.	OTHER INFORMATION	OTHER INFORMATION	OTHER_INFORMATION	
7.	COST CENTER	COST CENTER	COST_CENTER	
8.	EEIC	EEIC	EEIC	
9.	ITEM AMOUNT PRE_INITIATED_AMOUNT	ITEM AMOUNT PRE_INITIATED_AMOUNT	ITEM_AMOUNT PRE_INITIATED_AMOUNT	
10.	WORK UNIT TYPE	WORK UNIT TYPE	INDICATOR INDICATOR = "C" INDICATOR = "I"	 CWU, CONTRACT, CWU NUMBER IHWU, INHOUSE, IHWU NUMBER
11.	WU NUMBER	WORK UNIT NUMBER	WU_NUMBER	JON, WU, JOCAS, WORK UNIT NUMBER
12.	YEAR OF FUNDS	YEAR OF FUNDS	YEAR_OF_FUNDS	
13.	FUNDTYPE	FUNDTYPE	CATEGORY_OF_FUNDS	FUND CATEGORY
14.	PROGRAM ELEMENT	PROGRAM ELEMENT	PROGRAM_ELEMENT	P.E.
15.	TASK PRE_TASK	TASK PRE_TASK	TASK PRE_TASK	

ADDITION OF A PURCHASE REQUEST (SCREEN 3 of 3)

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	PR AMENDMENT	PR AMENDMENT	PR_AMENDMENT	
3.	REMARK_MADE	REMARK_MADE	REMARK_MADE	
4.	PREPARER	PREPARER	PREPARER_NAME	
5.	PREPARER TITLE	PREPARER TITLE	PREPARER_TITLE	
6.	APPROVER	APPROVER	APPROVER_NAME	
7.	DESIGNATION	DESIGNATION	APPROVER_TITLE	

ADD STEPS TO A PR PATH (SCREEN 1 OF 8) DIVISION

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	PR LOCATION	PR LOCATION	PR_LOCATION	
3.	STATUS	STATUS	STATUS	
			STATUS="N"	NEW
			STATUS="C"	ONGOING
4.	SOURCE	SOURCE	SOURCE	
			SOURCE="1"	SOLE SOURCE
			SOURCE="2"	COMPETITIVE
			SOURCE="3"	TO BE DETERMINED
5.	INSTITUTION	INSTITUTION	INSTITUTION	
			INSTITUTION="1	US UNIV
			INSTITUTION="2"	FOREIGN UNIV
			INSTITUTION="3"	INDUSTRY
			INSTITUTION="4"	GOVT AGENCY
			INSTITUTION="5"	TBD
6.	INSTRUMENT TYPE	INSTRUMENT TYPE	INSTRUMFNT_TYPE	INSTRUMENT
			INSTRUMENT_TYPE="1"	CONTRACTUAL
			INSTRUMENT_TYPE="2"	GRANT
			INSTRUMENT_TYPE="3"	FUND TRANSFER
7.	CONTRACTOR ORGANIZATION	CONTRACTOR ORGANIZATION	CONTRACTOR_ORG	CONTRACTOR ORG
8.	CONTRACT MANAGER	CONTRACT MANAGER	CONTRACT_MANAGER	MANAGER
9.	PHONE	PHONE	PHONE	EXTENSION
10.	DIVISION NAME	DIVISION NAME	DIVISION_NAME	
11.	RECEIVED BY DIVISION	RECEIVED BY DIVISION	AT_DIVISION	
12.	REVIEW COMPLETE	REVIEW COMPLETE	REVIEW_COMPLETE_ON	
13.	APPROVAL STATUS FOR DIVISION	APPROVAL STATUS FOR DIVISION	APPROVAL_STATUS_FOR_DIV	

ADD STEPS TO A PR PATH (SCREEN 2 OF 8) REMARKS

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	PR LOCATION	PR LOCATION	PR_LOCATION	
3.	STATUS	STATUS	STATUS	
			STATUS="N"	NEW
			STATUS="C"	ONGOING
4.	SOURCE	SOURCE	SOURCE	
			SOURCE="1"	SOLE SOURCE
			SOURCE="2"	COMPETITIVE
			SOURCE="3"	TO BE DETERMINED
5.	INSTITUTION	INSTITUTION	INSTITUTION	
			INSTITUTION="1"	US UNIV
			INSTITUTION="2"	FOREIGN UNIV
			INSTITUTION="3"	INDUSTRY
			INSTITUTION="4"	GOVT AGENCY
			INSTITUTION="5"	TBD
6.	INSTRUMENT TYPE	INSTRUMENT TYPE	INSTRUMENT_TYPE	INSTRUMENT
			INSTRUMENT_TYPE="1"	CONTRACTUAL
			INSTRUMENT_TYPE="2"	GRANT
			INSTRUMENT_TYPE="3"	FUND TRANSFER
7.	CONTRACTOR ORGANIZATION	CONTRACTOR ORGANIZATION	CONTRACTOR_ORG	CONTRACTOR ORG
8.	CONTRACT MANAGER	CONTRACT MANAGER	CONTRACT_MANAGER	MANAGER
9.	PHONE	PHONE	PHONE	EXTENSION
10.	REMARK LINE	REMARK LINE	REMARK_LINE	

ADD STEPS TO A PR PATH (SCREEN 3 OF 8) MIPR CONTROL

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	PR LOCATION	PR LOCATION	PR_LOCATION	
3.	STATUS	STATUS	STATUS	
			STATUS="N"	NEW
			STATUS="C"	ONGOING
4.	SOURCE	SOURCE	SOURCE	
			SOURCE="1"	SOLE SOURCE
			SOURCE="2"	COMPETITIVE
			SOURCE="3"	TO BE DETERMINED
5.	INSTITUTION	INSTITUTION	INSTITUTION	
			INSTITUTION="1"	US UNIV
			INSTITUTION="2"	FOREIGN UNIV
			INSTITUTION="3"	INDUSTRY
			INSTITUTION="4"	GOVT AGENCY
			INSTITUTION="5"	TBD
6.	INSTRUMENT TYPE	INSTRUMENT TYPE	INSTRUMENT_TYPE	INSTRUMENT
			INSTRUMENT_TYPE="1"	CONTRACTUAL
			INSTRUMENT_TYPE="2"	GRANT
			INSTRUMENT_TYPE="3"	FUND TRANSFER
7.	CONTRACTOR ORGANIZATION	CONTRACTOR ORGANIZATION	CONTRACTOR_ORG	CONTRACTOR ORG
8.	CONTRACT MANAGER	CONTRACT MANAGER	CONTRACT_MANAGER	MANAGER
9.	PHONE	PHONE	PHONE	EXTENSION
10.	DATE SENT TO MIPR	DATE SENT TO MIPR	DATE_SENT_TO_MIPR	

ADD STEPS TO A PR PATH (SCREEN 4 OF 8) PKR

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	PR LOCATION	PR LOCATION	PR_LOCATION	
3.	STATUS	STATUS	STATUS	
			STATUS="N"	NEW
			STATUS="C"	ONGOING
4.	SOURCE	SOURCE	SOURCE	
			SOURCE="1"	SOLE SOURCE
			SOURCE="2"	COMPETITIVE
			SOURCE="3"	TO BE DETERMINED
5.	INSTITUTION	INSTITUTION	INSTITUTION	
			INSTITUTION="1"	US UNIV
			INSTITUTION="2"	FOREIGN UNIV
			INSTITUTION="3"	INDUSTRY
			INSTITUTION="4"	GOVT AGENCY
			INSTITUTION="5"	TBD
6.	INSTRUMENT TYPE	INSTRUMENT TYPE	INSTRUMENT_TYPE	INSTRUMENT
			INSTRUMENT_TYPE="1"	CONTRACTUAL
			INSTRUMENT_TYPE="2"	GRANT
			INSTRUMENT_TYPE="3"	FUND TRANSFER
7.	CONTRACTOR ORGANIZATION	CONTRACTOR ORGANIZATION	CONTRACTOR_ORG	CONTRACTOR ORG
8.	CONTRACT MANAGER	CONTRACT MANAGER	CONTRACT_MANAGER	MANAGER
9.	PHONE	PHONE	PHONE	EXTENSION
10.	RECEIVED BY PKR	RECEIVED BY PKR	DATE_RECEIVED_BY_PKR	
11.	APPROVAL FOR PKR	APPROVAL FOR PKR	APPROVAL_FOR_PKR	
12.	RETURNED FROM PKR	RETURNED FROM PKR	DATE_RETURNED_FROM_PKR	

ADD STEPS TO A PR PATH (SCREEN 5 OF 8) BUYER

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	PR LOCATION	PR LOCATION	PR_LOCATION	
3.	STATUS	STATUS	STATUS	
			STATUS="N"	NEW
			STATUS="C"	ONGOING
4.	SOURCE	SOURCE	SOURCE	
			SOURCE="1"	SOLE SOURCE
			SOURCE="2"	COMPETITIVE
			SOURCE="3"	TO BE DETERMINED
5.	INSTITUTION	INSTITUTION	INSTITUTION	
			INSTITUTION="1"	US UNIV
			INSTITUTION="2"	FOREIGN UNIV
			INSTITUTION="3"	INDUSTRY
			INSTITUTION="4"	GOVT AGENCY
			INSTITUTION="5"	TBD
6.	INSTRUMENT TYPE	INSTRUMENT TYPE	INSTRUMENT_TYPE	INSTRUMENT
			INSTRUMENT_TYPE="1"	CONTRACTUAL
			INSTRUMENT_TYPE="2"	GRANT
			INSTRUMENT_TYPE="3"	FUND TRANSFER
7.	CONTRACTOR ORGANIZATION	CONTRACTOR ORGANIZATION	CONTRACTOR_ORG	CONTRACTOR ORG
8.	CONTRACT MANAGER	CONTRACT MANAGER	CONTRACT_MANAGER	MANAGER
9.	PHONE	PHONE	PHONE	EXTENSION
10.	BUYER	BUYER	BUYER	

ADD STEPS TO A PR PATH (SCREEN 6 OF 8) TECHNICAL EVALUATION (TE)

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	PR LOCATION	LOCATION	LOCATION	
3.	STATUS	STATUS	STATUS	
			STATUS="N"	NEW
			STATUS="C"	ONGOING
4.	SOURCE	SOURCE	SOURCE	
			SOURCE="1"	SOLE SOURCE
			SOURCE="2"	COMPETITIVE
			SOURCE="3"	TO BE DETERMINED
5.	INSTITUTION	INSTITUTION	INSTITUTION	
			INSTITUTION="1"	US UNIV
			INSTITUTION="2"	FOREIGN UNIV
			INSTITUTION="3"	INDUSTRY
			INSTITUTION="4"	GOVT AGENCY
			INSTITUTION="5"	TBD
6.	INSTRUMENT TYPE	INSTRUMENT TYPE	INSTRUMENT_TYPE	INSTRUMENT
			INSTRUMENT_TYPE="1"	CONTRACTUAL
			INSTRUMENT_TYPE="2"	GRANT
			INSTRUMENT_TYPE="3"	FUND TRANSFER
7.	CONTRACTOR ORGANIZATION	CONTRACTOR ORGANIZATION	CONTRACTOR_ORG	CONTRACTOR ORG
8.	CONTRACT MANAGER	CONTRACT MANAGER	CONTRACT_MANAGER	MANAGER
9.	PHONE	PHONE	PHONE	EXTENSION
10.	SENT TO TE	SENT TO TE	DATE_SENT_TO_TE	
11.	RECEIVED AT TE	RECEIVED AT TE	DATE_RECEIVED_AT_TE	
12.	SUSPENSION DATE	SUSPENSION DATE	SUSPENSION_DATE	
13.	FIRST EXTENSION	FIRST EXTENSION	EXTENSION_DATE_1	
14.	SECOND EXTENSION	SECOND EXTENSION	EXTENSION_DATE_2	
15.	RETURNED FROM TE	RETURNED FROM TE	DATE_RETURNED_FROM_TE	

ADD STEPS TO A PR PATH (SCREEN 7 OF 8) OBLIGATION

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	PR LOCATION	PR LOCATION	PR_LOCATION	
3.	STATUS	STATUS	STATUS	
			STATUS="N"	NEW
			STATUS="C"	ONGOING
4.	SOURCE	SOURCE	SOURCE	
			SOURCE="1"	SOLE SOURCE
			SOURCE="2"	COMPETITIVE
			SOURCE="3"	TO BE DETERMINED
5.	INSTITUTION	INSTITUTION	INSTITUTION	
			INSTITUTION="1"	US UNIV
			INSTITUTION="2"	FOREIGN UNIV
			INSTITUTION="3"	INDUSTRY
			INSTITUTION="4"	GOVT AGENCY
			INSTITUTION="5"	TBD
6.	INSTRUMENT TYPE	INSTRUMENT TYPE	INSTRUMENT_TYPE	INSTRUMENT
			INSTRUMENT_TYPE="1"	CONTRACTUAL
			INSTRUMENT_TYPE="2"	GRANT
			INSTRUMENT_TYPE="3"	FUND TRANSFER
7.	CONTRACTOR ORGANIZATION	CONTRACTOR ORGANIZATION	CONTRACTOR_ORG	CONTRACTOR ORG
8.	CONTRACT MANAGER	CONTRACT MANAGER	CONTRACT_MANAGER	MANAGER
9.	PHONE	PHONE	PHONE	EXTENSION
10.	OBLIGATION DATE	OBLIGATION DATE	OBLIGATION_DATE	
			OBLIGATION_DATE=0	UNOBLIGATED
11.	CONTRACT NUMBER	CONTRACT NUMBER	CONTRACT_NUMBER	CONTRACT NO
12.	STARTING DATE	STARTING DATE	START_DATE	
13.	ENDING DATE	ENDING DATE	END_DATE	
14.	PR FUNDS	PR FUNDS	PR_FUNDS	

ADD STEPS TO A PR PATH (SCREEN 8 OF 8) PR LINE ITEM

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	PR LOCATION	PR LOCATION	PR_LOCATION	
3.	STATUS	STATUS	STATUS	
			STATUS="N"	NEW
			STATUS="C"	ONGOING
4.	SOURCE	SOURCE	SOURCE	
			SOURCE="1"	SOLE SOURCE
			SOURCE="2"	COMPETITIVE
			SOURCE="3"	TO BE DETERMINED
5.	INSTITUTION	INSTITUTION	INSTITUTION	
			INSTITUTION="1"	US UNIV
			INSTITUTION="2"	FOREIGN UNIV
			INSTITUTION="3"	INDUSTRY
			INSTITUTION="4"	GOVT AGENCY
			INSTITUTION="5"	TBD
6.	INSTRUMENT TYPE	INSTRUMENT TYPE	INSTRUMENT_TYPE	INSTRUMENT
			INSTRUMENT_TYPE="1"	CONTRACTUAL
			INSTRUMENT_TYPE="2"	GRANT
			INSTRUMENT_TYPE="3"	FUND TRANSFER
7.	LINE ITEM	LINE ITEM	LINE_ITEM	
8.	ITEM DESCRIPTION	ITEM DESCRIPTION	ITEM_DESCRIPTION	
9.	DELIVERY ON	DELIVERY ON	DELIVERY_DATE	
10.	INFORMATION	OTHER INFORMATION	OTHER_INFORMATION	
11.	COST CENTER	COST CENTER	COST_CENTER	
12.	EEIC	EEIC	EEIC	
13.	ITEM AMOUNT	ITEM AMOUNT	ITEM_AMOUNT	
14.	WORK UNIT TYPE	WORK UNIT TYPE	INDICATOR	
			INDICATOR = "C"	CONTRACT, CWU NUMBER, CWU
			INDICATOR = "I"	INHOUSE, IHWU, IHWU NUMBER

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
15.	WU NUMBER	WORK UNIT NUMBER	WU_NUMBER	JON, JOCAS, WORK UNIT NUMBER, WU
16.	FUNDTYPE	FUNDTYPE	CATEGORY_OF_FUNDS	FUND CATEGORY
17.	FUNDCITE	FUNDCITE	FUND_CITE	
18.	DOCUMENT TYPE	DOCUMENT TYPE	DOCUMENT_TYPE	
19.	ITEM AMOUNT	ITEM AMOUNT	ITEM_AMOUNT	

CHANGE/DELETE/DISPLAY STEPS IN A PURCHASE REQUEST PATH

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
2.	FY	FY	FISCAL_YEAR	FISCAL YEAR
[illegible]	OBLIGATION ROUTE	OBLIGATION ROUTE	OBLIGATION_ROUTE	
4.	PR LOCATION	PR LOCATION	PR_LOCATION	
[illegible]	STATUS	STATUS	STATUS	
			STATUS = "N"	NEW
			STATUS = "C"	ONGOING
[illegible]	SOURCE	SOURCE	SOURCE	
			SOURCE = "1"	SOLE SOURCE
			SOURCE = "2"	COMPETITIVE
			SOURCE = "3"	TO BE DETERMINED
	INSTITUTION	INSTITUTION	INSTITUTION	
			INSTITUTION = "1"	US UNIV
			INSTITUTION = "2"	FOREIGN UNIV
			INSTITUTION = "3"	INDUSTRY
			INSTITUTION = "4"	GOVT AGENCY
			INSTITUTION = "5"	TBD
	INSTRUMENT TYPE	INSTRUMENT TYPE	INSTRUMENT TYPE	INSTRUMENT
			INSTRUMENT TYPE = "1"	CONTRACTUAL
			INSTRUMENT TYPE = "2"	GRANT
			INSTRUMENT TYPE = "3"	FUND TRANSFER
	CONTRACTOR ORGANIZATION	CONTRACTOR ORGANIZATION	CONTRACTOR ORG	CONTRACTOR ORG
[illegible]	CONTRACT MANAGER	CONTRACT MANAGER	CONTRACT MANAGER	MANAGER
	PHONE	PHONE	PHONE	EXTENSION
	ENTRY NUMBER	ENTRY NUMBER	ENTRY NUMBER	
	DIVISION NAME	DIVISION NAME	DIVISION NAME	
[illegible]	[illegible]	[illegible] RECEIVED BY DIVISION	AT DIVISION	

	[illegible]	[illegible]	DATABASE NAME	SYNONYMS
[illegible]	REVIEW COMPLETE	REVIEW COMPLETE	REVIEW COMPLETE ON	
[illegible]	APPROVAL STATUS FOR DIVISION	APPROVAL STATUS FOR DIVISION	APPROVAL STATUS FOR DIV	
	DATE SENT TO MIPR	DATE SENT TO MIPR	DATE SENT TO MIPR	
[illegible]	RECEIVED BY PKR	RECEIVED BY PKR	DATE RECEIVED BY PKR	
[illegible]	RETURNED FROM PKR	RETURNED FROM PKR	DATE RETURNED FROM PKR	
[illegible]	APPROVAL FOR PKR	APPROVAL FOR PKR	APPROVAL FOR PKR	
[illegible]	SENT TO TE	SENT TO TE	DATE SENT_TO_TE	
[illegible]	RECEIVED AT TE	RECEIVED AT TE	DATE RECEIVED AT_TE	
[illegible]	SUSPENSION DATE	SUSPENSION DATE	SUSPENSION DATE	
[illegible]	RETURNED FROM TE	RETURNED FROM TE	DATE RETURNED FROM TE	

LISTING THE PURCHASE REQUESTS (TRACKING SYSTEM)

	PR SYSTEM	THEMIS HEADING	DATABASE NAME	SYNONYMS
1.	FY	FY	FISCAL_YEAR	FISCAL YEAR
2.	PR NUMBER	PR NUMBER	PR_NUMBER	PR
3.	PR LOCATION	PR LOCATION	PR_LOCATION	
4.			1 week after WORK_DATE	
5.			"LATE" IF CURRENT DATE GREATER THAN 1 WEEK AFTER WORK_DATE	
6.	WU NUMBER	WORK UNIT NUMBER	WU_NUMBER	WU, JON, JOCAS, WORK UNIT NUMBER

END

5-87

DTIC