CHAPTER 3

GEMPAK Variables

3.1 ADDSTN

ADDSTN is a logical variable which indicates whether stations which are in STNFIL, but not already included in the data file, should be added to the data file.

Enter YES to add stations. Enter NO to update current stations but not add new ones.

3.2 AFOSFL

AFOSFL is the name of the AFOS graphics file to be displayed.

3.3 AIRM

AIRM is the ending valid time for the airmet, the colors for the instrument flight rules, mountain obscuration, turbulence and icing, and flags for plotting symbols or airmet type, the end time, and the flight levels on the map.

End time|IR;MO;TB;IC clrs|TB color2|Flight lvl|low;upper filter lvl|
Symbol flg|Time flg|Flight lvl flg

Airmets that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST or ALL. LAST will use the system time and plot all current airmets. ALL will plot all the airmets in the data files for the last ten days, whether they are active, cancelled, updated or expired.

The colors are separated by a semi-colon. If any color is set to 0, that type of symbol will not be plotted. If any color is missing, a default will be used. Defaults are red for instrument flight rules, purple for mountain obscuration, light blue for turbulence and green for icing.

TB color2 is the second color for turbulence. The color from the first list will be used to plot Turbulence AIRMETs below the specified level. The color listed as the second color will be for Turbulence AIRMETs above the specified level.

Flight lvl is the dividing level for the turbulence display. The value is in hundreds of feet.

The lower and upper filter levels are flight level values used to filter the AIRM data display. If neither value is given, then all data is plotted. If only the lower level is present, then only data above that level is displayed. For the upper level only, data below this upper value are displayed. If both values are given, then the data is plotted for levels between the two boundary values.

The symbol flag is YES or NO and controls whether or not to plot a symbol or identifying text for the airmet on the map. The default is NO.

The time flag is YES or NO and controls whether or not to plot the end time of the airmet on the map. The default is NO.

The flight level flag is YES or NO and controls whether or not to plot the flight level(s) in hundreds of feet on the map. The default is NO.

3.4 ANLYSS

ANLYSS is the average station spacing and the grid extend region separated by a slash:

station spacing / grid extend region

This information is retrieved from the grid file and used in the objective analysis programs.

The station spacing is in degrees of latitude and is used to compute the weighting functions in the Barnes analysis programs. The default for the station spacing is twice the grid spacing.

The grid extend area is specified by four integers, separated by semicolons, which are the numbers of grid points to extend the grid left, down, right, and up. Only data within the extended grid area is used after the first Barnes pass. The default for the grid extend region is 2;2;2;2.

3.5 AREA

AREA is the data area. Only data within the area specified will be processed.

Areas may be defined containing subareas. Subareas must be separated by slashes. Each subarea is additive, +, or subtractive, -, depending on the first character following the slash, with + being the default. Additive subareas add stations to the list of valid stations; subtractive subareas eliminate stations which were previously valid.

Subareas may be specified in the following ways:

1. lat1;lon1;lat2;lon2
   This defines a latitude/longitude range where (lat1, lon1) is the lower left corner and (lat2, lon2) is the upper right corner. West longitude is negative.

   #clat;clon;dlat;dlon
   This defines a latitude/longitude range by the center latitude and longitude. The lower left corner is (clat-dlat; clon-dlon); the upper right corner is (clat+dlat; clon+dlon). No corrections are made for the poles or the International Date Line.

2. GEOG
   This is an abbreviation for a geographic area defined in the GEMPAK geographic table which includes abbreviations for states, provinces, and countries, as well as other names. A suffixed + or * will decrease the extent of the geographic area. A suffixed - will increase the extent of the geographic area.

3. STN
   This defines an area centered on a station found in the GEMPAK station table. A suffixed + or * will decrease the extent of the geographic area. A suffixed - will increase the extent of the geographic area.

4. DSET
   This includes all the stations in the current data set.

5. @ST
   This area includes those stations located in the state, province or country defined by ST. Only some countries are recognized (US,CN,MX,CI,BW,AU); other countries may be specified using method 6.

6. @CN:C
   This area includes those stations located in the country defined by CN.

7. @STN1;STN2;...;STNn
   This area includes the stations listed, where STNi may be a station identifier or a station number.

8. SHDR:iloval:ihival
   This area defines a range of integer values for the station header, SHDR. Valid keywords for SHDR are:

COUN	--	country
SELV	--	elevation (in meters)
SLAT	--	latitude (in degrees x 100)
SLON	--	longitude (in degrees x 100, West is negative)
SPRI	--	priority

STAT -- state
STID -- character identifier
(6 digits for surface--usually the WMO 5-digit number followed by a 0)

where COUN, STAT and STID are not very useful, since the integer representation of characters is system dependent.

For example, SELV:0:2000 specifies stations whose elevations are less than 2000 meters.

9. GAREA
This area corresponds to a slightly larger area than that specified by GAREA. It will ensure that data will appear near the bounds of the view region.

3.6 ATCF

ATCF is the initial time for the ATCF forecast tracks, the colors for each model track, the model names, flags for plotting the time, the storm name or number, the forecast wind speeds and markers at each forecast time, and an optional specific storm identifier.

Initial time|Model clrs|Model names|Time flg|Id flg|Speed flg|
Marker flag|Name

ATCF forecast tracks valid for the initial time will be plotted on the map. Forecast tracks show points at 6 or 12 hour intervals from 0 through 126 hours, if available. The actual storm track will be plotted as a white line, solid up to the initial time and dashed after the initial time (when data is available). The initial time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The initial time may also be LAST. LAST will use the system time to plot the most recent tracks whose initial time is within 9 hours of the current time. ALL is not accepted as an initial time for ATCF data.

The colors are separated by a semi-colon, as are the four-character model names. If no colors or model names are given, all model tracks will be plotted at default colors. If specific model names are listed, only those model tracks will be plotted. Default colors will be used unless colors are explicitly given, with a one-to-one correspondence between model names and colors. Specifying colors without model names has no effect.

The time flag is YES or NO and controls whether or not to plot the initial time of the ATCF forecast tracks on the map. The default is NO.

The storm id flag is YES or NO and controls whether or not to plot the storm name or

number on the map. The default is NO.

The speed flag is YES or NO and controls whether or not to plot the speed in knots, when given, at each forecast time. The default is NO.

The marker flag is YES or NO and controls whether or not to plot a marker at each forecast time on the map. The default is NO.

The name or number of a tropical storm may be specified. If one is given, only tracks for that storm will be displayed for the date/time indicated. The default is all storms are plotted.

3.7 ATCO

ATCO is the initial time for the old format ATCF forecast tracks, the colors for each model track, the model names, flags for plotting the time, the storm name or number, the forecast wind speeds and markers at each forecast time, and an optional specific storm identifier.

Initial time|Model clrs|Model names|Time flg|Id flg|Speed flg|
Marker flag|Name

ATCF forecast tracks valid for the initial time will be plotted on the map. Forecast tracks show points at 12, 24, 36, 48 and 72 hours. The actual storm track will be plotted as a white line, solid up to the initial time and dashed after the initial time (when data is available). The initial time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The initial time may also be LAST. LAST will use the system time to plot the most recent tracks whose initial time is within 9 hours of the current time. ALL is not accepted as an initial time for ATCF data.

The colors are separated by a semi-colon, as are the model names. The four-character model name is prefixed with a two digit model number. If no colors or model names are given, all model tracks will be plotted at default colors. If specific model names are listed, only those model tracks will be plotted. Default colors will be used unless colors are explicitly given, with a one-to-one correspondence between model names and colors. Specifying colors without model names has no effect.

The time flag is YES or NO and controls whether or not to plot the initial time of the ATCF forecast tracks on the map. The default is NO.

The storm id flag is YES or NO and controls whether or not to plot the storm name or number on the map. The default is NO.

The speed flag is YES or NO and controls whether or not to plot the speed in knots,

when given, at each forecast time. The default is NO.

The marker flag is YES or NO and controls whether or not to plot a marker at each forecast time on the map. The default is NO.

The name or number of a tropical storm may be specified. If one is given, only tracks for that storm will be displayed for the date/time indicated. The default is all storms are plotted.

3.8 AWPSFL

AWPSFL is the name of the AWIPS graphics file to be displayed. These files can be viewed by using the debug option.

```
awpsfl | d
```
or
```
awpsfl | D
```
the output file is called awips.out.

3.9 BND

BND specifies the parameters needed for processing bounds areas:

name[|tag]/color/fillsiz/fillpat/filt/minpts !
lincol/linpat/linwid !
mrksym/col/typ/siz/wid

FILLING BOUNDS AREAS:

name - If name is "BG", then the entire background area in plot coordinates if filled with the given color, pattern, etc.

tag - The tag option allows specification of a precise subarea to fill, e.g., fill a particular state instead of filling all the states. See examples.

color - Additional help for color is available in COLORS.

fillsiz, fillpat - The fill size is not yet implemented, however the fill pattern may be set to 1 (solid), 2 (slanted dash) or 3 (slanted line).

filt - The filter value is used to reduce the number of points used to draw the bound areas. Valid values for the filter flag are between 0 and 1. The default is 0.

minpts - The minpts variable allows plotting of only bounds with a number of points greater than a certain value, thus eliminating numerous small areas, such as islands.

The overall effect is to increase performance. Care must be taken, however, since some large geographic areas may be described with just a few points (e.g., the state of Wyoming). Usually, a value of 100 or 200 will suffice.

OUTLINING BOUNDS AREAS:

lincol - Color of bound outline. Additional help for color is available in COLORS.

linpat - Outline line pattern.

linwid - Outline line width.

Note that filt and minpts also apply to outlining.

PLOTTING A MARKER OR WEATHER SYMBOL AT BOUNDS CENTROID:

mrksym - Either "MARK" or "WTHR" to plot either a marker or weather symbol.

col - Color of marker or symbol. Additional help for color is available in COLORS.

typ - Marker or weather symbol type (number).

siz, wid - Marker or symbol size and width.

NOTE: any or all plot options may be requested at the same time.

The attributes for multiple bounds may be set by separating the settings for each bound with a plus sign (+).

Examples:

```
BND   = bg/4 + state_bnds/23 + lakes/4

BND   = state_bnds/23 + great_lakes/4

BND   = state_bnds|<STATE>FL/23

        - fills only the state of Florida

BND   = state_bnds|<STATE>FL/23 ! 2/2/5

        - fills only the state of Florida and outlines the
              state of Florida with a dashed red line of
              width 5.

BND   = state_bnds|<STATE>FL/23 ! 2/2/5 ! wthr/3/65/5/3

        - fills only the state of Florida and outlines the
```

state of Florida with a dashed red line of width 5. Also plots a weather symbol at the centroid of the state of Florida. This symbol is a green heavy rain symbol of size 5 and width 3.

3.10 BORDER

BORDER is the color, line type and line width of the background and underground plot separated with slashes:

background color; station line color; fill color/
background line type; station line type /
background line width; station line width

If the color is 0, no background will be drawn. The defaults for color, line type and line width are each 1.

3.11 BOUNDS

BOUNDS specifies the bound area(s) to consider when performing the graph-to-grid procedure.

name|<key>key_name|mask_flag

More than one bounds area may be indicated via the '+' separator.

name - Name of the bounds area, eg., "SSA" for seamless surface analysis.

key - The specific bound area keyword, eg., "AREA".

key_name - The specific bound area, eg., "HPC050".

mask_flag - "true" to perform the graph-to-grid analysis inside the above specified bounds area, "false" to perform the analysis outside.

Examples:

BOUNDS = SSA|<AREA>HPC050|true

Performs the graph-to-grid analysis only inside the HPC050 seamless surface analysis area.

3.12 CBTOP

CBTOP the user estimated cloud top height in meters. The default value is 8000 m. This is for "convective (CB)" only.

3.13 CENTER

CENTER allows the GD2NDFD user to specify the originating or generating center ID and sub-center ID. The input is given as follows:

Center ID #/Sub-Center ID #

Values may be omitted in specifying CENTER. For example, to omit the first value, specify only the second, enter the following:

/Sub-Center ID #

If values are omitted, the following defaults are inserted:

ID # Default value Meaning

Center	7	Center # (7->NCEP)
Sub	5	Sub-center (5->HPC)

See NCEP OFFICE NOTE 388 for more information on how to set these parameters. Below is a table of center numbers that may be used.

ID# NAME ABBREV

007 US Weather Svc - Nat. Cntrs for Envir. Prediction NCEP
008 US Weather Svc - NWS Telecommunications Gateway NCEP
009 US Weather Svc - Field Stations NCEP
034 Japanese Meteorological Agency - Tokyo JMA
052 US Weather Svc (NCEP/TPC) Nat. Hurricane Cntr - Miami NHC
054 Canadian Meteorological Service - Montreal CMS
057 US Air Force - Global Weather Central GWC
058 US Navy - Fleet Numerical Oceanography Center FNOC
059 NOAA Forecast Systems Laboratory - Boulder, CO FSL
060 Nat. Center for Atmos. Research (NCAR) - Boulder, CO NCAR
074 UK Meteorological Office - Bracknell UKMO
085 French Weather Service - Toulouse FWS
097 European Space Agency (ESA) ESA
098 Eur. Cntr for Medium-range Wthr Frcsts - Reading ECMWF
099 DeBilt, Netherlands DEBILT

3.14 CINT

CINT is the contour interval, minimum and maximum values separated by slashes:

contour interval / minimum / maximum

The contour interval may be any real number. If it is not specified or if the value is 0, the program will select an interval which will generate 5 to 10 contour levels.

The minimum and maximum values specify the range of data to use in selecting contour levels. If either value is not specified, the value will be obtained from the range of values in the dataset. If the minimum and maximum are equal, that value will be used and only one contour level will be selected.

A list of two or more contour levels may be entered using semicolons to separate the individual values. In this case, the minimum and maximum are ignored.

3.15 CLEAR

CLEAR is a logical variable which determines whether the graphics screen is cleared before plotting.

Enter YES to clear screen or NO to leave current graphics.

3.16 CLRBAR

CLRBAR specifies the characteristics of a color bar associated with contour fill. The attributes are separated by slashes:

color / orientation / anchor / x;y / length;width /
frequency | text_info

Color is the color of the labels and the bounding box around the color bar. If color is negative, the bounding box will not be drawn, and labels will be drawn in colors corresponding to the color bar. If the color is 0 or missing, no color bar is drawn.

Orientation specifies a vertical or horizontal orientation of the color bar where 'V' is a vertical bar and 'H' is a horizontal bar. The default is 'V'.

Anchor describes the location on the color bar corresponding to the location given in the next parameter. Valid inputs are LL, LC, LR, CL, CC, CR, UL, UC, and UR for lower-left, lower-center, lower-right, center-left, centered, center-right, upper-left, upper-center, and upper-right, respectively. For example, an 'LL' anchor point, with a

x;y of .1,.1, will place the lower-left corner of the color bar at view coordinates .1, .1. The default anchor point is 'LL'.

x;y is the position for the anchor point of the color bar in view coordinates. The default is .005, .05.

Length;width are the length and width of the color bar, normalized to the view coordinates. The defaults are .5 for the length, and .01 for the width.

Frequency describes the levels to be labeled. If the frequency is positive, the labels are plotted on the right/top of the color bar. If it is negative, the labels are plotted on the left/bottom of the color bar. The default is -1.

Text_info describes the color bar label attributes. These attributes are of the same format as the TEXT parameter. If any part of text_info is missing, then default text information is used. The user may only change the font type, hardware/software flag, text size and text width. The default values are the bold courier hardware font and text size and text width of 1.

To disable the color bar, set CLRBAR = 0 or leave it blank. If only contour lines are drawn (CTYPE = C), the CLRBAR variable is not used.

Examples:

```
CLRBAR = 1              text and bounding box in color 1;
                        defaults for the rest of the input;

CLRBAR = 5/V/ /.25;.1/1text and bounding box in color 5;
                        color bar plotted vertically;
                        length and width .25 and .1 of the
                        view window;
                        all intervals labeled along left
                        side of the color bar;
                        color bar anchor point at lower-left;

CLRBAR = 1//CL/.1;.5/.75;.1text and bounding box in color 1;
                        length and width .75 and .1 of the
                        view window;
                        center-left of the color bar
                        positioned at .1;.5 in view
                        coordinates;

CLRBAR = 1//CL/.1;.5/.75;.1|.55/2/111/1/l/hw

                        text and bounding box in color 1;
                        length and width .75 and .1 of the
                        view window;
                        center-left of the color bar
                        positioned at .1;.5 in view
```

```
coordinates;
text size of color bar .55;
hardware helvetica font; text width
2; no box around text;left justified;
```

3.17 CNTR

CNTR specifies the plot attributes for Cell Centroid movement barbs (knots):

color / size / width ; filter

A value of 0 is used to turn off centroid plotting.

FILTER is a logical variable or real number which controls the filtering of data in order to eliminate plotting of overlapping data.

3.18 CNTRFL

CNTRFL is the name of the file containing contour information.

filename

3.19 CNTRPRM

CNTRPRM is the SFPARM to contour.

The parameter to contour must be one of the parameters listed in the SFPARM variable for plotting. The user may set the plotting COLOR to 0 if the station data values are not to be shown.

3.20 COLORS

COLORS specifies a list of color numbers which must be separated using semicolons:

color 1 ; color 2 ; ... ; color n

The last color in the list will be repeated, if necessary, to determine all colors required by the program.

Colors may be entered as a range in the form: first-last-increment. If the increment is not entered, 1 is assumed.

Color-coding of any parameter may be done based on its own value or on the value of any other computable parameter. There is a one-to- one correspondence between the elements in the color list and the elements in the parameter list (e.g., SFPARM). To color-code any parameter, replace its corresponding color number in the COLORS list with the form:

(v1;v2;...;vN-1/c1;c2;...;cN/PARM/E) or (v1-vN-1-vInc/c1-cN-cInc/PARM/E) or a combination of a list and a range

where the v's are parameter values, the c's are color numbers, and PARM is the parameter whose value determines the color. If PARM is omitted, the parameter will be color-coded based on its own value. The number of values must be one less than the number of colors. If a value range is used, an increment must be specified. If a color range is used and no increment is specified, 1 is assumed. For example, to color-code a marker based on the 3-hour flash flood guidance value, the color element corresponding to the parameter MARK could be specified as:

(0.5;1;1.5;2;3/2;19;21;22;6;4/FF03)

meaning that values less than or equal to .5 inch would be plotted with color 2, values greater than .5 but less than or equal to 1 would be plotted with color 19, etc.

The E is a flag to indicate whether to include the break value with the lower range or the upper range of values. Valid values are L and U, respectively. The default is L for inclusion in the lower range of values. In the above example, the first data range is X <= 0.5, the second is 0.5 < X <= 1.0, etc. If the U flag is added, the ranges change to X < 0.5, 0.5 <= X < 1.0, etc.

If the input is blank, a default of 1 is used. If a color number of 0 is entered, that parameter or line will not be plotted.

New color assignments may be made by appending the following commands to the color number:

=INIT--	all colors are initialized to device-dependent colors
=NAME--	this color number is set to the color specified in NAME
=r:g:b--	this color number is set using RGB components in r, g, and b which must be separated using colons. These components must be in the range 0 - 255.

Note that only =INIT may be appended to a range.

Color number 101 is the background color.

Note that the GIF driver does not accept NAME.

The following colors are the default colors for the given devices:

XW,NCPS,PSP	PSC	GEMPAK NAMES	X COLOR NAMES
1	31	VANILLA	bisque1
2	2	RED	red
3	3	GREEN	green
4	4	BLUE	blue
5	5	YELLOW	yellow
6	6	CYAN	cyan
7	7	MAGENTA	magenta
8	8	BROWN	sienna3
9	9	CORAL	sienna1
10	10	APRICOT	tan1
11	11	PINK	LightPink1
12	12	DKPINK	IndianRed1
13	13	MDVIOLET	firebrick2
14	14	MAROON	red4
15	15	FIREBRICK	red3
16	16	ORRED	OrangeRed2
17	17	ORANGE	DarkOrange1
18	18	DKORANGE	orange3
19	19	GOLD	gold1
20	20	DKYELLOW	yellow2
21	21	LWNGREEN	chartreuse1
22	22	MDGREEN	green3
23	23	DKGREEN	green4
24	24	GRPBLUE	DodgerBlue4
25	25	LTBLUE	DodgerBlue1
26	26	SKY	DeepSkyBlue2
27	27	MDCYAN	cyan2
28	28	VIOLET	MediumPurple3
29	29	PURPLE	purple2
30	30	PLUM	magenta4
31	32	WHITE	white
32 1	1	BLACK	black
2		G95	gray95
3		G90	gray90
4		G85	gray85
5		G80	gray80
6		G75	gray75
7		G70	gray70
8		G65	gray65
9		G60	gray60
10		G55	gray55
11		G50	gray50
12		G45	gray45
13		G40	gray40
14		G35	gray35

15	G30	gray30
16	G25	gray25
17	G20	gray20
18	G15	gray15
19	G10	gray10
20	G05	gray5

On the color devices, colors 8 through 30 will provide a range of colors from brown to red to orange to yellow to green to blue to violet. On the Postscript device, 20 gray shades are used.

3.21 COLUMN

COLUMN specifies the number of columns for plotting the contents of an ASCII text file specified by TXTFIL.

3.22 COMPRESS

COMPRESS is a flag to determine whether the output will be written in compressed format.

Enter YES to write in compressed format. NO to write in uncompressed.

3.23 CONTUR

CONTUR sets attributes for the contour algorithms:

subbox factor / number of smoothing passes

Each grid box will be subdivided into the number of subboxes specified by the subbox factor. Increasing this value will produce smoother contours, but will increase contouring times and make metafiles larger. The new default value in GEMPAK 5.2 is 0.

A simple three-point smoothing filter is used if the number of smoothing passes is greater than 0. The default is 0.

3.24 CPYFIL

FORM: Grid file whose navigation is to be used in new grid file | subarea

CPYFIL identifies the location of the grid navigation and analysis information to be stored in a grid file, as well as an optional subarea. Three options are available:

1. If CPYFIL is blank, the information is taken from the input for PROJ, GRDAREA, KXKY, and ANLYSS.

2. If CPYFIL begins with a #, the information is read from the line in the grid navigation table which has the grid name or number corresponding to the rest of CPYFIL.

3. If CPYFIL is the name of a current grid file, the grid and navigation information will be copied from that file.

   For cases 2) and 3), the information may be followed by a vertical bar and a specified subarea. This subarea has the same meaning as GAREA and may take on the same values. The grid file that gets created has the same navigation and grid spacing as that indicated by the first part except over a smaller area.

   The input for CPYFIL may also be a file type (model alias). Valid aliases may be found in the table "datatype.tbl" with CATEGORY (column 4) equal to CAT_GRD. When one of these file types is input, the program searches locally for the most recent file first, then locally for the previous file. If no files are found locally, the program searches remotely for the most recent file, then remotely for the previous file.

   NOTE: If CPYFIL is not blank, the values of PROJ, GRDAREA, KXKY, and ANLYSS will be ignored.

3.25 CSIG

CSIG is the ending valid time for the convective sigmet and convective outlook, the colors for the area, line, isolated area and outlook, and flags for plotting the sequence number, end time, direction/speed, flight level and intensity on the map.

End time|AR;LN;IS;OL clrs|Seq|Tm|Mv|Fl|Insty

Convective sigmets and outlooks that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST or ALL. LAST will use the system time and plot all current convective sigmets and outlooks. ALL will plot all the convective sigmets and outlooks in the data files for the last ten days, whether they are active or expired.

The colors are separated by a semi-colon. If any color is set to 0, that line will not be plotted. If any color is missing, a default will be used. Defaults are red for areas, lines and isolated areas and green for outlooks.

The sequence number ID flag is YES or NO and controls whether or not to plot the identifying text for the convective sigmets and outlooks on the map. The default is NO.

The time flag is YES or NO and controls whether or not to plot the end time of the convective sigmet and outlook on the map. The default is NO.

The movement flag is YES or NO and controls whether or not to plot the direction from north in degrees and the speed in knots on the map. The default is NO.

The flight level flag is YES or NO and controls whether or not to plot the flight level in hundreds of feet on the map. The default is NO.

The intensity flag is YES or NO and controls whether or not to plot the intensity of the area, line or isolated area on the map. The default is NO.

3.26 CTLFLG

CTLFLG is a logical flag which indicates whether control characters are included in a raw surface data set to be decoded.

The raw surface data set must contain either bulletins from the Domestic Data Service or single station reports. If the data set contains bulletins, set CTLFLG = YES. Otherwise, it will be assumed that the file contains single station reports with one report per line.

If CTLFLG = YES, the input file must contain bulletins. If CTLFLG = NO, the file must have reports.

3.27 CTYPE

CTYPE specifies the contouring algorithms to use separated by slashes:

type 1 / type 2 / ... / type n

Valid inputs for type are:

C the original GEMPAK contouring algorithm
L GEMPAK contouring algorithm without subboxes
F contour fill algorithm
B box algorithm -- same as contour fill, but draws lines around the polygons rather than filling in polygons.

Note that contour attributes are specified in CONTUR. The contour interval and line characteristics for types C, L, S and B are read from CINT and LINE and for type F from FINT and FLINE.

Examples:

CTYPE = C-- draws contour lines

CTYPE = C / F--draws filled contours overlaid with lines

3.28 CURVE

CURVE is a number corresponding to the method to be used to fit the curve. Generally, CURVE should be set to 2.

The curve types currently available are:

1 - piecewise straight line
2 - cubic spline
21 - cubic spline with linear ends
22 - cubic spline with parabolic ends
23 - cubic spline with extrapolated ends

Note that types 2 and 21 are the same. Types 22 and 23 produce slightly different results at the ends of the splines.

3.29 CXSTNS

CXSTNS defines the x-axis for a cross-section plot.

In SNCROSS, CXSTNS is the list of stations, separated with semicolons, to be used for the cross section. Stations may be entered using either character or numeric identifiers.

In GDCROSS, CXSTNS contains the endpoints of the cross-section line separated using a >. Each endpoint may be defined as follows:

1. a station character or numeric identifier;

2. a latitude and longitude pair separated by a semicolon;

3. an @ followed by a grid x and y coordinate pair separated using a semicolon, e.g., @1.5;2.3>@25.9;30.

4. graphically using the CURSOR command.

3.30 DATOUT

DATOUT is the date and time which will be assigned in the output file.

DATOUT is an 11-character string entered as YYMMDD/HHMM, where:

YY is the last two digits of the year
MM is the month
DD is the day of the month
/ is the date and time separator
HH is the hour
MM is the minutes past the hour

The part before the / is the DATE; the part after the / is the TIME.

A list of times may be entered for DATOUT. Times in the list must be separated with semicolons. For example:

940513/1100;940412/1300;940515/0600

or

13/11;0412/13;0515/6.

In the above example, the times are:

940513/1100
940412/1300 and
940515/0600.

The options LAST, LIST, ALL and /ALL are not supported by DATOUT.

3.31 DATTIM

DATTIM is the date and time to be used by GEMPAK programs. DATTIM is an 11-character string entered as YYMMDD/HHMM, where:

YY is the last two digits of the year
MM is the month
DD is the day of the month
/ is the date and time separator
HH is the hour
MM is the minutes past the hour

The part before the / is the DATE; the part after the / is the TIME.

DATTIM may be abbreviated. If the input has no / , it is assumed to be the TIME part.

An abbreviated version of either TIME or DATE is assumed to be the part closest to the /. The rest of the standard time is obtained from the last time in the file. For example, if the last time in the file is 940515/1200 the following translations will be done:

```
13/11       ---->     940513/1100
13          ---->     940515/1300
13/         ---->     940513/1200
0412/1300   ---->     940412/1300
```

A list of times may be entered for DATTIM. Times in the list must be separated with semicolons. For example:

13/11;0412/13;0515/6

In the above example, the times are:

940513/1100
940412/1300 and
940515/0600.

DATTIM may also be entered as a range. The first and last times must be separated by a minus sign. For example:

13/11-15/14

A range with an increment may also be entered using minus signs as separators. The format of the increment is hhhmm. If the increment is one or two digits, it is assumed to be in hours.

The following options are also valid for DATTIM:

```
LAST  --    the last time in the file
LIST  --    lists all times and waits for input
ALL   --    all the times in the file
/ALL  --    all the times for a single DATE.
```

If /ALL is entered, all the times for the most recent date are processed. If /ALL is appended to a specific date, then all the times for that date will be processed.

3.32 DELTAN

DELTAN is the average station spacing in degrees of latitude. The Barnes objective analysis programs use this number to compute weights for data interpolation.

3.33 DELTAX

DELTAX is the spacing between grid points in the x direction on CED grids. This value is in degrees longitude.

3.34 DELTAY

DELTAY is the spacing between grid points in the y direction on CED grids. This value is in degrees latitude.

3.35 DELZ

DELZ is the user chosen average height difference between pressure levels to be used in the vertical interpolation. The default value is 500 m.

3.36 DEVICE

DEVICE specifies the graphics device:

device | name | xsize ; ysize | color type

The following graphics devices are available:

XW	X Windows terminal
PS	PostScript
NC	NTRANS Computer Graphics Metafile
GF	GIF file using X-server
GIF	GIF file not using X-server
UTF	Universal Transmission Format (AFOS)
RBK	AWIPS RedBook Graphics
VG	Vector Graphics (N-AWIPS Product Generation)
XWP	Combination driver
FAX	Fax driver
TIFF	TIFF file

The following three PostScript device names are included for backward compatibility only. The appropriate settings for the PS device are automatically selected based on the information below.

PS1	PostScript - Landscape / Letter / Monochrome
PSC	PostScript - Landscape / Letter / 32 Colors
PSP	PostScript - Portrait / Letter / 20 Grays

The XWP driver combines the capabilities of several drivers. Currently, it includes the XW and the PS drivers. XWP allows the user to display graphics to a window, then, without closing the window, a PostScript file may be created.

The UTF driver produces output for AFOS devices and the NAFOS product. Note that while both AFOS and NAFOS read files in universal transmission format, the exact file formats for are not compatible. The default output is to an AFOS formatted file. The color control (see below) is used to switch between output types.

The RBK driver produces output for AWIPS devices and OSO products. These products are created according to the Standard Formats for Weather Data Exchange format. However, the OSO format has an extra transmission header information section. The default file is of an OSO format. The color control (see below) is used to switch between output types.

The FAX driver produces an NMC 6 bit formatted file.

The TIFF driver produces a TIFF file that uses the Group 4 Fax compression scheme. It can also optionally create a file with no compression.

The VG driver produces a GEMPAK Vector Graphics file. This file can then be used in product generation for graphical editing of the elements. When producing a VG file, CLEAR has no effect, i.e., all elements are added to the output file regardless of the value of CLEAR.

NAME is the file or window name. In the NC driver, if the file already exists, new frames will be appended to it unless the default file name of Nmeta is used. In this case, the file is overwritten. The PS driver also uses the file name to generate plot files, however no appending is attempted. Files are always overwritten. In the XW or XWP drivers, up to five named windows may be opened.

If no file/window name is given, the following will be used:

XWP	GEMPAK
XW	GEMPAK
PS	ps.plt
NC	Nmeta
GF	gempak.gif
GIF	gempak.gif
VG	vgf.vgf
FAX	999X;0167 (produces the file 999X.6bt)
UTF	T01
RBK	T01
TIFF	AAAA00
PS1	ps1.plt
PSC	psc.plt
PSP	psp.plt

The UTF driver defaults to an AFOS test product PIL if no entry is given. The file name may be the last three characters of a valid PIL, or a full file name. If the file name is a PIL, the product table is read for specific size and time attributes. If a regular file name is given, suitable defaults are chosen for the size and forecast time. The user may also give a base time for the product. This is added to the file name following a semi-colon, i.e., "T01;1200". This product would have a base time of 1200 GMT. The forecast hour read from the product table is added to the base time to give a valid time for the product.

The RBK driver defaults to an OSO formatted file if no entry is given. The file name must be the last three characters of a valid AFOS PIL, or the test PIL id, T01. The PIL id is used by the product table to find the specific size and time attributes. The difference between the AWIPS format and the OSO format is the information given at the beginning of the file and that the AWIPS format does not have any padding of spaces at the end of the file. Similar to the UTF driver, the user may also give a base time for the product. This is added to the file name following a semi-colon, i.e., "93E;311200". This product would have a base date of the 31st and a base time of 1200 GMT. The base date may also be given in the full GEMPAK date/time format, i.e., "9JH;000931/1200". The forecast hour read from the product table is added to the base time to give a valid time for the product. If the base date or time is not specified, then the system date or time will be used for the valid time.

The FAX file name entry equates to a wheel and subset for the output product. Every fax product must have an associated wheel and subset number. The driver uses the supplied wheel and subset number to determine the dimensions of the product. These dimensions are defined in the product table, faxprod.tbl. This file will be named "XXXX.6bt" where XXXX represents the wheel number of the product. The subset number is embedded in the compressed 6 bit image and is only meaningful to OSO systems that transmit products.

The TIFF file name entry is the WMO ID of the product. The driver uses the supplied ID to determine the dimensions of the product. These dimensions are defined in the product table, tiffprod.tbl. The output file will be named "AAAAII.tiff" where AAAAII represents the 4 character and 2 digit WMO ID of the product.

XSIZE and YSIZE are the device dimensions. The specification of their values is a function of the device driver.

For XW or XWP, xsize and ysize may be (1) the number of pixels in the corresponding direction if the values are specified as integers, or (2) a fraction of the screen size if the values are specfied as reals > 0 and < = 1.

For the PS driver, xsize and ysize are the paper dimensions in inches. If xsize is greater than ysize, then a landscape orientation is used. For xsize less than ysize, the plot orientation is portrait.

For UTF driver, xsize and ysize have no meaning, as the dimensions for the display are determined by the entry on the product table (product.tbl) that matches the user supplied pil.

For the NC driver, xsize and ysize are fractions of the maximum dimension of a NTRANS CGM file. Their values must be > 0 and < = 1. If both values are less than 1, then the larger value is set to 1 and the smaller value is increased proportionally to maintain the aspect value of the user input values.

If xsize and ysize are not specified the following defaults will be used:

XWP	.7;.7	(70 percent of the screen size)
XW	.7;.7	(70 percent of the screen size)
PS	11;8.5	(Standard letter size paper in landscape)
NC	1.0;1.0	(Standard square CGM plotting space)

COLOR TYPE is a flag for specifying the color scheme to use for the driver. Currently, only PS will use the color type. Color type may have the following values:

C	32 Colors
G	20 Grays
M	Monochrome lines with color fills

The default is to use 20 grays. The exceptions to this are noted below.

For UTF (which is a monochrome device), a value of C is used to switch the output to an NAFOS formatted file. Any other value for color type results in an AFOS formatted file.

For RBK (which is a monochrome device), a value of C is used to switch the output to an AWIPS formatted file. Any other value for color type results in an OSO formatted file.

For TIFF, the default is monochrome output with a white background and all graphics drawn in black. This type of output will be compressed using the Group 4 Fax compression scheme. A value of G will create an output file that has a black background with all graphics drawn in white. It will also allow a grayscale image to be written to the output file. This type of output will not be compressed.

The GF driver has the same options as the XW driver. The differences in execution are that the GF device will not display a graphics window, and will create a separate file for each active frame either when the device is closed or a new file name is given. The file names are based on the user supplied file name, with the frame number appended to the name after the initial file has been created. That is, given the default name, the first GF file created will be named "gempak.gf", the following file will be named "gempak.gf.001".

3.37 DITHER

DITHER is used to specify the plotting behavior of the reflectivity intensities. A value of 0 specifies no dithering, the grid box is completely filled. Values 1-4 increase the number of dither points per grid box, approaching an increasingly opaque value. Dither can be used to overlay image data with radar reflectivity in order to simulate transparency. A dither value >= 5 will outline the grid box.

3.38 DTAAREA

DTAAREA defines the area over which station data will be input to the Barnes objective analysis. Since data must be interpolated from the first pass grid back to stations, only data within the EXTEND area will be used after the first pass. If the DTAAREA is not specified by the user, it will default to the EXTEND area in OAGRID or to the data area stored in the grid file analysis block in OABSFC and OABSND.

DTAAREA can be specified in three ways:

1. lat1;lon1;lat2;lon2
   This defines a latitude/longitude range where (lat1, lon1) is the lower left corner and (lat2, lon2) is the upper right corner. West longitude is negative.

   #clat;clon;dlat;dlon
   This defines a latitude/longitude range by the center latitude and longitude. The lower left corner is (clat-dlat; clon-dlon); the upper right corner is (clat+dlat; clon+dlon). No corrections are made for the poles or the International Date Line.

2. GEOG
   This is an abbreviation for a geographic area defined in the GEMPAK geographic table which includes abbreviations for states, provinces, and countries, as well as other names. A suffixed + or * will decrease the extent of the geographic area. A suffixed - will increase the extent of the geographic area.

3. STN
   This defines an area centered on a station found in the GEMPAK station table, which currently contains US, Canadian and Mexican stations. A suffixed + or * will expand, and - will reduce the area.

Note that the other ways of specifying AREA are not valid for DTAAREA in OAGRID but are valid in both OABSFC and OABSND.

For all projections, the lat/lon corners defined will be used exactly. For projections

which include the pole, if lat1 = lat2 and lon1 = lon2, then lat1 will specify the range of data from the pole and lon1 will specify the central longitude. West longitude is negative.

Note that the stations actually used for the data area may be changed in the objective analysis programs using DTAAREA.

3.39 ECHO

ECHO specifies whether to plot the grid box intesities. A value of 0 specifies no plotting of echoes; 1 specifies plotting only those echoes from radars in precipitation mode; 2 specifies plotting of echoes from radars in both precipitation and clear air mode.

3.40 EXTEND

EXTEND specifies the numbers of grid points beyond the GRDAREA which define the grid extend area in the Barnes objective analysis. The first pass is computed on the extend area to reduce edge effects on the GRDAREA.

EXTEND is specified as four integers, which are the number of grid points to extend the grid left, down, right, and up. The values are separated by semicolons. The default for EXTEND is 2;2;2;2.

3.41 FAXFIL

FAXFIL is the name of a 6-bit FAX product.

3.42 FILTER

FILTER is a logical variable or real number which controls the filtering of data in order to eliminate plotting of overlapping data.

If FILTER is YES, the data will be filtered.

If FILTER is NO, 0, or blank, all data will be plotted.

If FILTER is set to a real number, the default filter will be scaled by that number. FILTER = 1 corresponds to FILTER = YES. 0 < FILTER < 1 allows some data overlap. FILTER > 1 causes data to be more widely spaced.

3.43 FILTYP

FILTYP is the filter type. Valid input are NONE, LIGHT and HEAVY.

A LIGHT filter will smooth the data to allow a mesoscale analysis. A HEAVY filter will smooth the data to only a large scale analysis. A filter of NONE will not smooth the data.

Only the wind data and the virtual potential temperature are filtered to aid in the computation of the derivatives needed for the shear and Scorer parameter calculations.

3.44 FINT

FINT is the contour fill interval, minimum and maximum values separated by slashes:

fill interval / minimum / maximum

The contour fill interval may be any real number. If it is not specified or if the value is 0, the program will select an interval which will generate 5 to 10 contour fill levels.

The minimum and maximum values specify the range of data to use in selecting the fill levels. If either value is not specified, the value will be obtained from the range of values in the dataset. If the minimum and maximum are equal, that value will be used and only one contour fill level will be selected; however, since the number of colors is one greater than the number of fill levels, two colors will be needed--the first for filling regions with values less than the input value and the second for filling regions of greater value.

A list of two or more fill levels may be entered using semicolons to separate the individual values. In this case, the minimum and maximum are ignored.

3.45 FLINE

FLINE is the color and fill type to be used for contour fill:

colr1;..;colrn/type1;..;typen

The number of fill colors and types needed is one greater than the number of fill levels in FINT. The number of fill colors may be entered as a list of color numbers separated by semicolons or a range of colors. The number of fill types may be entered as a list of numbers separated by semicolons. More information on color selection can be found in the help for COLORS.

The fill type may be set any of the following values:

1	Solid
2	Slanted Dash
3	Wide-spaced Slanted Line
4	Medium-spaced Slanted Line
5	Zig-Zag Line
6	Dots
7	Thin-spaced Slanted Line

If fill type is set to 0, soild fill is used. If the fill type is set to a single negative number, negative values will use the absolute value of the fill type, and positive values will be solid.

3.46 GAMMA

GAMMA, the convergence parameter, is a multiplier for the weight and search radius for passes after the first pass of the Barnes analysis programs. GAMMA must be within the range 0 - 1. Any value outside this range will default to a value of 0.3. If GAMMA is 0, the number of passes will be set to 1. The recommended value for GAMMA is 0.3.

3.47 GAREA

GAREA is the graphics area. This is the area which will be displayed on a graphics device.

GAREA can be specified in the following:

1. lat1;lon1;lat2;lon2
   This defines a latitude/longitude range where (lat1, lon1) is the lower left corner and (lat2, lon2) is the upper right corner. West longitude is negative.

   #clat;clon;dlat;dlon
   This defines a latitude/longitude range by the center latitude and longitude. The lower left corner is (clat-dlat; clon-dlon); the upper right corner is (clat+dlat; clon+dlon). No corrections are made for the poles or the International Date Line.

2. GEOG
   This is an abbreviation for a geographic area defined in the GEMPAK geographic table which includes abbreviations for states, provinces, and countries, as well as other names. A suffixed + or * will decrease the extent of the geographic area. A suffixed - will increase the extent of the geographic area.

3. STN
   This defines an area centered on a station found in the GEMPAK station table, which currently contains US, Canadian and Mexican stations. A suffixed + or * will expand, and - will reduce the area.

4. Graphically using the CURSOR command.

Note that the other ways of specifying AREA are not valid for GAREA.

For all projections, the lat/lon corners defined will be used exactly. (If GAREAX is used with the CURSOR command, the display area attempts to fill the entire view area, extending the area defined by the selected lat/lon). For projections which include the pole, if lat1 = lat2 and lon1 = lon2, then lat1 will specify the range of data from the pole and lon1 will specify the central longitude. If the projection has been rotated so that a geographic pole is no longer at the center and lat1 = lat2 and lon1 = lon2, then lat1 will determine the range of data from the rotated pole and lon1 specifies the central longitude as before. If a cylindrical equidistant projection has been rotated for any angle1 between 90 and -90 degrees, then the entire world can be displayed by entering GAREA=0;0;0;0. The central longitude is taken from the PROJ specification for angle2. This works for angle1 = 0 as well.

West longitude is negative.

For overlay on satellite and radar imagery, PROJ must be set to SAT and RAD, respectively.

3.48 GBDIAG

GBDIAG allows for detailed GRIB message section information, byte-by-byte, to be printed out for selected GRIB messages. Simply list those GRIB sections to be examined (IDS, PDS, GDS, BMS, BDS, END or ALL for all sections), e.g., pds;gds. Selected GRIB messages for examination may also be identified by number in list and/or range format, e.g., 2;4;5-9, immediately following the section specification separated by a "|". For example, GBDIAG=pds;gds|2;4;6-12 . Please note that the BMS section will be listed only if it exists and that the sections BDS and END will be listed only if the GRIB data is actually being decoded and written into the GEMPAK file.

3.49 GBFILE

GBFILE is the name of the file which contains gridded data in GRIB messages.

3.50 GBTBLS

GBTBLS allows for specification of the GRIB decoding tables. The format is GBTBLS=W;N;V;C, where W is the WMO decoding table for parameters 1-127, N is the NCEP decoding table for parameters 128-255, V is the vertical coordinate table and C is the originating center table. The defaults are

$GEMTBL/grid/wmogribX.tbl,
$GEMTBL/grid/ncepgribX.tbl,
$GEMTBL/grid/vcrdgribX.tbl,
$GEMTBL/grid/cntrgribX.tbl,

where X is the version number of the GRIB message.

3.51 GCENTER

GCENTER sets the center latitude-longitude on the ETA model domain

GCENTER = TPH0D;TLM0D

TPH0D and TLM0D are the center latitude (W is negative) and longitude (E is positive) of the computational domain. Note that it is not necessary to to recompile the model if you change the areal coverage of the model domain as long as the number of grid points remains the same.

For a grid centered at 108 W, 39 N (Centered over Colorado)

```
TPH0D =   39.0
TLM0D =   -108.0   Note the Negative for W
```

set GCENTER = 39.0;-108.0

3.52 GDATTIM

GDATTIM is the date/time for the grid.

Grids may contain two date/time fields, in which case the fields must be separated using a colon. If the grid to be selected contains only one time, the colon and second time may be omitted.

The standard format for a grid time is a character string

YYMMDD/HHMMthhhmm

where:

YYMMDDis the year, month, day
/ is the date and time separator

```
HHMM is the hour, minute
t    is the type
          ( F=forecast   A=analysis   G=guess   V=valid )
hhhmm is the forecast hour, minute
```

If t is blank, an analysis grid is assumed. If hhhmm is blank, 00000 is assumed. If hhhmm has one, two, or three digits, they represent hours. With four or more digits, zeros will be added at the beginning of the field.

The field YYMMDD is called the date; HHMM is the time; t is the type; hhhmm is the forecast time. The fields may be abbreviated. If the input has no /, it is assumed to be the time part. Any abbreviated version of either date or time is assumed to be the part closest to the /. The rest of the date and time is obtained from the last time in the file. If the type is missing, then A is assumed, and a missing forecast time is replaced by 00000.

The type and forecast time fields are used with forecast model data. If GDATTIM is 940831/0000F24, the grid to be found is the 24-hour forecast from the model run at 00Z on Aug 31. If GDATTIM is 940831/0000V24, the grid to be found is the 24 hour forecast valid for 00Z on Aug 31 from the model run at 00Z on Aug 30.

Examples (with the last time = 941205/1600):

GDATTIM	TIME1	TIME2
941205/1200	941205/1200	
12:15	941205/1200	941205/1500
LAST	941205/1600	
/00F24	941205/0000F24	
FALL	all forecast hours	
ALLF24	24 h forecast of all forecast cycles	

The value in GDATTIM may be overridden by specifying ^GDATTIM with the grids to be found. For example, GFUNC = SUB (TMPF^28/12,TMPF^27/12) will compute the same time difference as GFUNC = TDF (TMPF) with GDATTIM=28/12:27/12.

Note that a grid from an objective analysis will have forecast type and time A00000, which is the default for a blank forecast type and time.

3.53 GDEFIL

GDEFIL is the name of the grid edit file which will be used to update a grid file. The edit file must contain only complete grids.

GDEFIL is a text file which may be created using the program GDLIST with F as an

output device and GAREA = DSET. A text editor may be used to create or change the grid edit file.

GDEFIL must contain the following information before the complete grid data:

The time, level, vertical coordinate and parameter name MUST appear on the same line in the order given. The time must be a fully qualified GEMPAK time. The parameter name is the name of the grid.

The first and last row and column information must appear on one line. Column information must be preceded by the word COLUMNS:. Row information must be preceded by the word ROW:. The first row and column must be 1. The last row and column must be the same as the grid size in the file. For example:

```
COLUMNS: 1 8 ROWS: 1 6
```

If the string FACTOR:, appears and is followed by an integer, the data will be divided by 10**SCALE before being stored in the grid file. In the following example, the data will be divided by 10**5.

```
SCALE FACTOR: 10**5
```

The string COLUMN: signals the beginning of the grid data. If the required grid information has not already been found, an error will result.

The data for the grid follows the grid keywords. The data for a grid is listed from the top (last) row to the bottom row in the grid. The beginning of each row of data must be preceded by the string ROW. Data consists of numeric values for each data point; missing data should be entered as -9999.0.

3.54 GDFILE

GDFILE is the name of the file which contains gridded data.

The input for GDFILE may contain more than one file name separated by +. Up to three file names may be entered. Individual operands in GFUNC or GVECT can be accessed from a specific file by placing +n after the operand name, where n is the number corresponding to the placement of the file name in the GDFILE input. In the example below, the temperature from the third file is advected by winds from the first file:

```
GDFILE = file1.grd + file2.grd + file3.grd
GFUNC  = ADV ( TMPK+3, WND )
```

The input for GDFILE may also be a file type. The following file types are examples

of the possible input. See the table, datatype.tbl, for the actual file types that can be used.

ETA	ETA model grid
NGM	NGM model grid
AVN	AVN model grid
MRF	MRF model grid
ECMWFG	ECMWF model grid (global)
ECMWFT	ECMWF model grid (tropical)
FNL	Final analysis
RUC2	Rapid update cycle
RUCS	Rapid update cycle surface
UKMET	UKMET model grid

When one of these file types is input, the program searches locally for the most recent file first. If no files are found locally, the program searches remotely for the most recent file. The remote directories are specified in the table DATA.TBL.

An optional base time may be included with the file type name, following a bar (|). For example:

GDFILE = eta | 00

This will attempt to find the most recent run of the ETA model at, or prior to, 00Z. The base time may be any valid format for a GEMPAK date/time. Any missing parts of the date/time will be supplied by the system time. For GDPLOT2, the base time is the cycle time. It will attempt to find the most recent run of the ETA model at 00Z cycle.

3.55 GDNUM

GDNUM allows the user to select grids by number in the following ways:

GDNUM = range
The first and last grid numbers in the range are separated by a **-**. If an increment is included, it will be ignored.

GDNUM = list
The grid numbers in the list are separated using semicolons.

GDNUM = ALL
All the grids in the file will be included.

GDNUM = LIST
All the grids in the file will be listed. The user will be prompted to select the grids to be included.

3.56 GDOUTF

GDOUTF is the output grid data file name.

GDOUTF is used in programs which create a new grid data file. It is also used in programs that move data from an input file to an output file. In that case, GDFILE is the original file.

The file types that can be used for GDFILE cannot be used to specify the GDOUTF value.

3.57 GDPFUN

GDPFUN specifies a grid diagnostic function which yields either a scalar or vector quantity. For more information, see the GPARM documentation.

3.58 GFUNC

GFUNC specifies a grid diagnostic function which yields a scalar quantity. For more information, see the GPARM documentation.

3.59 GGLIMS

GGLIMS is the parameter which controls the grid value limits and values.

lochk;loval | hichk;hival | default

Grid values less than lochk are set to loval. Grid values greater than hichk are set to hival.

If no contours are available in the CNTRFL file, the output grid is assigned "default" at all grid point locations.

Example: for a precipitation grid, set all negative values to zero:

```
GGLIMS0;0
```

Example: in previous example, if no contours are provided, set all grid point values to zero:

GGLIMS 0;0 | | 0.0

3.60 GLEVEL

GLEVEL is the vertical level for the grid.

Grids may contain two levels separated by a colon. If the grid to be selected contains only one level, the colon and second level may be omitted. In this case, the second level is stored in the grid file as -1.

Note that the vertical coordinate system for GLEVEL is specified by GVCORD.

The value in GLEVEL may be overridden by specifying @GLEVEL with the grids to be found. For example, the following two computations are identical:

GFUNC = SUB (TMPF@850,TMPF@500)

GFUNC = LDF (TMPF) and GLEVEL = 850:500.

3.61 GPACK

GPACK is the packing type and the number of bits (or data precision) to be used to pack the grid data, separated with a slash:

packing type / number of bits (NONE, GRIB, DIF)

packing type / precision (DEC)

The valid packing types are:

NONE	No packing
GRIB	Data is packed in GEMPAK GRIB format
DEC	Data is packed in GEMPAK GRIB format
DIF	Data is packed in GEMPAK DIF format

If the packing type is DEC, the number of bits is replaced by the data precision. The data will be scaled by 10**precision and rounded to the nearest integer. The number of bits used to store the data will be the minimum number required to store the resulting integers.

If the number of bits is less than 32, the packing type specified will be used. If no packing type is given, the data will be packed using the GEMPAK GRIB scheme.

In general, data should be stored using packing type GRIB with 16 bits, by specifying the precision in DEC or with no packing using type NONE. Care should be taken using the other packing options.

Pack Type	Minimum	Maximum	Default

NONE	32	32	32
DEC	-5	5	2
DIF	2	32	16
GRIB	2	32	16

The default data packing when GPACK is blank is GRIB/16.

3.62 GPARM

GFUNC and GVECT are the scalar and vector grid functions. They are input as nested strings of operators and operands. The operand list for an operator is enclosed in parentheses or square brackets, with operands separated by semicolons or commas.

If the entire grid is small enough (less than LLMXGD grid points) and GAREA is set to GRID, then the computations below are done over the entire grid; otherwise, the computations are done over a subset of the grid. This subset grid is large enough to cover the display area.

The following grids will be computed automatically from grids in the grid file, if possible:

```
TMPKDWPKTVRKMIXR  THTA  DRCT  TMWK
TMPCDWPCTVRCSMXR STHA  SPED  TMWC
TMPFDWPFTVRFMIXS  THTE  RELH  TMWF
          THES  SMXS  STHE
```

Mixing ratios will be computed automatically from dewpoint temperatures, specific humidity, or vapor pressure if a pressure grid exists.

The stability indices will be computed automatically from temperature, dewpoint temperature, and wind speed and direction. These special scalar parameters are:

CTOT VTOT TOTL KINX SWET

Haines Indices for fire weather detection will be computed automatically from temperature and dewpoint at three different levels. These scalar parameters are:

```
LHANLow elevation Haines Index
MHANMiddle elevation Haines Index
HHANHigh elevation Haines Index
```

The Heat Index, HEAT, will also be automatically computed from the temperature and relative humidity.

In addition, precipitation will be converted from inches (I) to millimeters (M) and vice versa, if the grids are named P__M or P__I. The middle characters are numbers giving

the time interval over which the precipitation accumulated. For example, P24M is a 24-hour precipitation total.

The units for sea surface temperature (SSTx), maximum temperature (TMXx), and minimum temperature (TMNx) will be converted automatically. (x may be K, C, or F.)

These special scalar parameter names denote constant value grids:

```
DTRConversion factor for degrees to radians = PI / 180
E  Base of natural logarithms = 2.71828182
GRAVTYGravitational constant = 9.80616 (note spelling)
KAPPAGas constant/specific heat = 2/7
PI 3.14159265
RTDConversion factor for radians to degrees = 180 / PI
nnnAny number (e.g., 2, -10.2)
```

Another class of special parameter names depends on the grid navigation:

```
CORLCoriolis force  = 2.  * OMEGA * SIN ( LATR )
LATRLatitude in radians
LONRLongitude in radians
XVALValue of the x coordinate in graph coordinates
YVALValue of the y coordinate in graph coordinates
MSFXMap scale factor in the x direction
MSFYMap scale factor in the y direction
LANDLand array; land=1,  sea=RMISSD
SEASea  array;  sea=1, land=RMISSD

BETADerivative of Coriolis force with respect to y direction
```

Note: This only works correctly for cylindrical grids.

A grid may be identified by its number in the grid file by prefixing the number with the symbol #, e.g., #5.

Standard vector grids are:

```
WNDTotal wind
GEOGeostrophic wind
AGEAgeostrophic wind
ISALIsallobaric wind
THRMThermal wind
```

Time, level, and vertical coordinate as specified through the user interface may be overridden by in-line parameters:

```
^time  @level %ivcord
```

appended to an operand in any combination.

If more than one file is opened, +n may also be used as an in-line parameter, where "n" is the number corresponding to the position of the file list entered in GDFILE. If +n is omitted, the first file is used. For example, to advect temperature from file 3 using winds from file 1:

```
GDFILE  =file1.grd  +  file2.grd  +  file3.grd
GFUNC   =ADV  (  TMPK+3,  WND  )
```

Grid operators may be nested. Note that layer and time range operators expect operands read directly from the grid file.

GFUNC may include a name for the computed grid. This name may be used in later diagnostic functions in an application. The grid is stored in an internal, circular grid list and will eventually be overwritten. It will never be available after exiting the application. The name is specified after two slashes at the end of GFUNC. For example,

GFUNC = DIV (WND) // DVRG

permits the divergence to be used in a later calculation as DVRG, as in this example:

GFUNC = LAP (DVRG)

This name will also be the default name used in the title. If a computed grid is given the same name as one computed in a previous GFUNC specification, then the earlier grid is replaced by the one most recently computed, even if the grids have different level or time identifiers. Use different names to preserve both grids. To recall saved grids, it may be necessary to use in-line identifiers following the name if the inputs for GDATTIM, GLEVEL, or GVCORD have been changed.

In the following list of diagnostic operators, scalar operands are named Si, and vector operands are Vi. Vector components are denoted by u and v. All meteorological grids are in MKS units, except as noted. POL following the description indicates that the computation currently can only be performed on polar (R, THETA) grids. In the trigonometric functions, the angles are expressed in radians.

The scalar constants used as arguments for the radial and tangential wind computations are defined as follows:

LAT = latitude of storm center
LON = longitude of storm center
D = direction of storm motion
ST = speed of storm motion

The second input in each of the filter functions GWFS and GWFV is an integer N. N gives the wavelength in units of the grid spacing for which the theoretical response of

a filter with normally distributed weights is 1/e = .3679. In practice, the actual response function will exceed the theoretical values at all wavelengths. The larger N is, the stronger the filtering will be.

SCALAR OUTPUT GRID

ABS(S)	Absolute value
ACOS(S)	Arc cosine function
ASIN(S)	Arc sine function
ATAN(S)	Arc tangent function
ATN2(S1,S2)	Arc tangent function
COS(S)	Cosine function
EXP(S1,S2)	Exponential to real
EXPI(S1,S2)	Exponential to integer [uses NINT(S2)]
LN(S)	Natural logarithm
LOG(S)	Base 10 logarithm
SIN(S)	Sine function
SQRT(S)	Square root
TAN(S)	Tangent function
NCDF(S1,S2,S3)	Cumulative normal distribution function for value, mean, and std dev
PAUB(S1,S2,S3)	Combine probabilities (S1 OR S2) with dependency parameter S3
ADD(S1,S2)	Addition
MUL(S1,S2)	Multiplication
QUO(S1,S2)	Division
SUB(S1,S2)	Subtraction
BOOL(S)	Boolean function
SLT(S1,S2)	Less than function
SLE(S1,S2)	Less than or equal to function
SGT(S1,S2)	Greater than function
SGE(S1,S2)	Greater than or equal to function
SBTW(S1,S2,S3)	Between two values function
SMAX(S1,S2)	Maximum of S1 and S2
SMIN(S1,S2)	Minimum of S1 and S2
MASK(S1,S2)	Mask S1 based on S2
MISS(S1,S2)	Set missing values in S1 to S2
ADV(S,V)	Advection
AVG(S1,S2)	Average
AVOR(V)	Absolute vorticity
BVSQ(THTA)	Brunt-Vaisala frequency squared in a layer
CROS(V1,V2)	Vector cross product magnitude
DDEN(PRES,TMPC)	Density of dry air (kg / m**3)
DDR(S)	Partial derivative with respect to R (POL)
DDT(S)	Time derivative
DDX(S)	Partial derivative with respect to X
DDY(S)	Partial derivative with respect to Y
DEF(V)	Total deformation
DIRN(V)	Direction relative to north

DIRR(V) Direction relative to grid
DIV(V) Divergence
DIVT(S,V) Divergence Tendency (only for cylindrical grids)
DOT(V1,V2) Vector dot product
DTH(S) Partial deriv. with respect to THETA (POL)
FCNT(S) Coriolis force at grid center (POL)
FOSB(TMPC,RELH, SPED) Fosberg index, also called Fire Weather Index
FRNT(THTA,V) Frontogenesis
GWFS(S,N) Filter with normal distribution of weights
HIGH(S,RADIUS) Relative maxima over a grid (RADIUS is expressed in grid points)
JCBN(S1,S2) Jacobian determinant
KNTS(S) Convert meters / second to knots
LAP(S) Laplacian operator
LAV(S) Layer average (2 levels)
LDF(S) Layer difference (2 levels)
LOWS(S,RADIUS) Relative minima over a grid (RADIUS is expressed in grid points)
MAG(V) Magnitude of a vector
MASS Mass per unit volume in a layer from PRES
MDIV(V) Layer-average mass divergence
MIXR(DWPC,PRES) Mixing ratio kg/kg internally, g/kg on output
MRAD(V,LAT,LON, D,ST) Magnitude of radial wind
MSDV(S,V) Layer-avg. mass-scalar flux divergence
MSFC(V) Psuedo angular momentum (for cross sections)
MTNG(V,LAT,LON, D,ST) Magnitude of tangential wind
NORM(V) Normal component (for cross sections)
PLAT(S) Latitude at each point (POL)
PLON(S) Longitude at each point (POL)
POIS(S1,S2) Solve Poisson equation of forcing function with boundary conditions
POLF(S) Coriolis force at each point (POL)
PVOR(S,V) Potential vorticity in a layer
RELH(TMPC,DWPT) Relative humidity
RICH(V) Richardson stability number in a layer
ROSS(V1,V2) Rossby number
SAVS(S) Average over display subset area of grid
SDIV(S,V) Flux divergence of a scalar
SHR(V) Shearing deformation
SM5S(S) 5-point smoother
SM9S(S) 9-point smoother
STAB(TMPC) Lapse rate over a layer in K/km
STR(V) Stretching deformation
TANG(V) Tangential component (for cross sections)
TAV(S) Time average
TDF(S) Time difference
THES(PRES,TMPC) Saturated equivalent potential temperature in Kelvin
THTA(TMPC,PRES) Potential temperature
THTE(PRES,TMPC, DWPC) Equivalent potential temperature

THWC(PRES,TMPC, DWPC)	Wet bulb potential temperature in Celsius
TMST (THTE,PRES)	Parcel temperature in Kelvin along a moist adiabat
TMWK(PRES,TMPK, RMIX)	Wet bulb temperature in Kelvin
DSUB(V1,V2)	DIRN (V1) - DIRN (V2)
UN(V)	North relative u component
UR(V)	Grid relative u component
VN(V)	North relative v component
VOR(V)	Vorticity
VR(V)	Grid relative v component
WNDX(S1,S2,S3,S4)	WINDEX (index for microburst potential)
WSHR(V)	Magnitude of the vertical wind shear in a layer
XAV(S)	Average along a display subset grid row
XSUM(S)	Sum along a display subset grid row
YAV(S)	Average along a display subset grid column
YSUM(S)	Sum along a display subset grid column

VECTOR OUTPUT GRID

AGE(S)	Ageostrophic wind
CIRC(V,S)	Circulation (for cross section)
DVDX(V)	Partial x derivative of V
DVDY(V)	Partial y derivative of V
GEO(S)	Geostrophic wind
GRAD(S)	Gradient of a scalar
GWFV(V,N)	Filter with normal distribution of weights
INAD(V1,V2)	Inertial advective wind
ISAL(S)	Isallobaric wind
KCRS(V)	Curl of V
KNTV(V)	Convert meters/second to knots
LTRN(S,V)	Layer-averaged transport of a scalar
NORMV(V)	Vector normal wind (for cross sections)
QVEC(S,V)	Q-vector at a level
QVCL(S,V)	Q-vector of a layer
RAD(V,LAT,LON, D,ST)	Radial wind
ROT(angle,V)	Coordinate rotation
SMUL(S,V)	Multiply a vector's components by a scalar
SM5V(V)	5-point smoother
SQUO(S,V)	Vector division by a scalar
TANGV(V)	Vector tangential wind (for cross sections)
THRM(S)	Thermal wind over a layer
TNG(V,LAT,LON, D,ST)	Tangential wind
VADD(V1,V2)	Add the components of two vectors
VASV(V1,V2)	Vector component of V1 along V2
VAVS(V)	Average vector over display subset grid
VECN(S1,S2)	Create vector from north relative components
VECR(S1,S2)	Create vector from grid relative components
VLAV(V)	Layer average for a vector

VLDF(V)	Layer difference for a vector
VMUL(V1,V2)	Multiply the components of two vectors
VQUO(V1,V2)	Divide the components of two vectors
VSUB(V1,V2)	Subtract the components of two vectors
VLT(V,S)	Less than function
VLE(V,S)	Less than or equal to function
VGT(V,S)	Greater than function
VGE(V,S)	Greater than or equal to function
VBTW(V,S1,S2)	Between two values function
VMSK(V,S)	Mask V based on S

3.63 GPOINT

GPOINT is the grid location to be used for the plot. The value can be entered in the following ways:

1. station numeric or character identifier

2. a latitude and longitude pair separated with a semicolon

3. @ followed by a grid x and y coordinate pair separated with a semicolon.

4. Graphically using the CURSOR command.

If necessary, the grid data will be interpolated using a bilinear interpolation to the point specified.

Examples:

GPOINT=	@1;1.5	Grid point (1,1.5)
GPOINT=	30;-120	Grid point at 30 latitude and -120 longitude
GPOINT=	5;5	Grid point at 5 latitude and 5 longitude. Note that this is probably an error and the input should have been @5;5
GPOINT=	BWI	Point located at Baltimore-Washington International Airport.

3.64 GRDAREA

GRDAREA specifies the area to be covered by the grid. This area is combined with

PROJ to define the region over which the grid is evenly spaced.

GRDAREA can be specified in three ways:

1. lat1;lon1;lat2;lon2
   This defines a latitude/longitude range where (lat1, lon1) is the lower left corner and (lat2, lon2) is the upper right corner. West longitude is negative.

   #clat;clon;dlat;dlon
   This defines a latitude/longitude range by the center latitude and longitude. The lower left corner is (clat-dlat; clon-dlon); the upper right corner is (clat+dlat; clon+dlon). No corrections are made for the poles or the International Date Line.

2. GEOG
   This is an abbreviation for a geographic area defined in the GEMPAK geographic table which includes abbreviations for states, provinces, and countries, as well as other names. A suffixed + or * will decrease the extent of the geographic area. A suffixed - will increase the extent of the geographic area.

3. STN
   This defines an area centered on a station found in the GEMPAK station table, which currently contains US, Canadian and Mexican stations. A suffixed + or * will expand, and - will reduce the area.

Note that the other ways of specifying AREA are not valid for GRDAREA.

For all projections, the lat/lon corners defined will be used exactly. For projections which include the pole, if lat1 = lat2 and lon1 = lon2, then lat1 will specify the range of data from the pole and lon1 will specify the central longitude. West longitude is negative.

3.65 GRDLBL

GRDLBL is the color number to be used in plotting the grid index numbers. If GRDLBL = 0 or blank, grid index numbers are not plotted.

3.66 GRDNAM

GRDNAM is the parameter name for the grid. In GDDIAG, this is the output name of the grid to be created. Time, level, and vertical coordinate for the grid may be overridden by in-line parameters:

^time @level %ivcord

appended to the output name of the grid in any combination. If the name is blank, the default name generated by the grid diagnostics package will be used.

3.67 GSKIP

GSKIP allows the NDFDG2 user to specify a skip factor in order to reduce the resolution of the resulting GEMPAK grid.

Any positive integer may be specified. This skip factor will be applied to both the I and J dimensions.

A warning will be issued if no value is specified and the resulting grid is too large.

3.68 GSPACE

GSPACE sets the grid spacing of the ETA model domain where:

GSPACE = DLHD

from the eta_run.csh script.

GSPACE is the grid spacing of the computational model domain in degrees longitude respectively. A VERY rough conversion to km over the central US would be:

km/150 = delta degrees

Thus from above:

```
10km grid spacing: GSPACE = 0.067
15km grid spacing: GSPACE = 0.098
32km grid spacing: GSPACE = 0.213
```

GSPACE is the same as the values for DLMD and DLHD in eta_run.csh.

3.69 GUESS

GUESS contains the information to use as a first guess for objective analysis programs. The name of the grid file containing the guess field and the time to be used to extract the field must be entered using * as a separator:

guess file * grid time

3.70 GVCORD

GVCORD is the vertical coordinate of the grid to be selected.

The standard values are:

NONEfor surface data
PRESdata in pressure coordinates (millibars)
THTAdata in isentropic coordinates (Kelvin)
HGHTdata in height coordinates (meters)
SGMAdata in sigma coordinates

The value in GVCORD may be overridden by specifying %GVCORD with the grids to be found. For example:

GFUNC = SUB (TMPC @850 %PRES, TMPC @1500 %HGHT)

will compute the difference between temperatures on the 850-mb level and the 1500-meter level.

3.71 GVECT

GVECT specifies a grid diagnostic function which yields a vector quantity. For more information, see the GPARM documentation.

3.72 HILO

HILO contains the information for plotting relative highs and lows in the following format:

colorh;colorl/symbolh;symboll/rangeh;rangel/radius/counth;countl/interp

Colorh and colorl are the colors for the high and low symbols to be plotted. If only a single number is entered, it will be used for both highs and lows. The default for this entry is 0.

Symbolh and symboll specify the symbols to be plotted. The format for the symbol input is:

character # precision

where the character is the character to be plotted. If the character is an integer,

markers corresponding to that number will be plotted. If the character is an integer preceeded by the character 'S', special symbols corresponding to that number will be plotted. Information about markers can be found in the help for MARKER. The # is a flag to plot values beneath the marker. The integer following the # is the number of decimal places to display in the value. If a # is present without the following number, integer values are printed. The default for the symbols is H;L.

Rangeh and rangel are ranges for highs and lows specified as:

minval - maxval

where minval and maxval are integers which specify the range of values to be considered for designation as a high or low. The default is to consider all data.

The search radius is a sqaure region of grid points. The region is a moving search area in which all points are compared to derive relative extrema. The default is 3, which is generally the most effective. To find more concentrated areas of highs and lows, use a smaller radius. A large radius, such as 10 or higher, is not very effective.

Counth and countl are integer values for the maximum number of high and low values to be displayed. The default is 20;20.

Interp is an interpolation flag which specifies whether the values and locations of the highs and lows will be at grid points, or will be interpolated between grid points. The default is NO.

In general, the above defaults are used if there is no entry for a part. For the parts which have values for both relative highs and lows, a single entry will be used for both highs and lows.

Examples:

HILO = 1/H#;L#/1020-1040;980-1000/2/30;20

Color 1 for highs and lows.
H and L characters with numeric values plotted below.
Plot highs from 1020 to 1040; plot lows from 980 to 1000.
Search radius of 2.
Plot the 30 highest highs and the 20 lowest lows in the specified range.

HILO = 2;4/X#;Y#//30/yes

Colors 2 and 4 for highs and lows.
X and L characters with numeric values plotted below.
Plot the 30 highest highs and 30 lowest lows.
Locations of highs and lows interpolated between grid points.

HILO = 2;4/S12#;S13#//30/yes

Same as previous example except use special symbols 12 and 13 for indicating relative minima and maxima.

3.73 HISTGRD

HISTGRD toggles the writing of the graph-to-grid history grid to the GEMPAK grid file. The history grid contains integral values which indicate which method was used to assign the data grid value. The grid is primarily a diagnostic tool and is usually not saved.

yes - save history grid
anything else - do not save history grid

The name of the history grid will be the name of the data grid concatenated with "HIST", e.g., data P06I will be P06IHIST. The vertical coordinate and level will be the same as the data grid.

3.74 HLSYM

HLSYM defines the characteristics for the HILO symbols specified in HILO. The text sizes, value position, fonts, text widths and hardware/software flags are specified for the symbols (s) and plotted values (v) as:

sizes;sizev/position/fonts;fontv/widths;widthv/hwflgs;hwflgv

The size, font, width, and hw flag are the same as the TEXT variable. If only one value is given, it is used for both the symbol and value.

The value plotting position may be 1, 2, or 3 where 2 is the default. The number selects the position of the value string beneath the symbol string. The three positions are shown below:

```
    H
1   2   3
```

It is common for HILO symbols near the edge of the display to be hidden when hardware text font is used. Therefore, when using hardware text font, the number of HILO symbols displayed may be slightly less than what the user specifies.

Examples:

```
HLSYM = 2;1/3/2//HW   --symbol text size = 2
```

```
                value text size = 1
                plot value in position 3
                hardware text font 2 applies to both

HLSYM = 2/1/1;2/ --symbol text size = 2
                value text size = 2
                plot value in position 1
                symbol text font = 1
                value text font = 2
```

3.75 HRCN

HRCN is the ending valid time for the tropical disturbance, the colors for the hurricanes, tropical storms, tropical depressions and directional arrows, the symbols for the hurricanes, tropical storms and tropical depressions, and flags for plotting the center located time, the name and minimum central pressure, the speed, the wind and sea quadrant radii, and the forecast track on the map.

End time|HU;TS;TD;DA clrs|HU;TS;TD syms|Time flg|Label flg|
Speed flg|Quad Wind flag|Fcst track flg|Name

Locations that are valid less than 24 hours before the ending time, given as a GEMPAK date/time string, will be plotted on the map. Any missing items from the date/time string will be filled in by the system time. The ending time may also be LAST or ALL. LAST will use the system time and plot all current tropical weather. ALL will plot all the tropical weather in the data files for the last ten days.

The colors are separated by a semi-colon. If any color is set to 0, that type of symbol will not be plotted. If any color is missing, a default will be used. Defaults are red for hurricane, yellow for tropical storm, green for tropical depression, and magenta for directional arrow.

The symbols are separated by a semi-colon. If they are not given, the default symbols will be used. The defaults are Northern Hemisphere hurricane, Northern Hemisphere tropical storm and tropical depression.

The time flag is YES or NO and controls whether or not to plot the location time of the tropical disturbance on the map. The default is NO.

The label flag is YES or NO and controls whether or not to plot the name of the disturbance and the minimum central pressure on the map. The default is NO.

The speed flag is YES or NO and controls whether or not to plot the speed in knots of the disturbance. The default is NO.

The quad wind flag is YES or NO and controls whether or not to plot the 64, 50 and 34

kts wind and 12 foot seas quadrant arcs. Only the most recent time period of each storm will have the arcs drawn. The default is NO.

The fcst track flag is YES or NO and controls whether or not to plot the valid forecasted latitudes and longitudes for all available forecast estimated positions for the disturbance. Only the most recent time period of each storm will have the track drawn. The default is NO. If both the quad wind flag and the fcst track flag are YES, the wind and sea quadrant arcs will be plotted for the most recent forecast positions as well as for the most recent current position.

The name of a tropical storm may be specified. If a name is declared, then only that storm will be displayed for the date/time indicated. The default is all storms are plotted. ALL will also plot all storms within the given time range.

3.76 IDNTYP

IDNTYP sets character or numeric station identifiers to be used for input or output. The valid values are STID and STNM. STID specifies station character identifiers; STNM specifies station numbers.

If the value in IDNTYP is not STNM, the default of STID will be used.

For example, to update station headers in SFSTNS:

```
IDNTYP = STID --compares character ids in file with those
              in the station table

IDNTYP = STNM --compares numeric ids in file with those
              in the station table
```

3.77 IJSKIP

IJSKIP is used to control subsetting of the internal grid by declaring bounding index values and numbers of points to skip in each index direction, I and J. Input is entered as follows:

```
    Iskp;Istrt;Istp/Jskp;Jstrt;Jstp
or
    Yes
or
  No
```

where Iskp and Jskp are the number of grid points to skip in the I and J grid index directions, respectively; Istrt and Istp are the beginning and ending I index values,

respectively; and Jstrt and Jstp are the beginning and ending J index values, respectively. GEMPAK grids have (I,J) = (1,1) at the lower left corner, with I increasing in the X (horizontal or east-west) direction. J increases in the Y (vertical or north-south) direction. The internal grid navigation is determined from the GDFILE entry.

The defaults for Iskp and Jskp are zero. The other parameters default to missing values so that they will be determined automatically, depending on the area of the grid required by the map display.

If only Iskp is given, then Jskp = Iskp, and the bounds are determined automatically. The skip values thin the grid by skipping over the number of points specified.

If IJSKIP = NO, then the results are the same as for IJSKIP set to blank or zero. If IJSKIP = YES, then all the skipping values are computed automatically. When IJSKIP = YES, skipping is only done if the number of grid points required to cover the display area is too large. The automatic number of points skipped is the same in each index direction, and it will be the minimum number required to make the internal computational grid fit in allocated memory.

IJSKIP and SKIP are functionally independent. If SKIP is also specified, IJSKIP operates first to create the subset grid, then the SKIP information is applied to that subset grid, which has already been thinned by IJSKIP. Since IJSKIP and SKIP are done in series, the combined effect is multiplicative. IJSKIP determines the internal computational grid; therefore, changing it changes the results of computations involving derivatives. The SKIP parameter is applied to the internal grid after computations and affects only the display. SKIP and IJSKIP results, when done separately and compared, will not always yeild coinci- dent points for the same skipping values, because IJSKIP creates a computational halo of grid points around the display region resulting in different initial indexes for IJSKIP vis-a-vis SKIP.

In programs like GDPLOT2, which allows different specifications of IJSKIP for different GDPFUN entries, IJSKIP must be the same for all fields if the // grid naming feature is used in GDPFUN. This is because IJSKIP determines the navigation of the internal grid, which must remain the same if saved grids are to be kept for reuse.

If user-supplied index bounds are not consistent with the given number to skip, then the bounds will be reset, taking into account any nearby grid boundaries. The reset values will be close to what the user intended. For best results, provide consistent bounding index values. If the full range of the index is required, then the unit (1) value of the index is the starting point.

If the grid is a global grid and the "seam" falls within the display area, then if Istrt is given, Istp must also be given; otherwise, an error message is generated. If both Istrt and Istp are given in the case of the global grid, the grid "seam" will not be shifted out of the display area.

If a start value (strt) exceeds a stop value, an error message appears.

Some examples follow:

Example Action

IJSKIP = YES Skip only if necessary, skipping as few points as possible; if the subset area is reduced fewer points will be skipped

IJSKIP = 5 Skip 5 points in both index directions; beginning and ending indexes are automatically determined

IJSKIP = 5/3 Skip 5 points in the I index direction; skip 3 points in the J index direction; beginning and ending indexes are automatically determined

IJSKIP = 5;3/2 Skip 5 points in the I index direction; skip 2 points in the J index direction; beginning I index is 3; all other indexes are determined automatically

3.78 IMBAR

IMBAR specifies the characteristics of a color bar associated with image display. The attributes are separated by slashes:

color / orientation / anchor / x;y / length;width / frequency | text_info

Color is the color of the labels and the bounding box around the image bar. If color is negative, the bounding box will not be drawn, and labels will be drawn in colors corresponding to the image bar. If the color is 0 or missing, no image bar is drawn.

Orientation specifies a vertical or horizontal orientation of the image bar where 'V' is a vertical bar and 'H' is a horizontal bar. The default is 'V'.

Anchor describes the location on the image bar corresponding to the location given in the next parameter. Valid inputs are LL, LC, LR, CL, CC, CR, UL, UC, and UR for lower-left, lower-center, lower-right, center-left, centered, center-right, upper-left, upper-center, and upper-right, respectively. For example, an 'LL' anchor point, with a x;y of .1,.1, will place the lower-left corner of the image bar at view coordinates .1, .1. The default anchor point is 'LL'.

x;y is the position for the anchor point of the image bar in view coordinates. The

default is .005, .05.

Length;width are the length and width of the image bar, normalized to the view coordinates. The defaults are .5 for the length, and .01 for the width.

Frequency describes the levels to be labeled. If the frequency is positive, the labels are plotted on the right/top of the image bar. If it is negative, the labels are plotted on the left/bottom of the image bar. The default is -1.

Text_info describes the image bar label attributes. These attributes are of the same format as the TEXT parameter. If any part of text_info is missing, then default text information is used. The user may only change the font type, hardware/software flag, text size and text width. The default values are the bold courier hardware font and text size and text width of 1.

To disable the image bar, set IMBAR = 0 or leave it blank. contour lines are drawn (CTYPE = C), the IMBAR variable is not used.

Examples:

```
IMBAR = 1                text and bounding box in color 1;
                         defaults for the rest of the input;

IMBAR = 5/V/ /.25;.1/1   text and bounding box in color 5;
                         image bar plotted vertically;
                         length and width .25 and .1 of the
                         view window;
                         all intervals labeled along left
                         side of the image bar;
                         image bar anchor point at lower-left;

IMBAR = 1//CL/.1;.5/.75;.1text and bounding box in color 1;
                         length and width .75 and .1 of the
                         view window;
                         center-left of the image bar
                         positioned at .1;.5 in view
                         coordinates;

IMBAR = 1//CL/.1;.5/.75;.1|.55/2/111/1/l/hw

                         text and bounding box in color 1;
                         length and width .75 and .1 of the
                         view window;
                         center-left of the image bar
                         positioned at .1;.5 in view
                         coordinates;
                         text size of image bar .55;
                         hardware helvetica font; text width
                         2; no box around text;left justified;
```

3.79 IMJM

IMJM sets the number of grid points for workstation eta in the N-S and E-W direction where,

IMJM = IM;JM

IM and JM are the number of grid points over the computational domain domain where:

IM is the number of grid points in the E-W (roughly) direction
JM is the number of grid points in the N-S (roughly) direction

IMPORTANT: The horizontal grid dimensions MUST be an ODD integer!

BINARY DISTRIBUTION USERS: The IM and JM values must be set to the dimensions of your compiled distribution. LM should be 45.

For a grid with 71 grid points in the E-W and 121 points in the N-S direction:

IMJM = 71;121

Note that during creating on the Arakawa-E grid the IM dimension becomes IM*2-1. This is the value that is used in etamap for display of the workstation Eta computational domain.

3.80 INDXFL

INDXFL is the name of the file which contains the GRIB message header information.

If this parameter is left blank, the header information will be read from the GRIB data file specified in GBFILE.

3.81 INFO

The location of the object is defined in LOCI.

```
TEXT      size/font/width/hw-sw  flag/justify/rotation/text
POLYGON   line  type
REGPOLY   line  type/radius/number  points/rotation
ARC       line  type/radius/number  points/start  ang/end  ang
CURVE     line  type/curve  type
LINE      line  type
ARROW     line  typ/arrw  typ/arrw  siz/head  siz/
                                        head  ang  mult/rotation
```

COLDFRONT number pips/pip size/line type/# smoothing passes
WARMFRONT number pips/pip size/line type/# smoothing passes
OCCLFRONT number pips/pip size/line type/# smoothing passes
STATFRONT number pips/pip size/line type/# smoothing passes
WEATHER symbol code/size
CLOUD symbol code/size
SKY symbol code/size
TURB symbol code/size
ICNG symbol code/size
SPCL symbol code/size
MARKER symbol code/size
PRESTEND symbol code/size
PASTWTHR symbol code/size

Special notes:

- For fronts, a positive value for the number of pips will plot on one side of the curve, and negative values will plot on the opposite side.
- The symbol codes can be found in the users' manual.

3.82 INTERP

INTERP is a logical variable which determines whether interpolation between sweeps will occur. If INTERP=NO, only values within the beam scan volume will be displayed. If INTERP=yes, data values between scan tilts will be interpolated using bilinear interpolation.

3.83 ISIG

ISIG is the ending valid time for the international SIGMET, the colors for the thunderstorms, turbulence, hurricanes, tropical storms, tropical depressions, volcanic ash clouds, marked mountain waves, tropical cyclones, squall lines, CAT, icing, hail, duststorms, sandstorms, and cumulonimbus, and flags for plotting symbols or storm names, the start and end times, the message id, the direction and speed, and the flight level or the central pressure and maximum wind speed associated with a tropical cyclone on the map.

End time|TS;TB;HU;TR;TD;VA;MW;TC;SQ;CT;IC;GR;DS;SS;CB clrs|Symbol flg|
Time flg|Id flg|Motion flg|Flight lvl flg

SIGMETs that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST or ALL. LAST will use the system time and plot all current SIGMETs. ALL will plot all the SIGMETs in the data files for the last ten days, whether they are active, cancelled, or expired.

The colors are separated by a semi-colon. If any color is set to 0, that type of symbol will not be plotted. If any color is missing, a default will be used. Defaults are cyan for thunderstorm, yellow for turbulence, red for hurricane, red for tropical cyclone, yellow for tropical storm, green for tropical depression, orange for volcanic ash cloud, magenta for marked mountain wave, magenta for squall line, yellow for CAT, green for icing, red for hail, orange for duststorm, orange for sandstorm, and red for cumulonimbus.

The symbol flag is YES or NO and controls

(1) for thunderstorms and turbulence: whether or not to plot the symbol at the center of the defined area.
(2) for volcanic ash clouds: whether or not to plot the symbol at the volcano location, if given, or at the center of the defined area.
(3) for named storms: whether or not to display the storm name.

The default is NO.

The time flag is YES or NO and controls whether or not to plot the start and end times of the SIGMET on the map. The default is NO.

The message id flag is YES or NO and controls whether or not to plot the SIGMET message identification and sequence number on the map. The default is NO.

The motion flag is YES or NO and controls whether or not to plot the direction in degrees and the speed in knots of the SIGMET. The default is NO.

The flight level flag is YES or NO and controls whether or not to plot the SIGMET flight level in hundreds of feet on the map. Or if a tropical cyclone is the phenomenon, this position controls whether or not to plot the central pressure in mb and the maximum winds in kts. The default is NO.

3.84 KEYCOL

KEYCOL indicates which contour lines to process.

```
KEYCOL = 0- process all lines
KEYCOL = n- process all lines whose color is n
```

3.85 KXKY

KXKY specifies the size of a grid as two numbers separated by a semicolon:

kx ; ky

These numbers are KX and KY, which represent the number of grid points in the x- and y- directions.

If the projection is CED, these numbers may be DELTAX and DELTAY, the grid spacing in degrees in the x and y directions. If the spacing is input, the first character in KXKY must be #. For example:

KXKY = #2.5;2.0

will create a grid with 2.5 degree spacing in x (longitude) and 2.0 degree spacing in y (latitude).

3.86 LAT

LAT specifies the latitude grid lines to be drawn. It is set to 10 degrees.

3.87 LATLON

LATLON specifies the latitude and longitude grid lines to be drawn. The line color, line type, line width, label frequency and increment are separated by slashes:

color/line_type/line_width/x-freq;y-freq/x-inc;y-inc/lt_label;ln_label/format

The label frequency specification contains the latitude and longitude label frequencies separated by a semicolon. The increment specification contains the latitude and longitude increments in degrees separated by a semicolon.

If the color is 0 or LATLON is blank, grid lines are not drawn. The latitude and longitude increments will default to 10 degrees. The label frequency defaults to 1.

The latitude and longitude labels refer to the latitude at which to label the longitudes lines and the longitude at which to label the latitude lines. The defaults for the latitude and longitude value placements if either or both are not specified are usually the left side for latitude labeling and the bottom for longitude labeling.

The format value specifies the current format of the labels. If format is equal to 1, the latitude and longitude labels have a '-' prepended to the southern and western number labels. If the format is equal to 2, 'N', 'S', 'E' and 'W' are appended to the latitude and longitude labels. The default is that the '-' will be prepended to the southern latitudes and western longitudes.

Examples:

LATLON= 1

Lat/lon grid lines are drawn every 10 degrees in color 1 using line type 1 and line width 1.

LATLON= 4/8/3/2/5;5

Lat/lon grid lines are drawn every 5 degrees in color 4 using line type 8 and line width 3. Every other line is labelled.

LATLON = 24/12/1/2;2/4;4/48.;-100./2

Lat/lon grid lines are drawn every 4 degrees in color 24 using line type 12 and line width 1. Every other line is labelled. The latitude labels appear on 100.0 W longitude and the longitude labels appear on 48 N latitude appended to the numerical labels.

3.88 LEVELS

LEVELS specifies the vertical levels to be extracted from the data set. The coordinate system for the levels is specified in the variable VCOORD as PRES, HGHT or THTA.

LEVELS may be a list separated by semicolons. The following items may be included in the list:

a single level;
MAN for the mandatory levels below 100 mb;
VAS for the standard VAS levels;
a range of levels with an increment separated by - .

The following items are also valid, provided they are not part of a list:

ALL for all levels;
a range of levels without an increment.

SFC or 0 may be entered for surface data. TOP or -1 is the top level at the station. These values may not be entered for a range with an increment.

The flag /MAN may be used after any specification of LEVELS so that any application will use only mandatory level data with no interpolation.

3.89 LINE

LINE is the color, line type, line width, line label freqency and smoothing separated by

slashes. The individual values in each group are separated by semicolons:

colr1;..;colrn/type1;..;typen/width1;..;widthn/labl1;..;labln/smth/fltr

For example:

LINE = 1;2 / 7;8 / 4;5 / 2 / 2

assigns colors 1 and 2 to alternate lines, dashing patterns 7 and 8 to alternate lines, line widths 4 and 5 to alternate lines, and labels every other line. Smoothing level 2 is used on all lines.

If any specification is missing, a default of 1 is used. Except for the smoothing, which defaults to 0, or no smoothing. If a color number of 0 is given, no plotting will be done.

Information on color selection can be found in the help for COLORS.

There are ten distinct line types:

1 - solid
2 - short dashed
3 - medium dashed
4 - long dash short dash
5 - long dash
6 - long dash three short dashes
7 - long dash dot
8 - long dash three dots
9 - medium dash dot
10 - dotted

These patterns can be expanded or compressed by prefixing the single digit with a number from 1 to 9. A prefix of 1 compresses the pattern, 2 is the default and prefixes 3 -- 9 expand the basic pattern. For example, 32 expands line type 2 while 12 compresses the same pattern.

If the line type is set to a single negative number, negative contour values will use the absolute value of the line type, and positive values will be solid.

If the label information is a single number, n, then every nth line will be labelled. If the label information is a single number, -n, then every nth line will be labelled, however, there will not be a break in the line for the label. If a label is a sequence of numbers separated by semicolons, lines corresponding to values other than 0 will be labelled. The pattern established will be repeated to accommodate all lines.

The smoothing level is an integer which specifies the amount of smoothing to apply using a parametric curve function. The current values are 0, 1 and 2 which correspond to no smoothing and two levels of increasing smoothing.

The filter is a real value that specifies the amount of filtering of the points on a line. Smaller values allow for more points, while larger values reduce the number of points on the line. Valid values are in the range of 0.0 to 1.0. The default is 0.0 which means that no reduction in the number of points will occur.

3.90 LOCI

TEXT x;y
POLYGON x1;y1/x2;y2/x3;y3/.../xN;yN
REGPOLY x;y
ARC x;y
CURVE x1;y1/x2;y2/x3;y3/.../xN;yN
LINE x1;y1/x2;y2/x3;y3/.../xN;yN
ARROW x;y
COLDFRONT x1;y1/x2;y2/x3;y3/.../xN;yN
WARMFRONT x1;y1/x2;y2/x3;y3/.../xN;yN
OCCLFRONT x1;y1/x2;y2/x3;y3/.../xN;yN
STATFRONT x1;y1/x2;y2/x3;y3/.../xN;yN
WEATHER x;y
CLOUD x;y
SKY x;y
TURB x;y
ICNG x;y
SPCL x;y
MARKER x;y
PRESTEND x;y
PASTWTHR x;y

If LOCI is preceded by a '#' then the x and y values should be latitudes and longitudes. If the first character is a '@' then all points will be grid point columns and rows.

3.91 LON

LON specifies the longitude grid lines to be drawn. It is set to 10 degrees.

3.92 LSTALL

LSTALL is a flag indicating whether the full contents of a file are to be listed. For example, in GDINFO, if LSTALL=YES, the grid identifiers will be listed; if LSTALL=NO, grid identifiers will not be listed.

3.93 LTNG

LTNG is the ending valid time for lightning data, the time increments (in minutes going back from the ending time) and the corresponding colors for the lightning data, and the positive and negative markers to display.

End time|time increments/colors|positive marker/negative marker

The ending time is the latest time for which lightning data will be plotted. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST. LAST will use the system time and plot all lightning data for the preceding times as defined by the time increments. ALL is not accepted as an ending time for lightning data.

The time increments and colors may each be specified using either a list separated by semicolons or a range in the form first-last-increment. Time increments are given in minutes going back sequentially from the ending time. The number of time increments must be the same as the number of colors. If no time increment and color are given, a single time increment of 5 minutes with a default color of red will be used. If the range format is used for the time, an increment must be specified. If the range format is used for the color and an increment is not specified, an increment of one is used.

The marker data includes the marker type, size and width, separated by semicolons. The default marker for positive strikes is a plus sign, and for negative strikes a minus sign. Default marker size multiplier is one, as is default width.

Examples:

LTNG = 991130/2315|1/5

All lightning data will be plotted in yellow for times 2314Z and 2315Z. Default marker values will be used.

LTNG = LAST

All lightning data for the preceding five minutes will be plotted in red.

LTNG = ltng=991201/0000|10;20;30;90/2;17;5;3|4;1.5;2/6;2;3

Lightning data for 991130/2350 to 991201/0000 will be plotted in red; for 2330 to 2349 in orange; for 2300 to 2329 in yellow; and for 2130 to 2259 in green. Positive strikes will be plotted as squares with a size multiplier of 1.5 and a line width of 2; negative markers will be plotted as diamonds with a size multiplier of 2 and a line width of 3.

3.94 LUTFIL

LUTFIL specifies a lookup table file name used to enhance the colors for satellite or radar images. Color enhancement allows certain features in a satellite or radar image to be highlighted.

Keywords may be specified for LUTFIL with the following definitions:

```
LUTFIL = DEFAULT(Use the color enhancement specified for this
                 image type in the table IMGTYP.TBL)
LUTFIL =         (Same as DEFAULT)
LUTFIL = GRAY (Image gray values, no enhancement)
LUTFIL = GREY (Image gray values, no enhancement)
LUTFIL = RADAR(Standard radar colors for reflectivity)
LUTFIL = NONE (Use the current look up table with no changes)
```

3.95 MAP

MAP is the map color, line type and line width separated by slashes:

map color / line type / line width / filter flag

If the color is 0, the map is not drawn. If the map color, line type, or line width is blank, a default of 1 is used.

Additional help for colors is available in COLORS; help on line types can be found in LINE.

The filter flag is used to reduce the number of points used to draw the map lines. Valid values for the filter flag are YES and NO. The default is NO.

The attributes for multiple maps may be set by separating the settings for each map with a plus sign (+). If the number of attribute groups is less than the number of map files, the last group of settings is used for the remaining maps.

Examples:

```
MAP   = 1//2 + 2//3
$MAPFIL= hicnus.nws + hipowo.cia

MAP   = 17
$MAPFIL= hipowo.cia + lorvwo.cia + lakes.cia
```

3.96 $MAPFIL

$MAPFIL is the name(s) of the map file(s) to be used for maps drawn by GEMPAK programs. If no directory is specified, the GEMPLT map files in GEMMAPS will be used.

Multiple maps may be drawn at one time by separating the names with a plus sign (+).

The map files in GEMMAPS are named by concatenating the resolution, map boundaries, and area with the three-letter source file type. For example, the medium-resolution political world map from GSFC is called MEPOWO.GSF.

RESOLUTION	FEATURES	AREA	SOURCE
ToP	POlitical	WOrld	GSFc
HIgh	COastline	NW quadrant	NWS
MEdium	REgional	NE quadrant	CIA
LOw	CouNty	SE quadrant	USGeol survey
MiXed	CountrY	SW quadrant	NCeP
	RiVers	North Hemisphere	RFC
	InterState highways	South Hemisphere	CPC
	U.s. Highways	US	
	State Highways	Us Oceans	
	RoaDs	North America	
	River Forecast Cntrs	Atlantic North	
	County Watch Areas	Atlantic1	
	ZoNes	Atlantic2	
	High Seas	Atlantic3	
	OffShore	Pacific North	
	Forecast Bounds	Pacific East	
	AViation	Pacific Surface	
	Flight Info region	Pacific1	
	Convective Sigmet Reg	Pacific2	
	Tpc High seas	Pacific3	
	Tpc Sigmets	MarylanD	
	Tpc surface Bounds	Basic Weather	
	Tpc surface Analysis	Medium Range	
	Tpc aViation bounds	Qpf Verification	
	Continental Divide	Western Region	
	Mar pred ctr Offshore	Arkansas-Red Basin	
	River fcst ctr Basins	Lower Mississippi	
	Climate Zones	Middle Atlantic	
	Palmer climate Zones	Missouri Basin	
	STates	North Central	
	LaKes	NorthEast	
		OHio	
		SouthEast	
		West Gulf	
		AlasKa	

The default map is $GEMMAPS/HIPOWO.CIA.

The following map files are currently available:

TPSTUS.NWS	HISTUS.NWS	MESTUS.NWS	LOSTUS.NWS
TPCNUS.NWS	HICNUS.NWS	MECNUS.NWS	LOCNUS.NWS
TPCWA.NWS	HICWA.NWS	MECWA.NWS	LOCWA.NWS
TPZNUS.NWS	HIZNUS.NWS	MEZNUS.NWS	LOZNUS.NWS
TPCSUS.NWS	HIPOWO.GSF	MEPOWO.GSF	LOPOWO.GSF
TPCDUS.USG	HICDUS.USG	MECDUS.USG	LOCDUS.USG
	HIRVUS.USG	MERVUS.USG	LORVUS.USG
	HIISUS.NWS		LOISUS.NWS
	HIUHUS.NWS		LOUHUS.NWS
	HISHUS.NWS		LOSHUS.NWS
	HIRDUS.NWS		LORDUS.NWS
	HIOSUO.NWS		LOOSUO.NWS
	HIPOWO.CIA		
	HICOWO.CIA		
	HICYWO.CIA		
	HIAVUS.NWS		
	HIPONE.CIA		
	HIPONW.CIA		
	HIPOSE.CIA		
	HIPOSW.CIA		
	HICNMD.GSF		
	HIFIWO.NCP		
	HIFIWO.NCP		
BWX1224.NCP			
BWX3648.NCP			
ISLANDS.CIA			
LAKES.CIA			
RFC.NWS			
TECTONIC.CIA			
TPCZUS.CPC			
TPPZUS.CPC			
TPFBWR.NCP			
TPTANA.NCP			
TPTBNA.NCP			
TPTHNA.NCP			
TPTSNA.NCP			
TPTVNA.NCP			
TPRBAB.RFC			
TPRBLM.RFC			
TPRBMA.RFC			
TPRBMB.RFC			
TPRBNC.RFC			
TPRBNE.RFC			
TPRBOH.RFC			
TPRBSE.RFC			
TPRBWG.RFC			
		MEFBNA.NCP	
TPHSUO.NWS	HIHSUO.NWS	MEHSUO.NWS	LOHSUO.NWS
		MEHSUO.NCP	
		MEREUO.NCP	

		MEFBAN.NCP	
		MEFBPE.NCP	
		MEFBPN.NCP	
		MEFBBW.NCP	
		MEFBMR.NCP	
		MEFBPS.NCP	
		MEFBQV.NCP	
		MEFBA1.NCP	
		MEFBA2.NCP	
TPFBA3.NCP	HIFBA3.NCP	MEFBA3.NCP	LOFBA3.NCP
		MEFBP1.NCP	
		MEFBP2.NCP	
TPFBP3.NCP	HIFBP3.NCP	MEFBP3.NCP	LOFBP3.NCP
TPMOUO.NWS	HIMOUO.NWS	MEMOUO.NWS	LOMOUO.NWS
			LOCONH.GSF
			LOCOSH.GSF
			LOCOWO.GSF
			LORVWO.CIA
			MXPOWO.NCP
TPLKUS.NWS	HILKUS.NWS	MELKUS.NWS	LOLKUS.NWS
	HIFIAK.NCP		
	HIZNAK.NCP		

The maps from GSFC were obtained for GEMPAK Version 1.0. The history of these maps is unknown. The maps from the University of Wisconsin were digitized there. The CIA map files were created from a subset of the CIA map database. The United States Geological Survey maps were converted from the USGS databases. The NWS maps were obtained from the National Weather Service/Modernization Systems Implementation Group. The NCEP map files were developed at the National Centers for Environmental Prediction. The RFC map files were provided by the Arkansas-Red Basin River Forecast Center.

There are 5 maps designed to be used for the seamless surface analysis which shows the area of responsibility for the Tropical Prediction Center, Marine Prediction Center and the Hydrometeorological Prediction Center. Also, these maps have the numbers 050 and 215 in their names which refer to the amount of time after the analysis time; 50 minutes past and 2 hours and 15 minutes past the analysis time.

The capability to use map alias names is available. This makes it easier to use the map files without previously knowing the long file name. The following is a list of alias definitions.

bwx1224	Basic Weather 12 & 24hr	bwx1224.ncp
bwx3648	Basic Weather 36 & 48hr	bwx3648.ncp
bwxgif	Basic Weather GIF	mefbbw.ncp
medrange	Medium Range Weather	mefbmr.ncp
cwa	County Warning Areas	hicwa.nws
rfc	River Forecast Centers	rfc.nws
abrfc	AR-Red Basin RFC Basins	tprbab.rfc
lmrfc	Lower MS RFC Basins	tprblm.rfc

marfc	Mid Atlantic RFC Basins	tprbma.rfc
mbrfc	MO Basin RFC Basins	tprbmb.rfc
ncrfc	North Central RFC Basins	tprbnc.rfc
nerfc	Northeast RFC Basins	tprbne.rfc
ohrfc	Ohio RFC Basins	tprboh.rfc
serfc	Southeast RFC Basins	tprbse.rfc
wgrfc	West Gulf RFC Basins	tprbwg.rfc
states	US states, NWS	histus.nws
county	US counties, NWS	hicnus.nws
zones	US zones, NWS	hiznus.nws
climate	US CPC Climate Zones	tpczus.cpc
palmer	US Palmer Climate Zones	tppzus.cpc
coast	World Coasts	hicowo.cia
country	Hi-res World Countries	hicywo.cia
inter	US Interstates	loisus.nws
base	Poltcal Bndry,World,CIA	hipowo.cia
nmap	Poltcal Bndry,World,CIA	hipowo.cia
nsat	Poltcal Bndry,World,CIA	hipowo.cia
roads	US Roads	lordus.nws
rivers	Rivers	lorvwo.cia
hirivers	Hi-res US Rivers	hirvus.usg
state	State Highways	loshus.nws
ushwy	US Highways	louhus.nws
islands	Islands	islands.cia
lakes	Lakes	lakes.cia
nafos	Mix-res Pol Bndry,World	mxpowo.ncp
hiseas	High Seas Forecast Areas	mehsuo.ncp
rseas	Regional Sea Fcst Areas	mereuo.ncp
offshore	Offshore Forecast Areas	hiosuo.nws
offsh2	Offshore Forecast MPC	himouo.nws
sigwx	Significant AVN Areas	sigwx.ncp
nam	North America Fcst Bnds	mefbna.ncp
epacprod	East Pacific Products	mefbpe.ncp
npacprod	North Pacific Products	mefbpn.ncp
natlprod	North Atlantic Products	mefban.ncp
pacsfcpd	Pacific Surface Products	mefbps.ncp
pacpart1	Pacific SFC Anal Part 1	mefbp1.ncp
pacpart2	Pacific SFC Anal Part 2	mefbp2.ncp
atlpart1	Atlantic SFC Anal Part 1	mefba1.ncp
atlpart2	Atlantic SFC Anal Part 2	mefba2.ncp
qpfver	QPF Verification	mefbqv.ncp
fir	Flight Information Regn	hifiwo.ncp
convsigmet	Convective Sigmet Bounds	tpcsus.ncp
wregion	Western Region Boundary	tpfbwr.ncp
tpcsfc	TPC Surface Analysis	tptana.ncp
tpcsfcbnd	TPC Surface Boundary	tptbna.ncp
tpchsf	TPC High Seas	tpthna.ncp
tpcsig	TPC SigMets	tptsna.ncp
tpcavn	TPC Aviation	tptvna.ncp
dcvaac	DC VAAC Boundary	dcvaac.ncp
hpcsfc	HPC SFC Anl Boundary	hpcsfc.ncp

The alias names are specified in the table: $GEMPAK/tables/config/mapfil.tbl.

3.97 MARKER

MARKER specifies the marker color, type, size, line width and hardware/software flag separated by slashes:

marker color / marker type / size / width / hw flag

If the marker color is 0, no markers will be drawn. If the marker color is not specified, a default of 1 will be used.

The marker type specifies the shape of the marker to be drawn. If the type is unspecified or zero, the current marker type (usually 1) will be used. The software marker types are:

1	plus sign	13	hourglass X
2	octagon	14	star
3	triangle	15	dot
4	box	16	large X
5	small X	17	filled octagon
6	diamond	18	filled triangle
7	up arrow	19	filled box
8	X with top bar	20	filled diamond
9	Z with bar	21	filled star
10	Y	22	minus sign
11	box with diagonals	23	tropical storm
12	asterisk	24	hurricane

Hardware marker types may differ.

The marker size is a real number multiplier for the default marker size. If the size is zero or unspecified, the current size will be used.

The hardware/software marker flag must be HW or SW. Otherwise, the current value is assumed.

3.98 MAXGRD

MAXGRD is the maximum number of grids that can be stored in the grid file being created.

3.99 MAXTOP

MAXTOP specifies the color and filter attributes for cell top annotations (feet):

color ; filter

A color value of 0 is used to turn off cell top annotations.

FILTER is a logical variable or real number which controls the filtering of data in order to eliminate plotting of overlapping data.

3.100 MESO

MESO specifies the plot symbol and filter attributes for mesocyclones:

color / marker / size / width / hw ; filter

A color value of 0 is used to turn off mesocyclone plotting.

Marker attributes behave as MARKER for other plotting programs.

FILTER is a logical variable or real number which controls the filtering of data in order to control plotting of overlapping data.

3.101 MIXRLN

MIXRLN specifies the color, line type, line width, minimum, maximum, and increment for the background mixing ratio lines on thermodynamic diagrams:

line color / line type / width / minimun / maximum / increment

The values should be separated by slashes. If the color is 0, or MIXRLN is blank, no lines will be drawn.

3.102 MRGDAT

MRGDAT is a logical variable indicating whether sounding data is to be merged or unmerged. The type of unmerged data follows a slash:

merge flag / unmerged data type

The valid unmerged data types are:

1 = mandatory data below 100 mb (TTAA, PPAA, TRPA, MXWA)
2 = mandatory and significant level data below 100 mb (TTAA, PPAA, TRPA, MXWA, TTBB, PPBB)

3 = mandatory and significant level data below and above 100 mb (TTAA, PPAA, TRPA, MXWA, TTBB, PPBB, TTCC, PPCC, TRPC, MXWC, TTDD, PPDD)

The default is 3. If the data is merged, the data type is ignored.

When MRGDAT is used to create a sounding file, it indicates whether the file is to contain merged or unmerged data. Unmerged datasets will store the data as separate parts. Merged data sets contain values for each parameter at each level.

If MRGDAT is used in a program to list data, the data will be merged if MRGDAT = YES. If MRGDAT = NO, the separate parts requested by the type will be listed.

3.103 MXDPTH

MXDPTH is the user estimated mixed layer depth in meters. The default value is 0 m, this uses surface values as the average for the mixed layer.

3.104 NCON

NCON is the ending valid time for the non-convective sigmet, the colors for the icing, turbulence, duststorm and sandstorm, and volcanic ash, and flags for plotting symbols, the end time, the message id, and the flight levels on the map.

End time|IC;TB;DU;VA clrs|Symbol flg|Time flg|Id flg|Flight lvl flg|
Id1 flg|Id2 flg| ... ... |Id10 flg|

Non-convective sigmets that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST or ALL. LAST will use the system time and plot all current non-convective sigmets. ALL will plot all the non- convective sigmets in the data files for the last ten days, whether they are active, cancelled, updated or expired.

The colors are separated by a semi-colon. If any color is set to 0, that type of symbol will not be plotted. If any color is missing, a default will be used. Defaults are green for icing, light blue for turbulence, gold for duststorm and sandstorm and orange for volcanic ash.

The symbol flag is YES or NO and controls whether or not to plot a symbol for the non-convective sigmet on the map. The default is NO.

The time flag is YES or NO and controls whether or not to plot the end time of the non-convective sigmet on the map. The default is NO.

The message id flag is YES or NO and controls whether or not to plot the message identification and sequence number on the map. The default is NO.

The flight level flag is YES or NO and controls whether or not to plot the flight level(s) in hundreds of feet on the map. The default is NO.

The Id1~10 flags are YES or NO and controls whether or not to plot the NCON data in corresponding names. The defaults are YES. The Id names are:

1 NOVEMBER
2 OSCAR
3 PAPA
4 QUEBEC
5 ROMEO
6 UNIFORM
7 VICTOR
8 WHISKEY
9 XRAY
10 YANKEE

3.105 NDVAL

NDVAL is the data value to be used where NIDS producte report "ND" (none detected). By default, tis is the RMISSD value of -9999. For certain products, the user may wish to change this for later computations..

3.106 NPASS

NPASS controls the number of passes for the Barnes objective analysis. Valid values are in the range 1 - 5. Note that two passes are STRONGLY RECOMMENDED.

3.107 NTRACE

NTRACE is the number of traces to be drawn in SFGRAM.

If NTRACE is less than 5, the user input for TRACEx where x is greater than NTRACE will be ignored.

The default value for NTRACE is 5.

3.108 OUTFIL

OUTFIL is the name of an output satellite image file.

3.109 OUTPUT

OUTPUT determines the output devices. The valid devices are the terminal (T), a file (F) or none (N).

Specify the output devices desired by entering the appropriate letters with no separators.

If output is sent to a file, the file name may be specified after a slash. If no file name is entered, the output will be written to "program.fil", where "program" is the name of the program being executed.

If N appears anywhere in the output string other than in the file name, no output will be generated.

Examples:

OUTPUT =f / data.dat	--	output will be written to data.dat
OUTPUT =	--	when no output device is specified, is sent to the terminal
OUTPUT =tf	--	output sent to the terminal and to the file program.fil where program is the GEMPAK program being run.

3.110 PANEL

PANEL specifies the panel location, panel outline color, line type and width separated with slashes:

panel location / outline color / line type / width / region

The panel location determines the location of the view region on the graphics device. It may be specified using a number or abbreviation as follows:

NUMBER	ABBREVIATION	DESCRIPTION
0	ALL	Entire device

1	UL	Upper left quadrant
2	UR	Upper right quadrant
3	LL	Lower left quadrant
4	LR	Lower right quadrant
5	L	Left half
6	R	Right half
7	T	Top half
8	B	Bottom half

An easy 9-panel capability uses abbreviations M1,...,M9 which will be laid out on the page as:

M1 M2 M3

M4 M5 M6

M7 M8 M9

Horizontal or vertical panels which divide the screen into thirds or fourths may be created using the syntax Tij where T is either V for vertical or H for horizontal, i is 3 for thirds or 4 for fourths, and j is the actual panel counting from the top or left.

The view region may also be specified as four numbers separated with semicolons, giving the lower left and upper right corners in fractions of the graphics display area. The origin is in the lower left of the display. For example, the lower left quadrant can be given as:

0;0;.5;.5

If the panel location is unspecified, the current location is unchanged.

The panel outline color, line type and line width specify the values used to draw a box around the specified region. The valid regions are VIEW, PLOT and DEVICE. If the color is 0 or unspecified, no box is drawn.

3.111 PDSEXT

PDSEXT is a logical flag which only becomes applicable when a PDS extension exists in the GRIB message.

YES or NO

If PDSEXT is YES, then a sequence of characters specifying the extension information will be appended onto the standard GEMPAK parameter name. If PDSEXT is NO, then the append will not be performed. For instance, if the parameter is HGHT and the PDS extension is an ensemble extension indicating that this

particular height field is an ensemble mean average, then the PDS extension suffix will be "ENMA". The final GEMPAK parameter name will be "HGHTENMA" and must be referenced as such in any GEMPAK program.

3.112 PDSVAL

PDSVAL provides a way to enter explicitly PDS numbers identifying a grid by parameter, level, vertical coordinate type, and time. None, some, or all of them may be entered. Default values are determined from the GEMPAK grid label information and the GEMPAK grid GRIB lookup tables.

The input has the following form:

parameter # %vertical coordinate type # @level # ^time

or

parm name %vertical coordinate name @level # ^time

The parameter number or name, if given, must appear first. It is not preceded by any marking delimiter. The parameter number will be assigned to PDS byte 9. After the parameter number, the entries may be given in any order. The parameter may be entered as a name to be found and matched to a number using the GEMPAK grid GRIB lookup tables.

The vertical coordinate type number is preceded by % as a marking delimiter. The number entered will be assigned to byte 10. The vertical coordinate may be entered as a name to be found and matched to a number using the GEMPAK grid GRIB lookup tables.

The level information is preceded by @. A single level value or two level values separated by a colon may be entered following the @ symbol. This information is assigned to bytes 11 and 12.

The time information is entered following the ^ symbol in the form YYYYMMDD/HHMMFhhhmm. This is a standard GEMPAK time, except that the year must have four digits. This information is assigned to bytes 13 through 25, with forecast time units assumed to be hours. Any accumulation period must come from information imbedded within the GEMPAK parameter name.

3.113 PIXRES

PIXRES is the input for how many pixels and lines to include in the new image. If

PIXRES is 4, then every 4th pixel and line will be used in the new image.

3.114 PLUS

PLUS specifies the size and width of a plus sign:

plus sign size / width

The plus sign size is a real number multiplier for the default size. If the size is zero or unspecified, the current size will be used.

3.115 POSN

POSN is the position number to be used to plot data in GDMAP.

If the position number is 0, the data will be plotted centered at the station.

The position numbers are:

```
        7
1               3
2       0       4
5               6
        8
```

3.116 PRECSN

PRECSN is the binary or decimal precision to be preserved in the packing of the gridded data.

Binary precision is entered as a B/n, where B indicates binary precision and n is an integer indicating the nearest power of 2 to which to pack the data. Power of 10 scaling of the data is NOT done when binary precision is specified. The following table relates values of n to the precision retained.

n Binary Precision Description

-4	Data values are rounded to the nearest 1/16.
-3	Data values are rounded to the nearest 1/8.
-2	Data values are rounded to the nearest 1/4.
-1	Data values are rounded to the nearest 1/2.
0	Data values are rounded to the nearest 1.
1	Data values are rounded to the nearest 2.

2 Data values are rounded to the nearest 4.
3 Data values are rounded to the nearest 8.
4 Data values are rounded to the nearest 16.

Decimal precision is entered as D/r, where D indicates decimal precision and r is a positive floating point number indicating the number of decimal significant digits to preserve. The fractional part of r is retained in the calculation of the number of packing bits required and may be used to enhance precision in cases where binary precision might require too many bits. The necessary power of 10 scaling is determined automatically.

3.117 PROJ

PROJ is the map projection, projection angles, and margins separated by slashes and an optional image drop flag separated from the rest by a bar:

map proj / ang1;ang2;ang3 / l;b;r;t (margins) | image drop flag

For all map projections, the lower left and upper right corners of the graphics area should be specified in GAREA.

The following simple map projections may be specified:

MERMercator
NPSNorth Polar Stereographic
SPSSouth Polar Stereographic
LCCNorthern Hemisphere Lambert Conic Conformal
SCCSouthern Hemisphere Lambert Conic Conformal
CEDCylindrical Equidistant
MCDModified Cylindrical Equidistant
NORNorth Orthographic
SORSouth Orthographic

The following full map projections may also be specified:

MER(CYL)Mercator
CED(CYL)Cylindrical Equidistant
MCD(CYL)Modified Cylindrical Equidistant
STR(AZM)Polar Stereographic
AED(AZM)Azimuthal Equidistant
ORT(AZM)Orthographic
LEA(AZM)Lambert equal area
GNO(AZM)Gnomonic
LCC(CON)Northern Hemisphere Lambert Conic Conformal
SCC(CON)Southern Hemisphere Lambert Conic Conformal

In addition for full map projections, three angles MUST be specified in PROJ. The

angles have the following meanings for the different projection classes:

CYLangle1 -- latitude of origin on the projection cylinder
0 = Equator
angle2 -- longitude of origin on the projection cylinder
0 = Greenwich meridian
angle3 -- angle to skew the projection by rotation of
the cylindrical surface of projection about
the line from the Earth's center passing
through the origin point. This results in
curved latitude and longitude lines.

If angle3 is greater than 360 or less than -360
degrees, then the rectangular Cartesian coordinate
system on the projection plane is rotated
+/- |angle3|-360 degrees. This results in
latitude and longitude lines that are skewed
with respect to the edge of the map.

The difference between |angle3| < 360 and
|angle3| > 360 is that, in the former case,
the rotation is applied to the developable
cylindrical surface before projection and
subsequent development; while, in the latter
case, the rotation is applied to the Cartesian
coordinate system in the plane after development.
Development here refers to the mathematical
flattening of the surface of projection into a
planar surface.

Exception:

MCDangle1 -- scaling factor for latitude
0 = default scaling (1/cos(avglat))
angle2 -- longitude of origin (center longitude) angle3 -- not used

AZMangle1 -- latitude of the projection's point of tangency
angle2 -- longitude of the projection's point of tangency angle3 -- angle to skew the projection by rotation about
the line from the Earth's center passing
through the point of tangency

CONangle1 -- standard latitude 1
angle2 -- polon is the central longitude angle3 -- standard latitude 2

The angles for the full map projection types are given as three numbers separated with semicolons. Note that THREE angles must be entered even if some angles are not used.

Note that transverse projections may be obtained using a cylindrical projection with

the first angle set to either 90 or -90. The second angle is the longitude at which the cylinder axis intersects the equator. This will be the transformed location of the "south" pole when the first angle is 90 or the "north" pole when the first angle is -90. For example, if angle1 = 90 and angle2 = 0, the axis of the cylinder of projection is perpendicular to the earth's axis and enters the earth at 0N 0E and emerges at 0N 180E. The great circle formed by 90E and 90W becomes the "equator" on the cylinder. This cylinder is ideal for a transverse cylindrical projection of locations on the continent of North America.

Satellite and radar projections are available:

SATspecifies remapped or nonremapped satellite projections.

RADspecifies the radar projection.

Currently, the McIDAS area format is supported for satellite and radar images. NIDS radar images from WSI may also be displayed.

The image drop flag may be specified as a D or an ND, and is valid for SAT and RAD only. A value of D causes the image to be dropped before any additional graphics are drawn. Conversely, a value of ND does not drop the image. When the image drop flag is undefined, the image is dropped when CLEAR is set to YES, and is not dropped when CLEAR is set to NO.

If the projection is DEF or is blank, a default projection will be obtained from the geographic table for the specified GAREA. If no default projection has been defined for the specified GAREA and the projection is DEF, the current map projection will be used.

In the grid programs the following graph projections are also available:

LINlinear x, linear y
LOGlinear x, logarithmic y
KAPlinear x, y ** KAPPA
POLpolar coordinates (R, THETA)

Margins may be input as four numbers separated with semicolons. The four numbers represent the left, bottom, right, and top margin sizes in character widths. If no margins are specified, the default will be (0,3,0,0) in map mode and (6,4,4,1) in graph mode. If the input for the margins is NM, all four margins will be set to 0.

3.118 PTYPE

PTYPE is the type of y axis plot to be used, the height-to-width ratio of the plot, and

the margins, separated by slashes.

The valid inputs for type for the y axis are:

```
LINlinear
LOGlogarithmic
STUVEscaled by raising to KAPPA, 2/7, power
KAPsame as STUVE
SKEWTlogarithmic y-axis; skewed x-axis
SKEWsame as SKEWT
```

If the height-to-width ratio is 0, the entire screen will be used. This is also the default when ratio is not specified.

The margins are specified as: left;bottom;right;top. The values are multiples of the current character size. If the margin specification is missing or incomplete, a default appropriate to the program will be used. The default in the profile programs is: 10;3;(6 times wind barb size);5. The right margin allows room for plotting winds and typically has a value around 20.

3.119 QCNTL

QCNTL is the quality control threshold values. It is used only when the first-guess field exists. If the difference between the original data and the interpolated values from the first guess is greater than the threshold values, the data will be discarded. Only positive threshold values are used. The default value is 0.

3.120 QSCT

QSCT is the ending valid time for the QuikScat wind data, the speed intervals and colors, the wind barb size and width and plotting flags. Skip is a value that indicates how many rows and data points to skip when plotting. The flags include High Wind Speed, Low Wind Speed, Rain, Sensor Availibility.

End time | Speed intervals | colors1 | colors2 |Barb size;Barb width
| Skip | Time stamp interval | Time stamp color | Line Width
| High Spd | Low Spd | Rain | Availibility | Rain Colors

The ending time is the latest time for which QuikScat data will be plotted. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST. LAST will use the system time and plot all QuikScat data for the preceding 4 hours. ALL is not accepted as an ending time for QuikScat data.

The speed intervals and colors may each be specified using either a list separated by semicolons or a range in the form first-last-increment. Speed intervals are given in knots. The number of intervals must be the same as the number of colors. If no interval and color are given, a single speed interval of 200 knots will be used. This means that any wind speed less than 200 knots will be plotted. The default color is green. If the rain flag in the data is true, and the rain colors flag is true, the wind bard is plotted in the second colors for that wind speed. If the rain flag is false or the rian colors flag is false, then the first color is used.

The wind barb attributes are the size and width of the barbs, separated by a semicolon. The default size is 0.7 and the default width is 1.

The Skip value is an integer used for skipping rows and columns of data when plotting the winds.

The time stamp interval is the time interval in minutes. Line width is the width of the time stamp. The default value is 30 time stamp interval and 1 for line width.

The flags correspond to flags in the QuikScat data. The High Speed, Low Speed, Rain present and Sensor Availibility flags allow the user to display wind data that has any of these attributes. The default for all flags is NO.

3.121 RADDUR

RADDUR is the length of time (in minutes) prior to RADTIM for which data will be used in composites.

3.122 RADFIL

RADFIL is the name of a radar image file.

For animation programs, a list of radar image files, separated by semicolons, may be entered. For long image names, part of the first name may be separated by backslashes ( ); the following values in the list will be substituted for the characters within the backslashes,

i.e.

$RADAR/REF_941017_1200;05;10;15

is interpreted as

$RADAR/REF_941017_1200;$RADAR/REF_941017_1205;$RADAR/
REF_941017_1210;$RADAR/REF_941017_1215

3.123 RADFRQ

RADFRQ is the update frequency for RADAR composites.

RADFRQ is a time, in seconds, for which the program will wait before creating the next composite.

3.124 RADINFO

RADINFO specifies the color for radar site operational status annotations. NA, data not available; OM, out for maintenance; NE, no echoes.

3.125 RADIUS

RADIUS is the search radius (in meters) for which data will be considered.

3.126 RADMODE

RADMODE allows the user to select whether to include radar data from sites operating in (P) precipitation/storm mode, (C) clear air mode, and/or (M) maintainence mode. The default, if none are specified is data from all 3 modes (PCM). Multiple modes may be specified.

3.127 RADPARM

RADPARM is the Radar parameter to be displayed. Valid values are dz (reflectivity), vr (radial velocity), sw (spectrum width).

3.128 RADTIM

RADTIM is the date and time to be used for RADAR composites.

RADTIM may either be an 11-character string entered as YYMMDD/HHMM following the format of DATTIM, or the word "current" which refers to the current SYSTEM time.

3.129 RCMFIL

RCMFIL is the RCM data file. Bulletins with radar observation times in the RCM file will be plotted if the observation time is within the range specified by the starting and ending times.

RCMFIL may be a file alias defining a file template.

3.130 REFVEC

REFVEC specifies the size and location on the screen of the reference arrow using the following format:

Magnitude; x; y; text size/font/width/HW; string

Magnitude refers to the size of the reference wind arrow to be plotted. For example, using 10.0 results in a reference arrow of 10.0 units being plotted.

If the magnitude specified is 0, no reference arrow is plotted. The default is 0.

The user specifies the location of the reference arrow by entering values between 0.0 and 1.0 for x-location and y- location. These values are normalized to the display so, for example, the center of the display is 0.5;0.5. If no values are entered, the reference arrow is plotted in the lower left hand corner: 0.05;0.05.

The text attributes: size, font, width and HW flag; are applied only to the text displayed with the reference vector. See the TEXT help for further details on these attributes.

The string specifies the label for the reference vector. This text may contain any keyboard character. If the string is empty, an appropriate label will be generated.

3.131 REGION

REGION specifies an areal location.

In GPBOX, REGION may be VIEW, PLOT or DEVICE where:

VIEW corresponds to the view region (includes margins);

PLOT corresponds to the plot region (excludes margins);

DEVICE corresponds to the entire device space.

In OABOX, the region must be GRID, DATA, or EXTEND where:

GRID corresponds to the area over which the objective analysis is performed;

DATA corresponds to the area from which data will be extracted for the objective analysis;

EXTEND corresponds to the extended grid area over which the first pass of the objective analysis is performed.

3.132 $RESPOND

$RESPOND is a logical variable indicating whether the user will respond interactively to GEMPAK programs. If set to NO, programs will not wait for input from the user.

3.133 ROTATE

ROTATE is the angle of rotation for the coordinate axes. This is used to determine the wind component in a user definded plane. Default = 'blank' or 270 means no rotation.

3.134 RTRAJ

RTRAJ is a logical variable which determines whether the trajectory will start or end at the specified GPOINT.

Enter YES for the trajectory to end at GPOINT (reverse trajectory). Enter NO to begin at the specified GPOINT.

3.135 SATFIL

SATFIL is the name of a satellite image file.

For animation programs, a list of satellite image files, separated by semicolons, may be entered. For long image names, part of the first name may be separated by backslashes ( ); the following values in the list will be substituted for the characters within the backslashes,

i.e.

$GOES7/VIS_941017_1201;13;14

is interpreted as

$GOES7/VIS_941017_1201;$GOES7/VIS_941017_1301;$GOES7/VIS_941017_1401

3.136 SCALE

SCALE is the scaling factor for the data. All data will be multiplied by 10 ** SCALE. The user specifies the scaling factor for scalar grids and/or vector grids by entering:

scalar / vector

If SCALE is not specified, an appropriate scaling will be selected. In the grid programs, a data-dependent scaling will be selected. In the surface, sounding and the grid to station interpolation programs, a default of 0 will be used. If no vector scale is specified the scalar scaling factor will be used in its place.

If the absolute value of SCALE is greater than 5 in a surface or sounding program, a value of 0 will be used. If the absolute value is greater than 20, a default will be computed in a grid program. In the grid to station interpolation program, a default of 0 will be used.

Note that scaling data may create integer overflow problems in programs, such as SFMAP, which round data to the nearest integer. Valid integers must be in the range -2*10**9 to 2*10**9, approximately.

3.137 SEARCH

SEARCH controls the search radius in an objective analysis program. The radius is the maximum distance that a station may be from a grid point to be used in the analysis for that point. The search radius is set so that stations whose weighting factor is less than EXP (-SEARCH) are not used. SEARCH must have a value in the range 1 - 50. If the value is outside this range, a default value of 20 is used. If SEARCH is given a very small value, many grid points will not have three stations within the search area, and consequently will be set to the missing data value.

SEARCH may also be used to set a flag to allow extrapolation of data values to grid points on the periphery of the data area. To do this, follow the value of SEARCH with /EX; for example, SEARCH = 20/EX will result in data extrapolation.

3.138 SFEFIL

SFEFIL is the name of the surface edit file to be used to update a surface file.

SFEFIL is a text file which may be created using the program SFLIST with F as an output device. A text editor may be used to create or change the surface edit file.

The parameters to be edited must be specified at the beginning of the surface edit file. For example:

PARM = TMPF;DWPF

Parameters that have character values, such as WTHR, cannot be edited. Instead, the numeric value must be used, e.g., WSYM in the case of WTHR. All the parameters which are to be edited must already exist in the surface data file, since no parameter transformations will be done. Station information, such as latitude, longitude and elevation, cannot be changed with SFEFIL. Use GEMPAK program, SFSTNS, to update station information in a surface file.

The data follow the parameter list.

Stations and times which do not already exist in the surface data file will be added.

3.139 SFFILE

SFFILE is the name of the surface data file to be accessed.

The input for SFFILE may also be a file type. The following file types may be input:

METAR	Surface observations
SYNOP	Synoptic observations
ACFT	Aircraft observations
SHIP	Ship/Buoy observations
SHIP6HR	6-hour ship observations
SCD	Supplemental Climatological Data
FFG	Flash flood guidance
NGMMOS	NGMMOS model
AVNMOS	AVNMOS model
MRFMOS	MRFMOS model
NEWAVNMOS	New AVNMOS model
NEWMRFMOS	New MRFMOS model

When one of these file types is input, the program searches locally for the most recent file first. If no files are found locally, the program searches remotely for the most recent file. The remote directories are specified in the table DATATYPE.TBL.

An optional base time may be included with the file type name, following a bar (|). For example:

SFFILE = hrly | base time

The base time may be any valid format for a GEMPAK date/time. Any missing parts of the date/time will be supplied by the system time.

SFFILE may also be entered as a file template for the SFGRAM program. The program searches for all the files with the specified path and template.

3.140 SFFSRC

SFFSRC is the surface file source. With this parameter, the type of data the can be contained in the file is specified.

SFFSRC may be set to either decoded data (including UNKN, AIRW, METR, SHIP, BUOY, and SYNP) or TEXT. If both types are requested, they are separated by a '|'.

The decoded file type MUST be specified first, otherwise a default to a text only file will be created.

3.141 SFOUTF

SFOUTF is the output surface data file.

SFOUTF is used in programs which create a new surface data file. It is also used in programs in which data is moved from an input file to an output file, in which case, SFFILE is the original file.

When used with program NAMSND, SFOUTF can be used to specify two output surface files. This is done by appending a + to the output file name. In this case, the second file will have the same name as the first, with the suffix _aux. The second file will contain surface data for the diagnostic or overflow parameters listed in the auxiliary surface packing file (described in SFPRMF). For example,

SFOUTF = new.sfc+

will create output files new.sfc and new.sfc_aux, if both a primary and an auxiliary surface packing file have been provided.

3.142 SFPARM

SFPARM is a list of surface parameters to be used in a surface program.

The four-character parameter names must be separated by semicolons. For example:

SFPARM = TMPF;DWPF;WTHR

If a parameter is not present in a data set, the program will attempt to derive it from those parameters which are present. For example, relative humidity can be computed from the temperature and dewpoint temperature. Note that STHA, STHE, and SMXR are computed from PALT.

In plotting programs, the position of the parameter determines where it will appear with respect to the station location. The first position is centered on the station. The other positions are shown below:

18	14	8	16	22
19	2	10	4	23
12	3	1	5	13
20	6	11	7	24
21	15	9	17	25

In the example above, WTHR is plotted in position 3.

Functions can be used to modify/qualify the output parameters. These functions must follow the parameter name and are applied in the order given; however, arithmetic operators must precede the other operators. The function symbols must precede the qualifying value and are defined as follows:

*	multiply	=	equal to
/	divide	$	direction
+	add	<	less than or equal to
-	subtract	>	greater than or equal to

In the case of weather symbols, the size, line width and other information needed to draw the symbol may be specified following a colon after the symbol name and after the function specifications if any exist. The drawing attributes are separated by colons. For all the symbols, the information is entered as:size:width;for arrows and barbs the information is entered as :size:width:type:headsiz, where the headsiz applies only to arrows. The type is a three-digit number, ABC, interpreted digit by digit as follows:

A	B	C
1 = plot calm wind	1 = start at stn	1 = not filled
2 = ignore calm wind	2 = center at stn	2 = filled
	3 = start on sky symbol	3 = not filled with box
		4 = filled with box

Calm winds are plotted as a circle or an arrowhead for barbs and arrows, respectively. Arrowheads and 50-unit barb flags are filled if C=2 or 4. A box is plotted with background color if C = 3 or 4. For example, if TYPE=132, a barb will be plotted as a circle if the wind is calm; it will begin on the edge of the cloud cover symbol, and 50-

unit flags will be filled. The default is 111 unless sky symbols are being plotted in which case it is 131.

For all symbols (weather, cloud, pressure tendency, sky cover, past weather, icing, combination, etc.) and wind barbs and arrows, the area immediately surrounding the symbol may be blanked out. The resulting effect allows the object to be more easily identified. This capability may be invoked by adding the additional blank-out width (*100) to the object width. For example, to blank-out an extra 8 width units around the weather symbols of size 2 and width 3, specify the SFPARM as WSYM:2:803.

Aliases are available to make it easier for the user to plot typical surface data by using pre-set parameters and colors. To use an alias, enter the alias name for SFPARM and leave COLORS blank. If the user does not leave COLORS blank, the selected colors will be used instead of the pre-set alias colors.

See PRMLST.TBL for a list of current aliases for surface data.

The GEMPAK surface parameters and the corresponding four-character abbreviations are:

TEMPERATURE

TMPC - Temperature in Celsius
TMPF - Temperature in Fahrenheit
TMPK - Temperature in Kelvin
STHA - Surface potential temperature in Kelvin
STHK - Surface potential temperature in Kelvin
STHC - Surface potential temperature in Celsius
STHE - Surface equivalent potential temperature in Kelvin
STHS - Surface saturation equiv. pot. temp. in Kelvin
TVRC - Virtual temperature in Celsius
TVRF - Virtual temperature in Fahrenheit
TVRK - Virtual temperature in Kelvin
THTV - Virtual potential temperature in Kelvin
TDXC - Maximum 24-hour temperature in Celsius
TDNC - Minimum 24-hour temperature in Celsius
TDXF - Maximum 24-hour temperature in Fahrenheit
TDNF - Minimum 24-hour temperature in Fahrenheit
T6XC - Maximum 6-hour temperature in Celsius
T6NC - Minimum 6-hour temperature in Celsius
T6XF - Maximum 6-hour temperature in Fahrenheit
T6NF - Minimum 6-hour temperature in Fahrenheit
DMAX - Daily weather map maximum temperature in Fahrenheit
DMIN - Daily weather map minimum temperature in Fahrenheit
SSTC - Sea surface temperature in Celsius
SSTF - Sea surface temperature in Fahrenheit
LTMP - Temp. in Celsius of surface air lifted to 500 or !x mb

MOISTURE

DWPC - Dewpoint in Celsius
DWPF - Dewpoint in Fahrenheit
DWPK - Dewpoint in Kelvin
DPDC - Dewpoint depression Celsius
DPDF - Dewpoint depression Fahrenheit
DPDK - Dewpoint depression Kelvin
SMXR - Surface mixing ratio in g/kg
SMXS - Surface saturated mixing ratio in g/kg
RELH - Relative humidity in percent
TMWK - Wet bulb temperature Kelvin
TMWC - Wet bulb temperature Celsius
TMWF - Wet bulb temperature Fahrenheit
VAPR - Vapor pressure in millibars
VAPS - Saturation vapor pressure in millibars

PRESSURE AND ALTIMETER

PRES - Station pressure in millibars
PMSL - Mean sea level pressure in millibars
PALT - Pressure in millibars from altimeter
ALTI - Altimeter setting in inches of mercury
ALTM - Altimeter setting converted to millibars
SALT - Abbreviated altimeter in millibars
SMSL - Abbreviated mean sea level pressure
SALI - Abbreviated ALTI
RMSL - First 3 digits left of decimal of PMSL * 10
RSLI - First 3 digits left of decimal of ALTI * 100
RSLT - First 3 digits left of decimal of ALTM * 10
PTND - Complete pressure tendency with symbol
PTSY - Pressure tendency symbol only
P03C - Pressure change over 3 hours
P03D - Pressure tendency and change group, appp
P24C - Pressure change over 24 hours
ZMSL - Estimated height at PMSL
Z000 - Estimated height at 1000 mb
Z850 - Estimated height at 850 mb
Z800 - Estimated height at 800 mb

WIND

ARRW - Wind arrow (m/s)
ARRM - Wind arrow (m/s)
ARRK - Wind arrow (knots)
BARB - Wind barb (m/s)
BRBM - Wind barb (m/s)
BRBK - Wind barb (knots)
BRBS - Wind barb (mi/hr)
DARR - Wind arrows of uniform length
UWND - U component of the wind in meters/second
VWND - V component of the wind in meters/second
UKNT - U component of the wind in knots
VKNT - V component of the wind in knots
DRCT - Wind direction in degrees

SPED - Wind speed in meters/second
SKNT - Wind speed in knots
SMPH - Wind speed in miles/hour
PSPD - Packed speed and direction (ddfff) in meters/second
PKNT - Packed speed and direction (ddfff) in knots
GUST - Wind gusts in knots
GUMS - Wind gusts in meters/second
PWDR - Peak wind direction in degrees
PWSP - Peak wind speed in meters/sec
PWHR - Hour of peak wind
PWMN - Minutes of peak wind

CLOUD

For the following parameters, the character x may be replaced by L, M, or H, indicating low, middle or high clouds. The character T indicates the value of the parameter at the level of maximum cloud coverage.

xCLD - Character cloud coverage
TCLD - Character maximum cloud coverage
xCLO - Fractional cloud coverage
TCLO - Fractional maximum cloud coverage
CLCx - Numeric cloud coverage
CLCT - Numeric maximum cloud cover
CLDS - Combined cloud coverage from three levels
CMBC - Numeric combined cloud coverage from three levels
CLHx - Cloud height in hundreds of feet
CLDx - Combined cloud height and coverage
CLDT - Maximum value of CLDx
COMx - Numeric combined cloud height and coverage
COMT - Maximum value of COMx
CEIL - Ceiling in hundreds of feet

For the next two cloud parameters the x can be replaced by 1, 2, or 3 and represents the cloud report number.

CHCx - Numeric combined cloud height and coverage
CHDx - Combined cloud height and short code

The following numeric cloud parameters are WMO standard codes.

CFRT - Fraction of celestial dome covered by cloud from WMO Code 2700
CFRL - Fraction of celestial dome covered by low or mid clouds from WMO Code 2700
CTYL - Low-level cloud genera from WMO Code 0513
CTYM - Mid-level cloud genera from WMO Code 0515
CTYH - High-level cloud genera from WMO Code 0509
CBAS - Cloud base height from WMO Code 1600
CSYL - Low cloud type symbol
CSYM - Middle cloud type symbol
CSYH - High cloud type symbol

CSYT - Cloud type symbol on first reported level
SKYC - Sky coverage symbol
SKYM - Sky coverage symbol with wind barbs in m/s
SKYK - Sky coverage symbol with wind barbs in knots

The following numeric parameter follows the guidelines in the National Weather Service Operations Manual, Chapter D-31.

XVFR - Categorical identification of flight rules
0 = Low Instrument Flight Rules (LIFR)
1 = Instrument Flight Rules (IFR)
2 = Marginal Visual Flight Rules (MVFR)
3 = Visual Flight Rules (VFR)

WEATHER

WTHR - Character weather code from any numeric code
WCOD - Character weather code
WNUM - Numeric weather code
WSYM - Present weather symbol
WTMO - Character weather code from WMO
WWMO - Numeric WMO weather code
PWTH - Past weather symbol
PWWM - Numeric past weather in WMO code

STATION VARIABLES

STID - Character station identifier
STNM - 5-digit station identifier
SLAT - Station latitude in degrees
SLON - Station longitude in degrees, West is negative
SELV - Station elevation in meters
SPRI - Station priority

MODEL OUTPUT STATISTICS

MXMN - Maximum or minimum temperature in Fahrenheit
TNTF - Night temperature fcst in Fahrenheit
TNCF - Night temperature climatology in Fahrenheit
TNAF - Night temperature anomaly in Fahrenheit
TDYF - Day temperature fcst in Fahrenheit
TDCF - Day temperature climatology in Fahrenheit
TDAF - Day temperature anomaly in Fahrenheit
TCNT - Night cloud coverage fcst
TCDY - Day cloud coverage fcst
CL12 - Prevailing total sky cover fcst for a 12-hr period
1 = CL = mostly clear
4 = OV = mostly overcast
7 = PC = mixed clouds and clear skies
SKNN - Night wind speed fcst in knots
SKND - Day wind speed fcst in knots
SK12 - Maximum sustained surface wind speed fcst for a 12-hr period

5 = light 0 - 12 knots
15 = Moderate 13 - 21 knots
25 = Strong 22 - 33 knots
40 = High greater than or equal to 34 knots

PP06 - Probability of precipitation fcst in a 6-hr period
PP12 - Probability of precipitation fcst in a 12-hr period
PP1C - Probability of precipitation climatology in a 12-hr period
PP1A - Probability of precipitation anomaly in a 12-hr period
PPNT - Probability of precipitation fcst for night
PPNC - Probability of precipitation climatology for night
PPNA - Probability of precipitation anomaly for night
PPDY - Probability of precipitation fcst for day
PPDC - Probability of precipitation climatology for day
PPDA - Probability of precipitation anomaly for day
PP24 - Probability of precipitation fcst in a 24-hr period
PP2C - Probability of precipitation climatology in a 24-hr period
PP2A - Probability of precipitation anomaly in a 24-hr period
QPX2 - Maximum amount of precipitation in inches fcst in a 12-hr period. Values are same as QP12
QP06 - Quantitative precipitation fcst in a 6-hr period

1 = 0.01 - 0.09 inches
2 = 0.10 - 0.24 inches
3 = 0.25 - 0.49 inches
4 = 0.50 - 0.99 inches
5 = 1.00 - 1.99 inches

QP12 - Quantitative precipitation fcst in a 12-hr period

0 = no precipitation expected
1 through 5 same as QP06
6 = greater than or equal to 2.00 inches

QP24 - Quantitative precipitation fcst in a 24-hr period

0 through 5 same as QP12
6 = 2.00 - 2.99 inches
7 = greater than or equal to 3.00 inches

TS06 - Unconditional probability of thunderstorms occurring in a 6-hr period
TS12 - Unconditional probability of thunderstorms occurring in a 12-hr period
TS24 - Unconditional probability of thunderstorms occurring in a 24-hr period
TC06 - Conditional probability of severe weather occurring in a 6-hr period
TC12 - Conditional probability of severe weather occurring in a 12-hr period
PCPT - Categorical forecast of precipitation

0 = R = rain
1 = S = snow
2 = Z = freezing

POZP - Conditional probability of freezing precipitation (not included during the warm season)
POSN - Conditional probability of snow (not included during the warm season)
PSNT - Conditional probability of snow for night (not included during the warm season)
PSDY - Conditional probability of snow for day (not included during the warm season)
SN06 - Categorical forecast of snow amount falling in a 6-hr period

0 = no snow
1 = trace to less than 2 inches
2 = greater than or equal to 2 inches

SN12 - Categorical forecast of snow amount falling in a 12-hr period

0 and 1 same as SN06
2 = 2 to less than 4 inches
4 = 4 to less than 6 inches
6 = greater than 6 inches

(not included during the warm season)

SN24 - Categorical forecast of snow amount falling in a 24-hr period

0 = no snow or a trace
1 = greater than a trace to less than 2 inches
2 = 2 to less than 4 inches
4 = 4 to less than 6 inches
6 = 6 to less than 8 inches
8 = greater than 8 inches

(not included during the warm season)

PZ12 - Conditional probability of freezing precipitation in a 12-hr period

PS12 - Conditional probability of snow in a 12-hr period

PR12 - Conditional probability of mixed liquid/frozen precipitation in a 12-hr period

PC12 - Categorical forecast of precipitation type in a 12-hr period

0 = R = liquid
1 = S = frozen
2 = Z = freezing
3 = RS = mixed liquid and frozen precipitation
4 = RZ
5 = SZ
6 = RSZ

FCIG - Categorical forecast of ceiling height conditions

1 = less than 200 feet
2 = 200 - 400 feet
3 = 500 - 900 feet
4 = 1000 - 3000 feet
5 = 3100 - 6500 feet
6 = 6600 - 12,000 feet
7 = greater than 12,000 feet

FVIS - Categorical forecast of visibility conditions

1 = less than 0.5 miles
2 = 0.5 - 0.875 miles
3 = 1.0 - 2.75 miles
4 = 3.0 - 5.0 miles
5 = greater than 5.0 miles

FVSA - Categorical forecast of visibility conditions (for new MOS)

1 = less than 0.25 miles
2 = 0.25 to less than .5 mile
3 = .5 mile to less than 1.0 mile
4 = 1.0 to less than 3.0 miles
5 = 3.0 to 5.0 miles
6 = 6.0 miles
7 = greater than 6.0 miles

OVIS - Categorical forecast in plain language of obstructions to vision

0 = N = none of the following
1 = FG or F = fog or ground fog (vis. less than .625 mile)
2 = HZ or H = haze, smoke, dust
3 = BR = mist (fog with visibility greater than .625 mile)
4 = BL = blowing dust, sand, snow

WXPB - Categorical weather precipitation probability or areal coverage determined by the precipitation parameter having the highest probability or areal cover-

age in WNUM
For probability:
1 = slight chance
2 = chance
3 = likely
4 = occasional
5 = definite
For areal coverage:
1 = isolated
2 = widely scattered
3 = scattered
4 = numerous
5 = widespread

TERMINAL AERODROME FORECAST (TAF)

TDRC - Temporary/probability wind direction in degrees
TSKN - Temporary/probability wind speed in knots
TGST - Temporary/probability wind gusts in knots
BRGK - Gust barb feathered in knots
TCHx - Temporary/probability numeric combined cloud height and coverage, as for CHCx
TCEL - Temporary/probability ceiling in hundreds of feet, as for CEIL
TSKC - Temporary/probability cloud coverage graphics symbol, as for SKYC
TXVF - Temporary/probability categorical identification of flight rules, as for XVFR
TWNM - Temporary/probability numeric weather code, as for WNUM
TWSY - Temporary/probability graphics weather symbol corresponding to TWNM, as for WSYM
TVSB - Temporary/probability visibility in statute miles
PPRB - Probability for TAF forecast change indicator
30 = PROB30 - 30 percent probability condition
40 = PROB40 - 40 percent probability condition
50 = TEMPO - temporary condition
VWNM - Vicinity numeric weather code, as for WNUM
VWSY - Vicinity graphics weather symbol corresponding to VWNM, as for WSYM
TVWN - Temporary/probability vicinity numeric weather code, as for WNUM
WSKC - Worst case cloud coverage graphics symbol, as for SKYC
WXVF - Worst case categorical identification of flight rules, as for XVFR
TPWN - Temporary/probability/vicinity numeric weather code, as for WNUM
TPWS - Temporary/probability/vicinity graphics weather symbol corresponding to TPWN, as for WSYM
AWNM - Prevailing/temporary/probability/vicinity numeric weather code, as for WNUM
AWSY - Prevailing/temporary/probability/vicinity graphics weather symbol corresponding to AWNM, as for WSYM
LLWS - Low level wind shear forecast flag
MOTV - Mountain obscuration threshold value in hundreds of feet
CMSL - Ceiling converted to mean sea level in hundreds of feet
MOBS - Mountain obscuration threshold met indicator

MARINE

WHGT - Wave height in meters

WHFT - Wave height in feet
WPER - Wave period in seconds
HOWW - Height of wind wave in meters
POWW - Period of wind wave in seconds
HOSW - Height of predominant swell wave in meters
POSW - Period of predominant swell wave in seconds
DOSW - Direction of predominant swell wave in degrees
HOS2 - Height of secondary swell wave in meters
POS2 - Period of secondary swell wave in seconds
DOS2 - Direction of secondary swell wave in degrees
WAV2 - Combined wind wave period and height in feet ("2 group")
WAV3 - Combined predominant and secondary swell wave direction in tens of degrees ("3 group")
WAV4 - Combined predominant swell wave period and height in feet ("4 group")
WAV5 - Combined secondary swell wave period and height in feet ("5 group")
WPHM - Combined wave period and height in half meters
WVSW - Combined swell wave direction, period and height in half meters
SWEL - Character combined swell wave direction, period and height in half meters
DAWV - Swell wave direction arrows of uniform length
IDTH - Thickness of ice on ship in meters
ROIA - Rate of ice accretion on ship from WMO code table 3551
IGRO - Rate of ice accretion on vessel in salt water in inches per 3 hours
DIGR - Character rate of ice accretion in inches per three hours
SHPD - True direction from which ship is moving (for 3 hours before obs) in degrees
SHPK - Ship's average speed (for 3 hours before obs) in knots
DASH - Ship's true direction arrows of uniform length

AIRCRAFT

TURB - Amount of turbulence
TBSE - Base of turbulence in feet
TTOP - Top of turbulence in feet
HBOT - Base of turbulence in meters
HTOT - Top of turbulence in meters
FQOT - Frequency of turbulence
TPOT - Type of turbulence
TBSY - Turbulence symbol
ICNG - Amount of airframe icing
IBSE - Base of icing in feet
ITOP - Top of icing in feet
HBOI - Base of icing in meters
HTOI - Top of icing in meters
TPOI - Type of icing
ICSY - Icing symbol
WBSE - Base of weather in feet
WTOP - Top of weather in feet
HBWX - Base of weather in meters
HTWX - Top of weather in meters
CLC1 - Numeric cloud coverage 1
CBS1 - Cloud base 1 in feet
CTP1 - Cloud top 1 in feet
CB1M - Cloud base 1 in meters
CT1M - Cloud top 1 in meters

CLC2 - Numeric cloud coverage 2
CBS2 - Cloud base 2 in feet
CTP2 - Cloud top 2 in feet
CB2M - Cloud base 2 in meters
CT2M - Cloud top 2 in meters
ACRT - Aircraft report type
SELV - Flight level in meters
FELV - Flight level in hundreds of feet
ITSY - Icing type symbol
TTSY - Turbulence type symbol
TFSY - Turbulence frequency symbol
ACTP - Character aircraft type
ATP1 - Numeric aircraft type

MISCELLANEOUS

DDEN - Density of dry air in kg/(m3)**
VSBY - Visibility in statute miles
VSBK - Visibility in kilometers
VSBN - Visibility in nautical miles
VSBF - Character visibility in fractions of statute miles for visibilities between 0. and 1.
VSBC - Character visibility in fractions of statute miles for all visibility numbers
Pnnl - Precipitation over last nn hours in inches
nn = 01, 03, 06, 09, 12, 18 or 24
PnnM - Precipitation over last nn hours in millimeters
nn = 01, 03, 06, 09, 12, 18 or 24
DPRC - Character daily weather map precipitation in inches
PR24 - Precipitation over last 24 hours in inches, as sum of four successive 6-hour precip amounts
SNOW - Snow depth in inches
SNEW - Amount of new snow in inches
SNRT - Forecast snow and ice pellet accumulation to watch threshold ratio
SI12 - Forecast snow and ice pellet 12-h accumulation in inches
SNIP - Snow and ice pellet watch threshold in inches
FZRT - Forecast freezing rain accumulation to watch threshold ratio
FZ12 - Forecast Freezing rain 12-h accumulation in inches
FZRN - Freezing rain watch threshold in inches
WEQS - Water equivalent of snow on the ground in inches
HAIL - Hail flag
HLSZ - Hail size in centimeters
HEAT - Heat index in Fahrenheit
HMTR - Humiture (apparent temperature) in Fahrenheit
WCEQ - Wind chill equivalent temperature in Fahrenheit
WCHT - Revised wind chill temperature in Fahrenheit
MSUN - Duration of sunshine in minutes
FFnn - Flash flood guidance for next nn hours in inches
nn = 01, 03, 06, 12 or 24
TOST - Type of station (manned or automatic)
0 = automatic
1 = manned
STIM - Report hour and minutes as hhmm
TEXT - Undecoded data

SPCL - Undecoded special reports
MARK - Markers
DTNM - Sea ice drifting distance in nautical miles

SPACING

SPAC - Plot a space, accounted for in FILTER
BLNK - Plot a blank, not accounted for in FILTER

3.143 SFPRMF

SFPRMF specifies the packing information for the surface file to be created. It may be the name of a surface parameter packing file or the information itself entered as follows:

SFPRMF=PRM1/MIN1-MAX1-RES1;PRM2/MIN2-MAX2-RES2; ...

where each PRMi, MINi, MAXi, and RESi is the parameter name, minimum, maximum and resolution for a parameter to be included in the file.

If SFPRMF specifies a file name, then each line of the file must contain the following information separated by blanks or tabs:

parameter name	CHAR*4
minimum data value	REAL
maximum data value	REAL
resolution	REAL

The resolution should be an integral power of 10; otherwise the next smaller resolution will be used. For example, res = .5 will become .1.

If the data are not to be packed, the minimum and maximum data values and the resolution should not be included. Note that either all of the parameters or none of them must have packing information.

METAR.PACK is a typical table used to pack surface data. This file may be used as an example when creating a packing file.

When SFPRMF is used with program NAMSND, the user must supply the parameter packing file name. In this case, a fifth entry is required for each line of the file, containing a real conversion factor used to scale from BUFR to GEMPAK. Diagnosed or extra computed parameters may be added at the end of the parameter list in the packing file. If diagnosed parameters are to be added, or if there is not enough room in the packing file for all the primary parameters, an auxiliary packing file must be used. This file will have the same name as that specified for SFPRMF, with the suffix _aux. The auxiliary file is not specified explicitly in SFPRMF. Rather, the presence of the

auxiliary file is indicated by suffixing the output surface file name given in SFOUTF with a +. Note that the order of the parameters in the packing file(s) must be the same as the order of the surface parameters listed in the NAMSND output file bufr_table.dump. The parameter names themselves do not have to be the same as those in the bufr_table.dump file, but the order must be preserved.

3.144 SHAPE

SHAPE is the object that the user wishes to plot on the current graphics device. Valid shapes include:

```
TEXT       A string of text.
POLYGON    An irregular polygon.
REGPOLY    A regular polygon.
ARC        An arc connected to the center point (pie).
CURVE      A smooth curve, or piecewise line.
LINE       A line segment.
ARROW      Two types of arrows.
COLDFRONT  A cold front.
WARMFRONT  A warm front.
OCCLFRONT  An occluded front.
STATFRONT  A stationary front.
WEATHER    Weather symbols.
CLOUD      Cloud type symbols.
SKY        Sky cover symbols.
TURB       Turbulence symbols.
ICNG       Icing symbols.
SPCL       Special symbols.
MARKER     Marker symbols.
PRESTEND   Pressure tendency symbols.
PASTWTHR   Past weather symbols.
```

For all SHAPEs the INFO, LOCI and FILL parameters must also be specified.

3.145 SHIPFL

SHIPFL is a logical variable which indicates whether the surface file contains stations which are not at a fixed location, such as moving ships, aircraft, or floating buoys.

A ship file will store and write data differently from a standard GEMPAK surface file. However, these files can be read using the surface library and all programs which access data in surface files can be used unchanged.

Note that station information cannot be added to these files, since the station information must be stored with the data.

3.146 SKIP

SKIP is a variable which determines the contour points or plot points to skip. Input is entered as:

skip_contour / skip_plot_x ; skip_plot_y

The defaults for skip_contour and skip_plot are 0.

Skip_contour thins the input grid before computing the contours to be drawn.

Skip_plot_x and _y specify the points at which data is to be displayed. If skip_plot_x is positive and skip_plot_y is not specified, skip_plot_y is set to skip_plot_x.

If skip_plot_x is negative, the x plot locations on alternate rows are indented by half the skip_plot_x value. In this case, the absolute value of skip_plot_x must be odd. If not, the absolute value minus 1 is used. If no value for skip_plot_y is specified, half the skip_plot_x value is used.

Examples:

SKIP	SKIP_CNTR	SKIP_PLOT_X	SKIP_PLOT_Y	STAGGER
' '	0	0	0	no
2	2	0	0	no
-1	0	0	0	no
2;3	2	0	0	no
/3	0	3	3	no
/2;3	0	2	3	no
/;1	0	0	1	no
/-1	0	1	0	yes
/-3	0	3	1	yes
/-1;1	0	1	1	yes

Winds may be thinned by latitude by setting skip_plot_y to a negative value. This feature is most useful when plotting winds on a cylindrical grid on a projection with converging meridians. In this case, ABS(skip_plot_y) determines how often rows are plotted. The variable skip_plot_x is not used.

Examples:

SKIP	SKIP_CNTR	SKIP_PLOT_X	SKIP_PLOT_Y	LAT THIN
/1;-1	0	1	1	yes
-- every row is plotted with winds thinned along each row.				
/1;-2	0	1	2	yes

-- every other row is plotted with winds thinned.

3.147 SKPMIS

SKPMIS is a logical variable which indicates whether non-reporting stations will be listed.

If SKPMIS is YES, nonreporting stations will not be listed. Otherwise, all stations will be listed.

In SFMAP, markers can be plotted at nonreporting stations when SKPMIS is NO.

3.148 SNBUFR

SNBUFR is the name of the BUFR model sounding file to be used as input to create GEMPAK sounding and surface data files using program NAMSND.

The first message of the BUFR file must be a table of information about the file contents.

If the BUFR sounding file name is followed by |sss=#####, where sss is a 3-character station ID and ##### is the corresponding station number, then an ASCII file named prof.sss is generated. This file will contain only the output for station #####. For example,

SNBUFR = eta.T00Z.class1.bufr|pit=72520

creates an ASCII file prof.pit containing sounding data for station 72520.

The number of stations and times which may be written to the output files is determined by TIMSTN.

3.149 SNEFIL

SNEFIL is the name of the sounding edit file to be used to update a sounding data file.

SNEFIL is a text file which may be created using the program SNLIST with F as an output device. A text editor may be used to create or change the edit file.

The parameters to be edited must be specified at the beginning of the edit file. For example:

SNPARM = PRES;TMPF;DWPF

If the output sounding file exists, the data set parameters must be the same as those listed in the edit file. Station information, such as latitude, longitude, and elevation, cannot be changed with SNEFIL. Use GEMPAK program SNSTNS to update station information in a sounding file.

If the file does not exist, a new, unpacked file with these parameters will be created.

The data follows the parameter list. Only level data will be added to the file. Stability indices from STNDEX will be ignored. The data should not include undecoded text (raw reports), although the output sounding file, if it exists, may include undecoded text.

Stations and times which do not already exist in the surface data file will be added.

3.150 SNFILE

SNFILE is the filename for an upper air data set.

The input for SNFILE may also be a file type. The following file type may be input:

UAIR	observed upper air

When this file type is input, the program searches locally for the most recent file. If no files are found locally, the program searches remotely for the most recent file. The remote directories are specified in the table DATA.TBL.

An optional base time may be included with the file type name, following a bar (|). For example:

SNFILE = uair | base time

The base time may be any valid format for a GEMPAK date/time. Any missing parts of the date/time will be supplied by the system time.

3.151 SNOUTF

SNOUTF is the output sounding data file.

SNOUTF is used in programs which create a new sounding data file. It is also used in programs in which data is moved from an input file to an output file, in which case SNFILE is the original file.

3.152 SNPARM

SNPARM is a list of upper air parameters to be used in an upper-air program.

The four-character parameter names must be separated by semicolons. For example:

SNPARM = PRES;TMPC;DWPC;THTA

If a parameter is not present in a data set, the program will attempt to derive it from those parameters which are present. For example, if pressure, temperature and dewpoint are present in a data set, then relative humidity can be derived.

In plotting programs, the position of the parameter determines where it will appear with respect to the station location. The first position is centered on the station. The other positions are shown below:

```
          8
2        10      4
3        1       5
6        11      7
          9
```

In the example above, DWPC is plotted in position 3.

The layer parameters are computed over a default layer between the specified level and the next level upward in the sounding. The depth of the layer for layer averages may be specified preceded by ! in the user input. The shear and RICH calculations can be done relative to a direction by specifying the direction preceded by $ in the user input.

In-line functions can be used to modify/qualify the output parameters. These functions are applied in the order given; however, arithmetic operators must precede other operators. The function symbols must precede the qualifying value and are defined as follows:

*	multiply	=	equal to
/	divide	$	direction
+	add	%	vertical coordinate
-	subtract	!	depth
<	less than or equal to		
>	greater than or equal to		

In the case of wind symbols, the size, line width, type and headsiz (arrows) for drawing the symbol may be specified following a colon after the symbol name and after the function specifications if any exist. The drawing attributes are separated by colons. The type is a three-digit number, ABC, interpreted digit by digit as follows:

A	B	C
1 = plot calm wind	1 = start at stn	1 = not filled

2 = ignore calm wind 2 = center at stn 2 = filled
3 = start on sky symbol 3 = not filled with box
4 = filled with box

Calm winds are plotted as a circle or an arrowhead for barbs and arrows, respectively. Arrowheads and 50-unit barb flags are filled if C=2 or 4. A box is plotted with background color if C = 3 or 4. For example, if TYPE=122, a barb will be plotted as a circle if the wind is calm; it will be centered on the station location, and 50-unit flags will be filled. The default is 111.

Aliases were created to make it easier for the user to plot typical sounding data by using pre-set parameters and colors. To use an alias, enter the alias name for SNPARM and leave COLORS blank. If the user does not leave COLORS blank, the selected colors will be used instead of the pre-set alias colors.

See PRMLST.TBL for a list of current aliases for sounding data.

The GEMPAK sounding parameters and the corresponding four-character abbreviations are:

TEMPERATURES

TMPC - Temperature in Celsius
TMPF - Temperature in Fahrenheit
TMPK - Temperature in Kelvin
THTA - Potential temperature in Kelvin
THTE - Equivalent potential temperature in Kelvin
THTS - Saturation equiv. pot. temp. in Kelvin
THTV - Virtual potential temperature in Kelvin
TVRK - Virtual temperature in Kelvin
TVRC - Virtual temperature in Celsius
TVRF - Virtual temperature in Fahrenheit

MOISTURE PARAMETERS

DWPC - Dewpoint in Celsius
DWPF - Dewpoint in Fahrenheit
DWPK - Dewpoint in Kelvin
DPDC - Dewpoint depression in Celsius
DPDF - Dewpoint depression in Fahrenheit
DPDK - Dewpoint depression in Kelvin
MIXR - Mixing ratio in g/kg
MIXS - Saturation mixing ratio in g/kg
PWTR - Precipitable water (mm) up to the specified level
RELH - Relative humidity in percent
TMWK - Wet bulb temperature in Kelvin
TMWC - Wet bulb temperature in Celsius
THWC - Wet bulb potential temperature in Celsius
TMWF - Wet bulb temperature in Fahrenheit
VAPR - Vapor pressure in millibars

VAPS - Saturation vapor pressure in millibars
LHVP - Latent heat of vaporization in J/kg

HEIGHT

HGHT - Height in meters
HGTM - Height in meters (alternate name)
HGTK - Height in kilometers
HGTD - Height in decameters
HGFT - Height in feet
HGFH - Height in hundreds of feet
HGFK - Height in thousands of feet
HGML - Height in miles
STDZ - Character standard height convention used on upper air charts
RSTZ - Numeric standard height convention used on upper air charts
DHGT - Dry hydrostatic height in meters
MHGT - Moist hydrostatic height in meters

PRESSURE AND ALTIMETER

PRES - Station pressure in millibars
PMSL - Mean sea level pressure in millibars
ALTI - Altimeter setting in inches from PRES

WINDS

ARRW - Wind arrow (m/s)
ARRM - Wind arrow (m/s)
ARRK - Wind arrow (knots)
BARB - Wind barb (m/s)
BRBM - Wind barb (m/s)
BRBK - Wind barb (knots)
DARR - Wind direction arrows of uniform length
UWND - U component of the wind in meters/second
VWND - V component of the wind in meters/second
UKNT - U component of the wind in knots
VKNT - V component of the wind in knots
DRCT - Wind direction in degrees
SPED - Wind speed in meters/second
SKNT - Wind speed in knots
PSPD - Packed speed and direction (ddfff) in meters/second
PKNT - Packed speed and direction (ddfff) in knots
WCMP - Wind component toward a specific direction
WNML - Wind component toward 90 deg from a specific direction

LIFTED CONDENSATION LEVEL

TLCL - Temperature in Kelvin of parcel raised to LCL
PLCL - Pressure in millibars of parcel raised to LCL

STABILITY INDICES

Note: Default depths are enclosed in parentheses.

SHOW - Showalter Index
LIFT - Lifted Index (100 mb)
LFTV - LIFT computed by using virtual temperature
SWET - Sweat Index
KINX - K Index
CTOT - Cross Totals Index
VTOT - Vertical Totals Index
TOTL - Total Totals Index
CAPE - Convective Available Potential Energy (500 m)
CAPV - CAPE computed by using virtual temperature
CINS - Convective Inhibition (500 m)
CINV - CINS computed by using virtual temperature
EQLV - Equilibrium Level (500 m)
EQTV - EQLV computed by using virtual temperature
LFCT - Level of Free Convection
LFCV - LFCT computed by using virtual temperature
BRCH - Bulk Richardson Number (500 m, 6000 m)
BRCV - BRCH computed by using CAPV
MLTH - Mixed layer mean potential temperature (500 m)
MLMR - Mixed layer mean mixing ratio (500 m)
LCLT - Temperature in Kelvin of the LCL
LCLP - Pressure in millibars of the LCL
PWAT - Precipitable water (mm) for the whole sounding

LAYER QUANTITIES

Note: Default depths are the layer depths in the sounding except for SEPA for which the layer depth is 5 K.

RICH - Richardson number
BVFQ - Brunt-Vaisala frequency
BVSQ - Brunt-Vaisala frequency squared
BVPD - Brunt-Vaisala period
LAPS - Temperature lapse rate
STAB - Potential temperature lapse rate
STAP - Stability with respect to pressure in k/mb
SHRM - Wind shear magnitude
SHRD - Wind shear direction
SEPA - Vertical separation in mb between isentropes

STATION VARIABLES

STID - Character station identifier
STNM - 5-digit station identifier
SLAT - Station latitude in degrees
SLON - Station longitude in degrees, West is negative
SELV - Station elevation in meters
RANG - Range (specialized data)
AZIM - Azimuth (specialized data)
LATI - Latitude in degrees

LONG - Longitude in degrees, West is negative
DELT - Delta time (specialized data)

MISCELLANEOUS

DDEN - Density of dry air in kg/(m3)**
PSYM - Montgomery stream function
MARK - Markers
TEXT - Undecoded data

SPACING

SPAC - Plot a space, accounted for in FILTER
BLNK - Plot a blank, not accounted for in FILTER

3.153 SNPRMF

SNPRMF specifies the packing formation for the sounding file to be created. It may be the name of a sounding parameter packing file or the information itself entered as follows:

SNPRMF = PRM1/MIN1-MAX1-RES1;PRM2/MIN2-MAX2-RES2; ...

where each PRMi, MINi, MAXi, and RESi is the parameter name, minimum, maximum and resolution for a parameter to be included in the file.

If SNPRMF specifies a file name, then each line of the file must contain the following information separated by blanks or tabs:

parameter name	CHAR*4
minimum data value	REAL
maximum data value	REAL
resolution	REAL

The resolution should be an integral power of 10; otherwise the next smaller resolution will be used (e.g., res = .5 will become .1).

If the data are not to be packed, the minimum and maximum data values and the resolution should not be included. Note that either all of the parameters or none of them must have packing information.

It is important to remember to include the vertical coordinate in the parameter packing list.

SNMERG.PACK is a typical table used to pack sounding data. This file may be used as an example when creating a packing file.

Note that if MRGDAT is NO, the data will be packed using the standard packing for unmerged data, and the value of SNPRMF will be ignored.

When SNPRMF is used with program NAMSND, the user must supply the parameter packing file name. In this case, two more entries are required for lines of the file, in addition to the four listed above. These entries must contain the GEMPAK names corresponding to the BUFR sounding data parameters listed in the NAMSND output file bufr_table.dump. The order of the GEMPAK names must be the same as the order of the BUFR parameters, although the names themselves do not have to be the same. The fifth column is the real conversion factor to be applied to the GEMPAK parameter named in the sixth (last) column. Note that the last two columns of data are independent of the first four, and are used only for BUFR to GEMPAK conversion. The parameter named in column one does not necessarily have any relationship to the one referenced in columns five and six. Diagnosed or extra computed parameters may be added anywhere in the packing file for profile data.

3.154 SOURCE

SOURCE indicates whether the data used to compute the average station spacing are to be read from a surface or sounding file. Use SF to read from a surface file and SN to read from a sounding file.

3.155 SPLINE

SPLINE is a logical for using splines to interpolate the data to height levels. Valid input are YES and NO. If NO is selected for SPLINE, linear interpolation, with respect to log pressure, is used.

3.156 SQUALL

SQUALL is the length of the squall line used for the air and moisture flux calculations.The default value is 20000 m. The coordinate rotation is implied in the calculation of the fluxes, since only the V component of the wind is used in the equations. Therefore, ROTATE should be set such that the long axis of the sqall line is along X-axis.

3.157 STATION

STATION is the station to use in SFGRAM. Either a station character identifier or station number may be entered.

If a single station is entered, all traces will use data from that station. If a list of stations is entered, trace 1 will be for station 1, trace 2 for station 2, ... Stations in the list must be separated using semicolons.

3.158 STNCOL

STNCOL specifies the color for the station identifier, time and the parameters specified in STNDEX. These parameters are written at the top of the plot.

3.159 STNDEX

STNDEX is the list of stability indices or station parameters for upper-air data. The items in the list must be separated using semicolons. The depth for the layer averages may be specified preceded by a ! in the user input. For example, BRCH!1000!8000 instructs the program to average over a mixed layer 1000 meters deep and lower tropospheric layer 8000 meters deep. Similarly MLTH!750 results in an average potential temperature over a mixed layer 750 meters deep while the default is 500 meters.

The following is a list of valid names:

SHOWShowalter index
LIFTLifted index
LFTVLIFT computed by using virtual temperature
SWETSWEAT index
KINXK index
CTOTCross totals index
VTOTVertical totals index
TOTLTotal totals index
CAPEConvective Available Potential Energy
CAPVCAPE computed by using virtual temperature
CINSConvective Inhibition
CINVCINS computed by using virtual temperature
EQLVEquilibrium Level
EQTVEQLV computed by using virtual temperature
LFCTLevel of Free Convection
LFCVLFCT computed by using virtual temperature
BRCHBulk Richardson Number
BRCVBRCH computed by using CAPV
LCLTTemperature in Kelvin of the LCL
LCLPPressure in millibars of the LCL
MLTHMean mixed layer potential temperature
MLMRMean mixed layer mixing ratio
STIDStation identifier
STNMStation number

SLATStation latitude
SLONStation longitude
SELVStation elevation
TEXTUndecoded data

3.160 STNFIL

STNFIL is the name of a file which contains station information which includes the character identifier, number, name, state, country, latitude, longitude and elevation for each station.

All this information, except the station name, is stored as station header information in surface and sounding data files.

The file SFSTNS.TBL is a surface station table. SNSTNS.TBL is an upper-air table.

Information in the files must be stored using the exact format used in current tables, since they are read with a FORTRAN FORMAT statement. They may be changed using a text editor.

WARNING: The variable STNFIL is used for both surface and upper-air programs. Care should be taken that the correct file is specified.

3.161 STNPLT

STNPLT allows the user to plot station markers and station information.

text color / text attributes | marker attributes | stnfile # column

Text color is the color of the station information. If the text color is set to 0, no station information will be plotted. Text attributes are text size, font, width, border, rotation, justification, and hw flag.

Marker attributes are color, type, size, width, and hw flag. If the marker color is 0, no markers will be drawn and the station information will be centered on the station. If the marker color is not specified, a default of 1 will be used.

Stnfile is the station table from which the station information is read.

Column refers to the station table and is the column number from which to get the information to display. The following shows the columns for a station table:

1 ID
2 Number

3 Name
4 State
5 Country
6 Latitude
7 Longitude
8 Elevation
9 Priority
10 Extra information (not always present)

If no column number is given, the station ID will be displayed.

Multiple files with differing colors, types, etc. may be processed by listing the parameters individually separated with a '+' sign. See the third example.

Examples:

```
STNPLT= 5/1|3/12/1.25/2|sfstns.tbl
```

The text color of the station ID is color 5. The text size 1 is used. The marker color is 3. The marker type is 12. The marker size is 1.25 times larger than the default size and the marker width is 2 times larger than the default width. The station table filename from which the station information is read is sfstns.tbl.

```
STNPLT= 17/1|0|snstns.tbl
```

The text color of the station ID is color 17. The text size is 1. The marker color is 0. No markers appear and the station ID will be centered on the station. Other marker values are set to the defaults. The station table filename from which the station information is read is snstns.tbl.

```
STNPLT= 17/1|0|snstns.tbl#3
```

Same as the previous example, but displays the station name instead of the ID.

```
STNPLT= 5/1|3/12/1.25/2|sfstns.tbl + 17/1|0|snstns.tbl
```

Combine and plot the first two examples.

3.162 STNTYP

STNTYP is used to select the data reporting characteristic of a station. Stations will only be listed if they meet the selected characterstic(s).

The valid types are as follows:

```
A = list all stations
R = list reporting stations
```

M = list missing stations
U = list stations not in station table
L = list stations in station table

The characteristics may be combined. For example, STNTYP = ML will list missing stations that are in the station table.

It is necessary to set AREA = DSET in order to view any unlisted stations.

IF STNTYP is blank, the default value of 'A' is used.

3.163 STREAM

STREAM lines/arrows/stop/slow/scale

The STREAM parameter controls several parameters dealing with the overall streamline calculation and display. "Lines" is a real number multiplier which controls the number (density) of streamlines drawn (default 1.0); "arrows" is a real number multiplier which controls the number of arrowheads displayed (default 1.5*lines); "stop" is a real number multiplier which controls how close a streamline comes to another streamline before drawing is discontinued (default 0.5); "slow" is a real number multiplier which controls the minimum vector speed threshold for stopping a streamline (default 0.67); "scale" is a real number multiplier which controls how much the input vector field is scaled prior to streamline calculation (default 0.33).

3.164 STRMID

STRMID specifies the storm identifier used by programs GPTPC and GPKGRF:

Storm id / advisory num / device / num fcst days

The storm id is the six or eight character storm identifier given for each particular storm, for example, AL0300 or EP072001. The inclusion of the 2-digit century is optional.

The advisory num is the number of the advisory that the user wishes to see displayed. Both the storm id and the advisory num must be specified in order to view a particular storm. If either or both of these fields are blank, the program will get the storm(s) to be displayed by comparing the contents of the storm history file to the files in the storm advisory directory. Each storm id and advisory number in the history file is checked against the storms in the directory. If a storm advisory is found in the directory which has a higher number than the advisory number given in the history file for that storm, the new advisory is displayed and the history file is updated. If more

than one new storm advisory is in the directory for a specific storm, only the latest advisory will be displayed. If new advisories for multiple storms are in the directory, the latest new advisory for each storm will be displayed. (If a storm id and advisory number are explicitly specified using the STRMID parameter, the history file is neither referenced or updated.) The history file must be a local file named 'history.YYYY' for program GPTPC and 'history_kg.YYYY' for program GPKGRF, where YYYY is the 4-digit year. It looks like this:

```
n
stormid1_adv1
stormid2_adv2
   .
   .
   .
stormidn_advn
```

where n is the number of storm identifiers in the file (in I4 format), and where stormid# is the 8-character storm identifier (e.g., al892001) and adv# is the 3-character storm advisory number (e.g., 009) for the most recently displayed advisory for stormid#.

The device is the device driver to which the graphics will be sent. The current choices are limited to XW, GF, PSC and TEST. If TEST is chosen, the program will display the graphics in an XW window only, but the program becomes more interactive than if XW were specified. With TEST, the user has the option of which graphics to see, and is prompted to move from one graphic to the next. XW will create four graphics in successive windows for GPTPC with no user intervention, and a single graphic for GPKGRF with no user intervention except for the possible entering of breakpoints. If no device is specified, the default is GF. For GPKGRF, regardless of the device specified, the track error watch/warn graphic will be shown initially in XW, to allow for confirmation of user-specified breakpoints, if any.

The num fcst days is the number of forecast days of data to display. (This field is only used by program GPKGRF.) Permissible values are 3 and 5. The default is 5.

3.165 SVRL

SVRL is the ending valid time for the SLS watches, the colors for the severe thunderstorm and tornado (SLS) watches, a flag for plotting the start and stop times, a flag for plotting the county names for the watches on the map, and a flag to outline the county.

End time|T-storm color;Tornado color|Time flag|Label flag|Outline flag

SLS watches that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will

be filled in by the system time. The ending time may also be LAST and ALL. LAST will use the system time and plot all current SLS watches. ALL will plot all the watches in the data files, whether they are active, cancelled or expired.

The colors are separated by a semi-colon. If any color is set to 0, that type of symbol will not be plotted. If any color is missing, a default will be used. Defaults are cyan for thunderstorm and red for tornado.

The time flag is YES or NO and controls whether or not to plot the start and stop times of the SLS watch on the map. The default is NO.

The label flag is YES or NO and controls whether or not to plot the county name of the SLS watch on the map. The default is NO.

The outline flag is YES or NO and controls whether to outline the SLS watch county instead of plotting a marker. The default is NO. The outline colors are those specified previously. If a watch is a "test" only, a hollow marker will be plotted at the county centroid to indicate this, and no outlining will be done.

3.166 SYSTEM

SYSTEM is the system (storm) speed (m/s) and direction separated by a "/". These are used to compute the winds relative to the system.

3.167 TAXIS

TAXIS contains the range, increment and location for labels on a time axis input as:

start-stop-inc;lb;gl;tm

START and STOP are GEMPAK date/times which may be abbreviated. If the values are omitted, the data range will be used. The time axis will be reversed if the TAXIS specification begins with R or if the times are input with a later time first.

INC is the time increment in hours and minutes. The form for INC is HHHMM. If one or two digits are entered, hours will be assumed. If INC is omitted, a default appropriate for the range will be used. If the time range exceeds 720 days, the increment is ignored, and an appropriate labelling interval is selected automatically.

LB, GL, and TM are the frequencies for labels, grid lines, and tick marks.

Examples:

5/12-6/18-6	Draw the axis from 5/12 to 6/18 with labels at 6-hour increments.
17/12-20/12-3;2;4;1	Draw the axis from 17/12 to 20/12 with labels at 6-hour increments, grid lines at 12-hour increments, and tic marks at at 3-hour increments.

3.168 TCMG

TCMG is the ending valid time for the tropical disturbance, the colors for the disturbance symbol, the arrows, and the storm danger area, and the name of the center issuing the graphic.

End time|SY;AR;DA colors|center name

Tropical disturbances that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST. LAST will use the system time and plot all current tropical disturbances. ALL is not valid for TCMG.

The colors are separated by a semi-colon. If any color is set to 0, the color will not be changed. If any color is missing, a default will be used. Defaults are red for the tropical disturbance symbols, orange for the track arrows, and magenta, yellow, green, purple, cyan, blue, coral, pink, dark green and dark orange for the danger areas for tropical systems 1 through 10, respectively, in either the Atlantic or Pacific.

The name of the center is either TPC or CPHC. If anything other than CPHC is specified, the center will default to TPC. TPC will plot Atlantic tropical disturbances and Pacific tropical disturbances east of the dateline. CPHC will only plot Pacific tropical disturbances east of the dateline.

Recommended values of GAREA for use with TCMG are GAREA = -4;-104;61;-2 for TPC Atlantic disturbances GAREA = -4;-180;41;-80 for TPC Pacific disturbances GAREA = -4;180;41;-140 for CPHC Pacific disturbances

3.169 TEXT

TEXT is the size, font, text width and hardware/software flag for graphics text separated with slashes:

text size / font / width / border /
rotation / justification / hw flag

The size may be a real number multiplier for the default text size. If the size is zero or unspecified, the current size will be used.

The size may also be a name, or the first character of a name. The name is converted to a real number multiplier. For hardware text, the named sizes correspond to discrete point sizes. Sizes other than the named sizes will be rounded to the nearest point size. Any size may be given for software text. The standard names and size values are given in the table FONTSZ.TBL:

Name	Size	HW Point
Tiny	0.714	10
Small	0.857	12
Medium	1.000	14
Large	1.286	18
Huge	1.714	24
Giant	2.429	34

The text width is the integer line width to be used in generating software text. If the text size, font or width is not specified, the current value is used.

The text border is a border/blank fill flag. If the input value is less than or equal to zero, the current value is used. Border is a three digit number, ABC, where:

A - Border	B - Blank Fill	C - Border Type
1 = No	1 = No	1 = Regular Box
2 = Yes	2 = Yes	2 = Low Pressure Box
		3 = High Pressure Box
		4 = Freezing Level Box
		5 = Underline
		6 = Overline

Low and high border types refer to the low and high outlines for use on aviation forecast products.

The text rotation is a character input that specifies whether the text is aligned with the screen (S) or with north (N) on a given image. If the choice is invalid or not specified, the current value will be used.

The text justification is a character input that specifies whether the text is justified to the center (C), right (R), or left (L). If the choice is invalid or not specified, the current value will be used.

The hardware/software selector must be HW or SW to change to hardware- or software-generated text. This selector can appear anywhere in the string.

The font number must be specified by using the HW selector and choosing a font number from the list below.

	REGULAR	ITALIC	BOLD	ITALIC-BOLD
Courier	1	11	21	31
Helvetica	2	12	22	32
Times	3	13	23	33

There are also two software fonts. Font 1 has the full set of upper and lower case letters. Font 2 has only the upper case letters. Both fonts also contain all symbols and numerals. If the font number, 1 or 2, is preceded by a digit greater than or equal to 2, then the line width of the characters is increased to emulate a bold font. If a particular device driver does not support hardware fonts, the requested font is emulated using the software fonts.

Examples:

TEXT = 1/21/SW--	text size = 1; bold software font 1
TEXT = 1/2/HW --	text size = 1; hardware text font 2
TEXT = 2.5 --	text size = 2.5; current text font
TEXT = 1.24///221/s/c--	text size = 1.24; current text font; current text width; Border = yes, Blank fill = yes, Border type = box; screen relative; center justified

3.170 THTALN

THTALN specifies the color, line type, line width, minimum, maximum, and increment for the background dry adiabats (potential temperature lines) on thermodynamic diagrams:

line color / line type / width / minimun / maximum / increment

The values should be separated by slashes. If THTALN is blank, no lines will be drawn.

3.171 THTELN

THTELN specifies the color, line type, line width, minimum, maximum, and increment for the background moist adiabats (equivalent potential temperature lines) on thermodynamic diagrams:

line color / line type / width / minimun / maximum / increment

The values must be separated by slashes. If THTELN is blank, no lines will be drawn.

3.172 TILT

TILT is the Radar beam elevation/tilt number.

3.173 TIMSTN

TIMSTN contains the maximum number of times to include in a file and the number of stations to be included in addition to the stations in STNFIL.

3.174 TITLE

TITLE is the title color, title line, and title string separated by slashes:

title color / title line location / title string | short title

If the title color is 0, a title is not plotted.

The title line specifies the line on which the title will be written. The value of the title line has the following meanings:

```
  0 bottom line
 -n n lines from bottom
 +n n lines from top
```

If the line is not specified, the default is program dependent.

The title string is the title to be written. If no title string is specified, a default title will be determined by the program.

In the grid display programs, special characters will be replaced as follows:

^	Forecast date/time
~	Valid date/time
@	Vertical level
_	Grid function
$	Nonzero scaling factor
#	Grid point location
?	Day of the week flag

If the information for which a character stands is not applicable to the program, nothing is output in its place. Zero values of the scaling factor are not displayed.

If the "?" is included the abbreviated day of the week is added to the beginning of the date/time string. The day of the week flag must always be used in combination with either special character for specifying the date/time string. The result is the day of the week for the valid date/time.

A short title may also be input by the user after a |. This is used to label the metafile frame in the NC device driver. If the short title is blank, a suitable label is generated for the frame. The day of the week is not included in the short title.

3.175 TRACE

TRACE parameters contain specifications for each trace on the meteogram in the following format:

parameters/colors/range/witnes!parameters/colors/range/witnes

The parameters before the ! will be plotted on the left of the plot; those after the ! will be plotted on the right. The parameters may be any GEMPAK surface parameter. Real-valued parameters will be drawn as a graph. Character valued parameters will be rotated 90 degrees and written on the plot. Symbol parameters will be drawn as symbols.

For GUST and GUMS, the character G will be plotted. Up to four parameters may be plotted along each axis. The parameters must be separated using semicolons. Character and weather symbol data may only be plotted in positions 1, 2 or 3.

Each parameter name may be followed by a colon, the size or line type, a second colon and the width. For example, WSYM:.5:5 will draw weather symbols half the default size with a line width of 5. For example, TMPF:3 will plot a temperature line using dash pattern 3.

The colors for the parameters must also be separated using semicolons. If a single number is entered, all parameters are drawn in that color. If a zero is entered, the current default color is used.

The range specifies the scaling of the y axis. The format is: start;stop;increment. Note that in this program, the parts of range must be separated using semicolons. If no range is given, it is selected using the data values.

Witness lines are specified in WITNES. These are horizontal dotted lines. A list of y values may be entered separated by semicolons. If the value of witnes is YES, a witness line will be centered on the plot.

3.176 TROPHT

TROPHT is the user estimated tropopause height in meters. The default value is 10000 m.

3.177 TRPINT

TRPINT is the user chosen distance above (and below) the tropopause which is used for layer calculations. The default value is 1000 m.

3.178 TSTEP

TSTEP specifies the time step, in minutes, for the calculation of updated position of the parcel within the grid domain.

3.179 TVS

TVS specifies the plot symbol and filter attributes for tornado vortex signatures:

color / marker / size / width / hw ; filter

A color value of 0 is used to turn off TVS plotting

FILTER is a logical variable or real number which controls the filtering of data in order to eliminate plotting of overlapping data.

3.180 TXTFIL

TXTFIL specifies an ASCII text file to be read and displayed to the the current device driver.

If the input file is LOGO, the NOAA logo is plotted. To specify plotting of the NOAA LOGO enter:

LOGO | size | mode

or

NOAA | size | mode

The NWS logo can be plotted by entering:

NWS | size | mode

The size is a real number that specifies the size of the logo. The default size is 1.

The mode is a character that specifies the color mode of the logo. The options are 'M' for monochrome or 'C' for full color. The default is set for 'M'.

3.181 TXTLOC

TXTLOC specifies the start location for plotting the contents of an ASCII text file specified by TXTFIL. The X and Y coordinates are separated by a semi-colon:

x ; y

The X and Y are given in normalized-type coordinates for the given panel. They range from 0.0 to 1.0 in each dimension. The origin is at the lower left corner of the panel. For example,

TXTLOC = .25 ; 1

The values are treated as a percentage of the panel size in each dimension. Therefore, in this example, the text starts at a point 25% of the X direction panel size and at the top of the panel in the Y direction.

TXTLOC can also specify the location in map coordinates. The map coordinates start with a # and are separated by a semicolon:

#lat ; lon

3.182 TYPE

TYPE specifies the processing type for the GDPLOT2 GDPFUN parameter. The TYPE list does not need separators, however slashes could be used for clarity:

type 1 / type 2 / ... / type n

Valid inputs for type are:

SCALAR TYPEs:
C the original GEMPAK contouring algorithm
L GEMPAK contouring algorithm without subboxes
F contour fill algorithm

X box algorithm -- same as contour fill, but draws lines around the polygons rather than filling in polygons.
P plot grid point values
D plot scaler as a directional arrow

VECTOR TYPEs:
A wind arrows
B wind barbs
S streamlines

OTHER TYPEs:
M plot grid point markers
G plot grid indices (row/column numbers)

Note that contour attributes are specified in CONTUR. The contour interval and line characteristics for types C, L, S and X are read from CINT and LINE and for type F from FINT and FLINE. The wind arrow and barb characteristics are read from WIND. The streamline characteristics are read from STREAM. The marker characteristics are read from MARKER. The grid point index characteristics are read from GRDLBL.

Examples:

TYPE = C-- draws contour lines

TYPE = C / F-- draws filled contours overlaid with lines

TYPE = A-- plots wind arrows

TYPE = BS-- plots wind barbs and streamlines

TYPE = CFMP-- draws contour lines and fill, plots a marker at all grid point locations and the grid point values at all locations

3.183 VCOORD

VCOORD specifies the vertical coordinate system of the levels to process. Currently, there are four coordinates:

NONE= surface data only
PRES= pressure
THTA= theta (isentropic)
HGHT= height

A list or range of levels will be based on the vertical coordinate type, with the exception of MAN or VAS which always refer to a pressure coordinate system.

Note that data are ignored within superadiabatic layers found working upwards from the surface when interpolations are performed to isentropic coordinates.

3.184 VERCEN

VERCEN allows the GDGRIB user to specify the contents of bytes 4, 5, 6, and 26 of the GRIB PDS. The input is given as follows:

byte_4/byte_5/byte_6/byte_26

Values may be omitted in specifying VERCEN. For example, to omit the first and third values, specifying only the second and fourth, enter the following:

/byte_5//byte_26

If values are omitted, the following defaults are inserted:

BYTE	Default value	Meaning
4	2	Parameter Table Version #
5	7	CENTER # (7->NCEP)
6	0	Generating Process ID
26	5	Sub-center (5->HPC)

See NCEP OFFICE NOTE 388 for more information on how to set these parameters. Below is a table of center numbers that may be used in byte number 7 of the PDS.

ID# NAME ABBREV

007 US Weather Svc - Nat. Cntrs for Envir. Prediction NCEP 008 US Weather Svc - NWS Telecommunications Gateway NCEP 009 US Weather Svc - Field Stations NCEP 034 Japanese Meteorological Agency - Tokyo JMA 052 US Weather Svc (NCEP/TPC) Nat. Hurricane Cntr - Miami NHC 054 Canadian Meteorological Service - Montreal CMS 057 US Air Force - Global Weather Central GWC 058 US Navy - Fleet Numerical Oceanography Center FNOC 059 NOAA Forecast Systems Laboratory - Boulder, CO FSL 060 Nat. Center for Atmos. Research (NCAR) - Boulder, CO NCAR 074 UK Meteorological Office - Bracknell UKMO 085 French Weather Service - Toulouse FWS 097 European Space Agency (ESA) ESA 098 Eur. Cntr for Medium-range Wthr Frcsts - Reading ECMWF 099 DeBilt, Netherlands DEBILT

3.185 VGFILE

VGFILE is the name of the Vector Graphics File (VGF) to be displayed or processed.

It also specifies the name of the scale file and attribute file that are used by GPMAP to alter objects in the VGF when displayed or stored in the output device, e.g., XW, FAX, GIF, etc. These files allow the VGF object attributes to be tailored to meet the display requirements of FAX, GIF, and other supported product formats. The scale and attribute file names are specified using the "|" character as a delimiter in the following format:

vgfile | scale file | attribute file

Specifying the scale file allows a limited set of object attributes in the VGF to be changed in the output device by multiplying their values by numbers defined in the scale file. The following parameters can be scaled:

Parameter Name	Description
PIPSIZE	Front Pip Size
FRONTSTRENGTH	Frontal strength
SYMWIDTH	Symbol width
SYMSIZE	Symbol size
WINDWIDTH	Wind barb/arrow width
WINDSIZE	Wind barb/arrow size
WINDHDSIZ	Wind barb head size
LINEWIDTH	Line width
SPLWIDTH	Special line width
SPLSIZE	Special line pattern size
TEXTSIZE	Text size
TEXTWIDTH	Text width
SPTXTSIZE	Special text size
SPTXTWIDTH	Special text width

The parameter name must appear in the scale file followed by an equal sign, "=", and a real value. See the table $GEMTBL/pgen/scale.fax for examples.

Specifying the attribute file allows VGF object attributes to be modified for output devices by setting their values. Attributes such as color, size, thickness, etc. can be changed for particular object sub-types, e.g., cold fronts. Also, sub-types can be eliminated from the output device by setting their major color number to -1.

The value of the attribute for an object in the attribute file overrides the value in the VGF with the following exceptions:

1. If the value for an attribute is set to 0, then it is not changed except in the case of smoothing.
2. If the attribute file value for smoothing is -1, then smoothing remains unchanged.
3. Rotation values in the attribute file are ignored.

The attribute file can also be used to change the object sub-type.

For example, all underlined text objects can be changed to non-underlined text objects.

The attribute file uses a similar format as the table $GEMTBL/pgen/setting.tbl. The file, $GEMTBL/pgen/uattribd.tbl provides a sample template for the attribute file and additional instructions.

3.186 WARN

WARN is the ending valid time for the warnings, the colors for the severe thunderstorm, tornado and flash flood warnings, a flag for plotting the start and stop times, a flag for plotting the county names for the warning on the map, and a flag to outline the county.

End time|T-storm color;Tornado color;Flash flood color|Time flag|
Label flag|Outline flag

Warnings that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST and ALL. LAST will use the system time and plot all current warnings. ALL will plot all the warnings in the data files, whether they are active, cancelled or expired.

The colors are separated by a semi-colon. If any color is set to 0, that type of symbol will not be plotted. If any color is missing, a default will be used. Defaults are cyan for thunderstorm, red for tornado, and green for flash flood.

The time flag is YES or NO and controls whether or not to plot the start and stop times of the warning on the map. The default is NO.

The label flag is YES or NO and controls whether or not to plot the county name of the warning on the map. The default is NO.

The outline flag is YES or NO and controls whether to outline the warned county instead of plotting a marker. The default is NO. The outline colors are those specified previously. If a warning is a "test" only, a hollow marker will be plotted at the county centroid to indicate this, and no outlining will be done.

3.187 WATCH

WATCH is the ending valid time for the watches, the colors for the severe thunderstorm and tornado watches and a flag for plotting the start and stop times for the watch on the map.

End time | Watch colors | Time flag | Label flag | Color code

Watches that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST and ALL. LAST will use the system time and plot all current watches. ALL will plot all the watches in the data files, whether they are active, cancelled or expired.

If a status message was issued for the watch, a line will be plotted dividing the expired portion of the watch from the active portion.

The colors are separated by a semi-colon. If any color is set to 0, that type of line will not be plotted. If any color is missing, a default will be used. Defaults are cyan for thunderstorm, red for tornado, and yellow for status line.

The time flag is YES or NO and controls whether or not to plot the start and stop times of the watch on the map. The default is NO.

The label flag is YES or NO and controls whether or not to plot the watch box number on the map. The default is NO.

The color code flag is YES or NO, if YES, the colors are associated with the last digit of the watch number, otherwise, based on the weather type (tornado or thunderstorm).

3.188 WAVLEN

WAVLEN is the wavelength for the gravity or lee wave in kilometers. If no wavelength is required, use 99999.

3.189 WAVSPD

WAVSPD is the wave speed in m/s. This is used for calculating the SCORER parameter.

3.190 WCN

WCN is the ending valid time for the watch county notification(WCN), the colors for the county bounds, a flag for plotting the start and stop times, a flag for plotting the county names for the WCN on the map, and a flag to outline the county.

**End time | county bounds color | Time flag | Label flag |
Watch number | Outline flag | Color code flag**

WCNs that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST and ALL. LAST will use the system time and plot all current WCNs. ALL will plot all the WCN in the data files, whether they are active, cancelled or expired.

The colors are separated by a semi-colon. If any color is set to 0, that type of symbol will not be plotted. If any color is missing, a default will be used. Defaults are cyan for thunderstorm, red for tornado.

The time flag is YES or NO and controls whether or not to plot the start and stop times of the WCNs on the map. The default is NO.

The label flag is YES or NO and controls whether or not to plot the county name of the WCNs on the map. The default is NO.

The watch number flag is YES or NO and controls whether or not to plot the watch number of the WCNs on the map. The default is NO.

The outline flag is YES or NO and controls whether to outline the county instead of plotting a marker. The default is NO. The outline colors are those specified previously. If a WCN is a "test" only, and markers are selected, then a hollow marker will be plotted at the county centroid to indicate this. If the outline flag is YES, there is no difference when plotting regular reports and test reports.

The color code flag is YES or NO, if YES, the colors are associated with the last digit of the watch number, otherwise, based on the weather type (tornado or thunderstorm).

3.191 WEIGHT

WEIGHT is the Barnes weighting parameter. Typical values are between 20 and 50. A value of 20 is the default.

3.192 WIND

WIND specifies the wind symbol, size, width, type, and head size separated by slashes:

wind symbol / size / width / type / arrow head size

The wind symbol contains a letter for symbol type, a letter for symbol units and a color number with no separators. The character meanings are:

TYPE:B = BARB A = ARROW D = DIRECTIONAL ARROW

UNITS:K = KNOTSM = m/s

COLOR:Color number0 = no wind plotted

The default is BM1, i.e., barbs in meters/sec plotted in color number 1. If a partial specification is given, the remaining characteristics will be taken from the default.

The wind size is a real number which will be used as a multiplier for the default wind symbol size. If this number is negative, zero, or missing, the current size will be used. The sizes for barbs and arrows are independent.

The width is an integer specifying the line width to use in drawing the arrows or barbs.

The type is a four-digit number, FABC, interpreted digit by digit as follows:

A	B	C
1 = plot calm wind	1 = start at stn	1 = not filled
2 = ignore calm wind	2 = center at stn	2 = filled
	3 = start on sky symbol	3 = not filled with box
		4 = filled with box

F is a flag which specifies whether to plot the wind barb on the opposite side from where it would normally occur. If, F is not equal to zero, the wind barb is flipped.

Calm winds are plotted as a circle or an arrowhead for barbs and arrows, respectively. Arrowheads and 50-unit barb flags are filled if C=2 or 4. A box is plotted with background color if C = 3 or 4. For example, if TYPE=132, a barb will be plotted as a circle if the wind is calm; it will begin on the edge of the cloud cover symbol, and 50-unit flags will be filled. The default is 111.

The head size is a real valued multiplier used for the length of the arrow head. This variable is not used for wind barbs.

3.193 WINPOS

WINPOS specifies the position for plotting winds for vertical profile plots. Up to three separate wind profiles may be plotted. The stability indices will also be positioned at the top of the plot according to WINPOS. Position 1 is the leftmost position. The value of WINPOS will be incremented modulo 3 until the screen is cleared or the

program is run again.

3.194 WMOHDR

WMOHDR allows specification of a WMO header for a GRIB message.

WMO_ID / Origin_ID / DDHHMM

The first six bytes of the header (WMO_ID) must be given. The four-character originating center identifier (Origin_ID) defaults to KWBC. The six-character reference day, hour, and minute (DDHHMM) defaults to values from the reference time in the GRIB PDS (bytes 15, 16, and 17, respectively).

Bytes 7 and 12 of the WMO header are always blank.

Only the 21-byte version of the WMO header is generated.

3.195 WOU

WOU is the ending valid time for the watch outline update(WOU), the colors for the county bounds, a flag for plotting the start and stop times, a flag for plotting the county names for the WOU on the map, and a flag to outline the county.

End time | county bounds color | Time flag | Label flag |
Watch number | Outline flag | Color code flag

WOUs that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST and ALL. LAST will use the system time and plot all current WOUs. ALL will plot all the WOU in the data files, whether they are active, cancelled or expired.

The colors are separated by a semi-colon. If any color is set to 0, that type of symbol will not be plotted. If any color is missing, a default will be used. Defaults are cyan for thunderstorm, red for tornado.

The time flag is YES or NO and controls whether or not to plot the start and stop times of the WOUs on the map. The default is NO.

The label flag is YES or NO and controls whether or not to plot the county name of the WOUs on the map. The default is NO.

The watch number flag is YES or NO and controls whether or not to plot the watch

number of the WOUs on the map. The default is NO.

The outline flag is YES or NO and controls whether to outline the county instead of plotting a marker. The default is NO. The outline colors are those specified previously. If a WOU is a "test" only, and markers are selected, then a hollow marker will be plotted at the county centroid to indicate this. If the outline flag is YES, there is no difference when plotting regular reports and test reports.

The color code flag is YES or NO, if YES, the colors are associated with the last digit of the watch number, otherwise, based on the weather type (tornado or thunderstorm).

3.196 WSTM

WSTM is the ending valid time for the winter storms, the colors for the storm warning, watch and advisory, a flag for plotting the start and stop times, a flag for plotting the zone names for the storms on the map, and a flag to outline the zone.

End time|Warn color;Watch color;Advisory color|Time flag|Label flag|
Outline flag

Winter storms that are valid at the ending time will be plotted on the map. The ending time is given as a GEMPAK date/time string. Any missing items from the string will be filled in by the system time. The ending time may also be LAST and ALL. LAST will use the system time and plot all current storm messages. ALL will plot all the messages in the data files, whether they are active, cancelled or expired.

The colors are separated by a semi-colon. If any color is set to 0, that type of symbol will not be plotted. If any color is missing, a default will be used. Defaults are red for warning, orange for watch, and yellow for advisory.

The time flag is YES or NO and controls whether or not to plot the start and stop times of the storm message on the map. The default is NO.

The label flag is YES or NO and controls whether or not to plot the zone name of the storm message on the map. The default is NO.

The outline flag is YES or NO and controls whether to outline the storm zone instead of plotting a marker. The default is NO. The outline colors are those specified previously. If a message is a "test" only, a hollow marker will be ploteed at the zone centroid to indicate this, and no outlining will be done.

3.197 XAXIS

XAXIS contains the left bound, right bound, label increment, and frequency information separated by slashes in the form:

left/right/increment/lbfq;gdfq;tkfq

The frequencies for labels, grid lines, and tick marks follow the last slash and are separated with semicolons. Appropriate defaults are provided if values are not specified. If the increment is positive, all the label values will be divisible by the increment. If it is negative, the label values will begin with the left value and be separated by the increment. The bounds and increment are for the scaled data.

3.198 YAXIS

YAXIS contains the lower bound, upper bound, label increment, and frequency information separated by slashes in the form:

lower/upper/increment/lbfq;gdfq;tkfq

The frequencies for labels, grid lines, and tick marks follow the last slash and are separated with semicolons. If the increment is positive, all the label values will be divisible by the increment. If it is negative, the label values will begin with the lower value and be separated by the increment. The bounds and increment are for the scaled data.

Defaults will be supplied if no specification is given. The following defaults will be used when appropriate:

vcoord	lower	upper	defaults
PRES	1020	100	Mandatory levels
THTA	270	400	10
HGHT	0	20000	1000