

5.2 Constant Pressure Charts

Constant pressure charts are maps of selected conditions along specified constant pressure surfaces (pressure altitudes) and depict observed weather.

Constant pressure charts help to determine the three-dimensional aspect of depicted pressure systems. Each chart provides a plan-projection view at a specified pressure altitude.

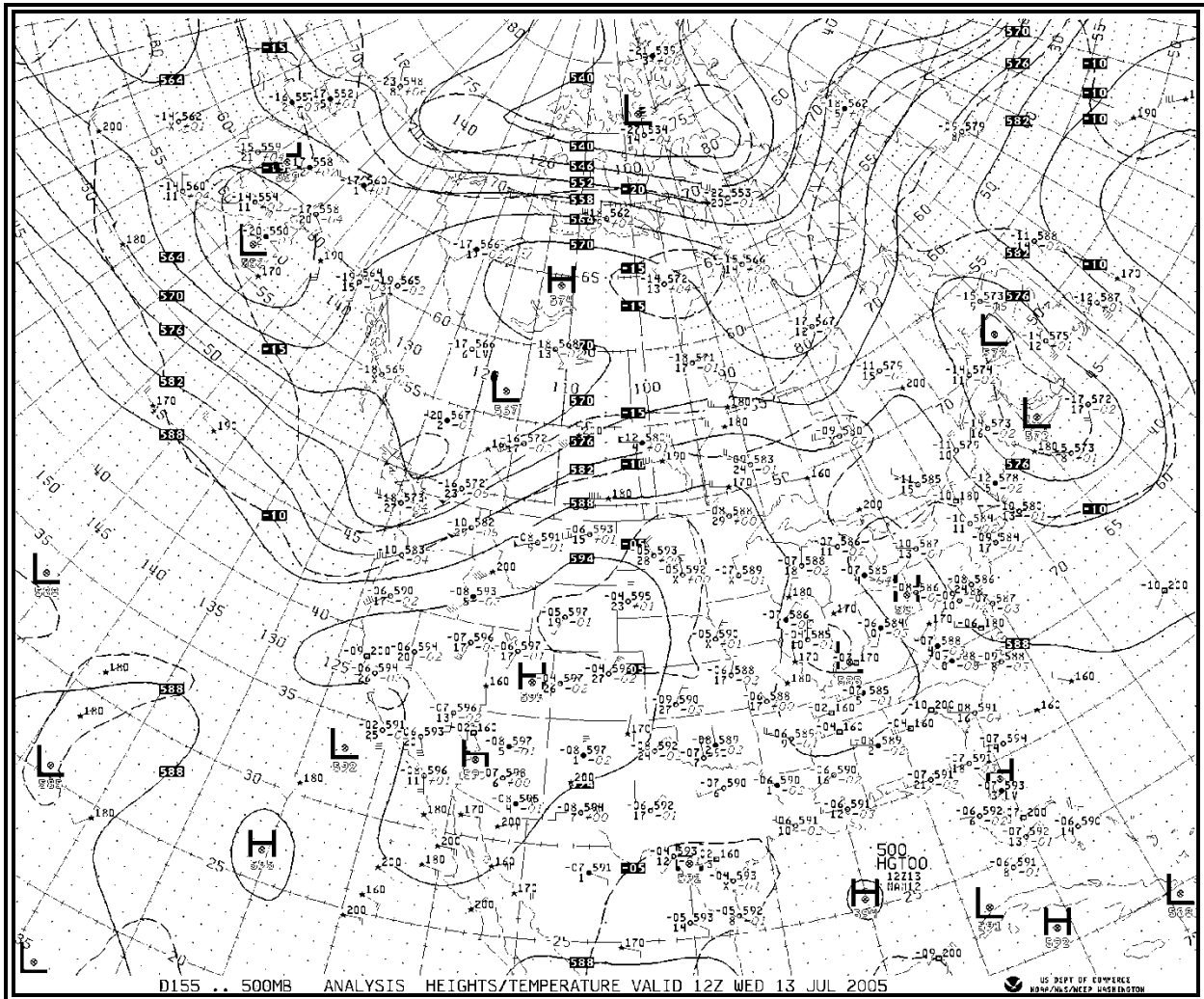


Figure 5-29. Constant Pressure Chart Example

5.2.1 Issuance

Constant pressure charts are issued twice per day from observed data obtained at 00Z and 12Z. Charts are available at the NWS Fax Chart web site at: <http://weather.noaa.gov/fax/barotrop.shtml>.

5.2.2 Observational Data

Observational data is plotted according to priority with some data deleted to prevent overlap. The retention priority is:

- [Radiosonde](#) observations (see Figure 5-30)
- Weather reconnaissance aircraft observations
- Aircraft observations on-time and on-level
- Aircraft observations off-time or off-level
- Satellite wind estimates

Many other data sources are used in the analysis but are not plotted. These include:

- Ships
- Buoys
- Tide gauges
- Wind profilers
- WSR-88D weather radar [VAD wind profiles](#)
- Satellite sounder

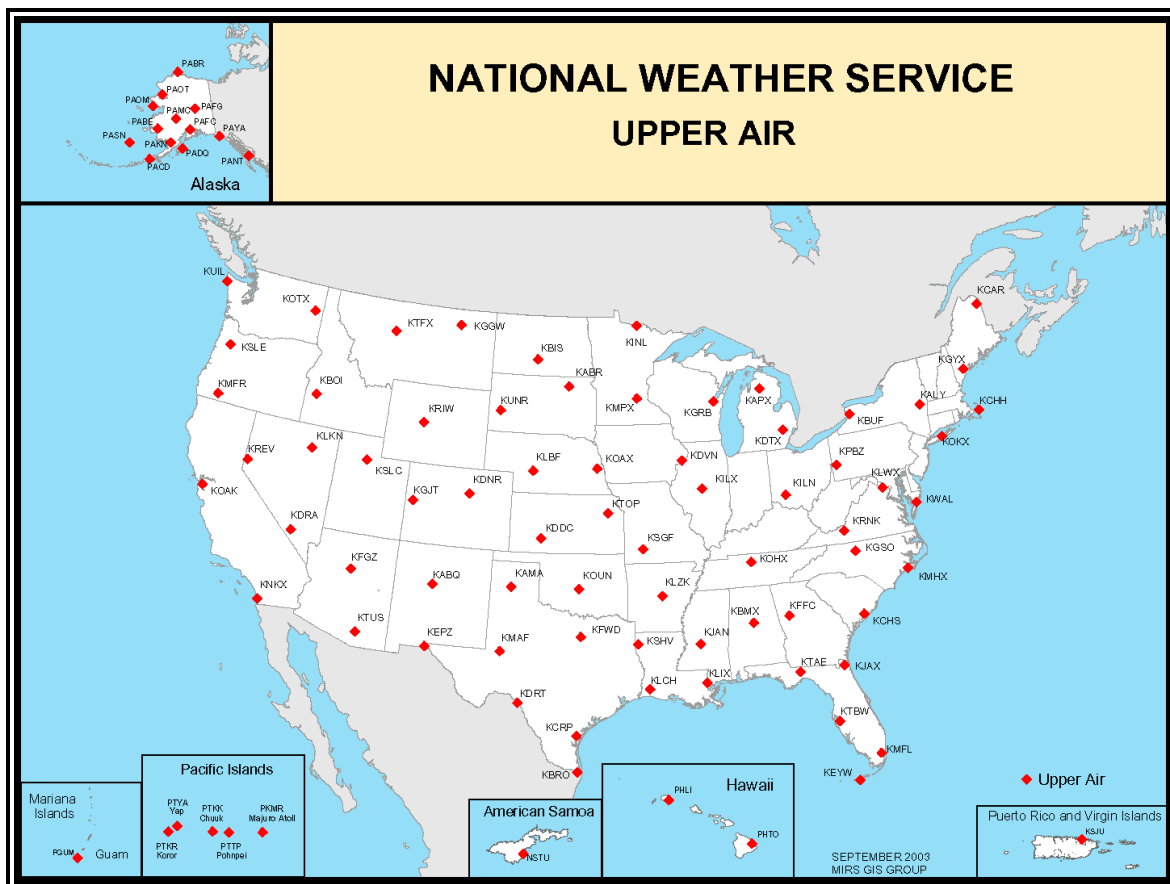


Figure 5-30. U.S. Radiosonde Network

Table 5-6 Features of Constant Pressure Charts

Constant Pressure Chart	Pressure Altitude (MSL)		Isotachs	Contour Interval (meters)	Height Plot Decoding		Examples of Height Plotting	
					Prefix	Suffix	Plotted	Height (meters, MSL)
850MB	5,000 ft	1,500 m	No	30 m	1	-	530	1,530 m
700MB	10,000 ft	3,000 m	No	30 m	2 or 3*	-	180	3,180 m
500MB	18,000 ft	5,500 m	No	60 m	-	0	582	5,820 m
300MB	30,000 ft	9,000 m	Yes	120 m	-	0	948	9,480 m
200MB	39,000 ft	12,000 m	Yes	120 m	1	0	164	11,640 m

Note: Pressure altitudes are rounded to the nearest 1,000 for feet and 500 for meters.
 * Prefix a "2" or "3," whichever brings the height closer to 3,000 meters.

Table 5-7. Constant Pressure Chart Plotting Models

Radiosonde	Reconnaissance Aircraft (RECCO)	Aircraft Report (AIREP)	Satellite Wind Estimate
SYMBOL	MEANING		
	Wind plotted in standard notation. The stem points in the direction from which the wind is blowing plotted to 36 compass points, relative to true north. Wind speed is denoted by a combination of flags (50 knots), barbs (10 knots), and half barbs (5 knots).		
TT	Temperature rounded to the nearest whole degree Celsius, with minus sign prefixed if negative.		
hhh	Height of the constant pressure surface in meters MSL. See the Table 5-8 to see how each chart abbreviates height.		
PaPaPa	Pressure altitude in hundreds of feet MSL.		
DD	Temperature-dew point spread (depression of the dew point temperature) rounded to the nearest whole degree Celsius. When DD is less than or equal to 5 degrees Celsius, the station circle is darkened so a region of high moisture content will stand out. If DD is greater than 5 degrees Celsius, the station circle is not shaded. If the DD is too large to measure, an X is plotted. For RECCO reports, DD will be missing when the temperature is colder than -41°C.		
R	Reconnaissance aircraft type.		

Table 5-8. Radiosonde Plotting Model Examples

Plotting Model		850MB	700MB	500MB	300MB	200MB
Wind*		190°/20 kt	190°/25 kt	270°/15 kt	240°/75 kt	250°/115 kt
TT	Temperature	20°C	8°C	-11°C	-36°C	-56°C
hhh	Height	1,504 m	3,156 m	5,820 m	9,560 m	12,140 m
DD	Temperature -Dew Point Spread	5°C	6°C	Too dry to measure	21°C	7°C
h_ch_c	Height Change	-10 m	-20 m	+10 m	-50 m	-20 m
* Wind direction assumes that north is at the top of the page. Latitude and longitude lines, as well as other geographical references, must be used to determine actual compass direction.						

5.2.3 Analyses

All [constant pressure charts](#) contain analyses of [height](#) and temperature. Selected charts have an analysis of wind speed as well.

5.2.3.1 Height

[Heights](#) are analyzed with contours. Contours are lines of constant [height](#) in MSL and are used to map [height](#) variations of constant pressure surfaces. They identify and characterize pressure systems on [constant pressure charts](#).

Contours are drawn as solid lines labeled with 3-digit numbers in decameters. Intervals at which the contours are drawn at: 30 meters for the 850 mb and 700 mb charts, 60 meters for the 500-mb chart, and 120 meters for the 300-mb and 200-mb charts. The location of a High or Low is marked with a ⊗ symbol together with a larger **H** or **L**, and the central value in decameters printed under the center location.

Contour gradient is the amount of [height](#) change over a specified horizontal distance. Gradients identify slopes of constant pressure surfaces that fluctuate in altitude. Strong gradients are denoted by closely-spaced contours which identify steep slopes. Weak gradients are denoted by widely-spaced contours which identify shallow slopes.

Wind speeds are directly proportional to contour gradients. Faster wind speeds are associated with strong contour gradients and slower wind speeds are associated with weak contour gradients. In mountainous areas, winds are often variable on [constant pressure charts](#) with altitudes near terrain elevation due to friction.

5.2.3.2 Temperature

Temperature is analyzed with [isotherms](#) which are lines of constant temperature. They are drawn as long dashed lines at intervals of 5° Celsius. They are given a two-digit label in whole degrees Celsius and are preceded with a + (positive) or - (negative) sign. The zero degree [isotherm](#) denotes the [freezing level](#).

Temperature gradient is the amount of temperature change over a specified distance. [Isotherm](#) gradients identify the magnitude of temperature variations. Strong gradients are denoted by closely spaced [isotherms](#) and identify large temperature variations. Weak gradients are denoted by loosely spaced [isotherms](#) and identify small temperature variations.

5.2.3.3 Wind Speed

Wind speed is analyzed with [isotachs](#). Isotachs are lines of constant wind speed. They are drawn on the 300-mb and 200-mb charts with short-dashed lines at 20-[knot](#) intervals beginning with 10 [knots](#). They are labeled with a two- or three-digit number followed by a **K** for [knots](#). Regions of high wind speeds are highlighted by alternate bands of shading and no-shading at 40-[knot](#) intervals beginning at 70 [knots](#). A [jet stream](#) axis is the axis of maximum wind speed in a [jet stream](#). Jet axes are not explicitly indicated, but their positions can be inferred from the [isotach](#) pattern and plotted winds.

5.2.3.4 Use

[Constant pressure charts](#) are used to provide an overview of selected observed weather conditions at specified pressure altitudes.

Pressure patterns cause and characterize much of the weather. Typically, lows and troughs are associated with bad weather, clouds and precipitation, while highs and ridges are associated with good weather.

Table 5-9. Reconnaissance Aircraft (RECCO) Plotting Model Examples

Plotting Model		850MB	700MB	500MB	300MB	200MB
	Wind*	150°/90 kt	130°/35 kt	180° /60 kt	240°/30 kt	110°/30 kt
TT	Temperature	19°C	9°C	-5°C	-28°C	-53°C
hhh	Height	1,366 m	3,146 m	5,800 m	9,660 m	12,420 m
DD	Temperature -Dew Point Spread	1°C	1°C	2°C	3°C	Missing
R	RECCO Type	AA329A	AA921A	AA923A	AA924A	AA916A
<p>* Wind direction assumes that north is at the top of the page. Latitude and longitude lines, as well as other geographical references, must be used to determine actual compass direction.</p>						

Table 5-10. Aircraft Report (AIREP) Plotting Model Examples

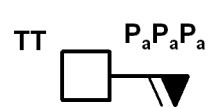
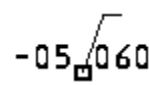
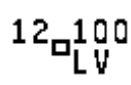
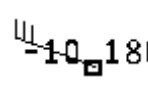
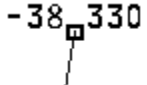
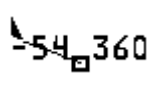



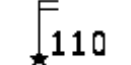
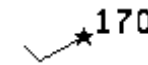



						
Plotting Model		850MB	700MB	500MB	300MB	200MB
	Wind*	20°/10 kt	Light and Variable	300°/30 kt	190°/5 kt	290°/50 kt
TT	Temperature	-5°C	12°C	-10°C	-38°C	-54°C
PaPaPa	Pressure Altitude (MSL)	6,000 ft	10,000 ft	18,000 ft	33,000 ft	36,000 ft
<p>* Wind direction assumes that north is at the top of the page. Latitude and longitude lines, as well as other geographical references, must be used to determine actual compass direction.</p>						

Table 5-11. Satellite Wind Estimate Plotting Model Examples

						
Plotting Model		850MB	700MB	500MB	300MB	200MB
	Wind*	290°/30 kt	360°/20 kt	240°/10 kt	140°/165 kt	310°/60 kt
PaPaPa	Pressure Altitude (MSL)	7,000 ft	11,000 ft	17,000 ft	33,000 ft	36,000 ft
<p>* Wind direction assumes that north is at the top of the page. Latitude and longitude lines, as well as other geographical references, must be used to determine actual compass direction.</p>						

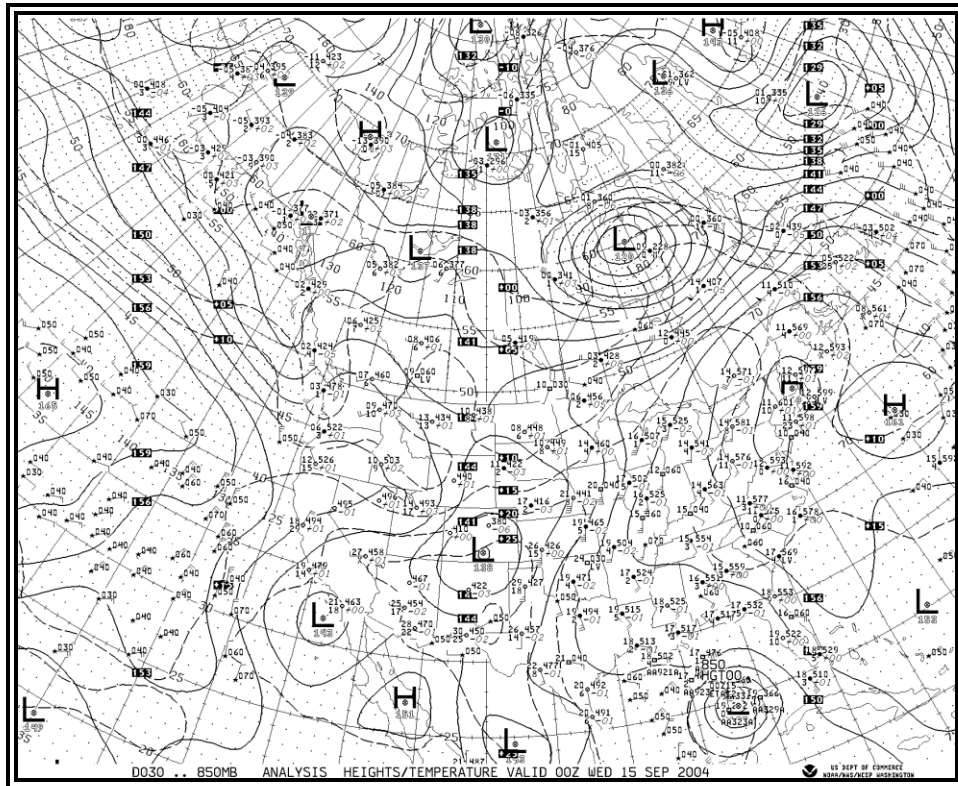


Figure 5-31. 850MB Analysis Chart Example

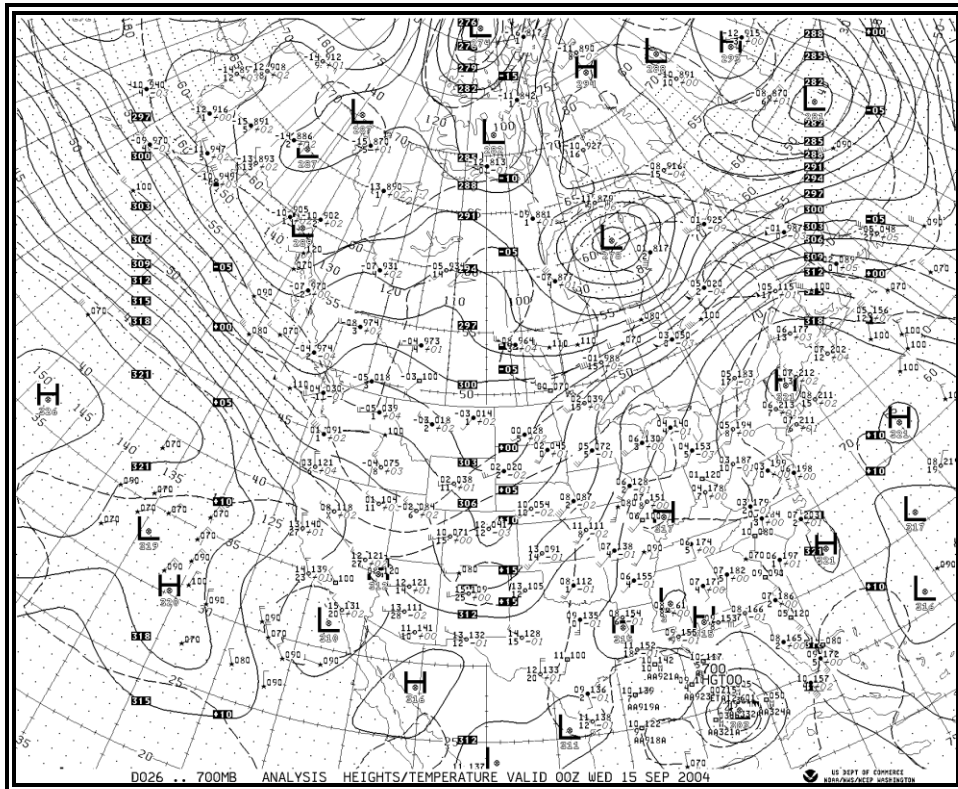


Figure 5-32. 700MB Analysis Chart Example

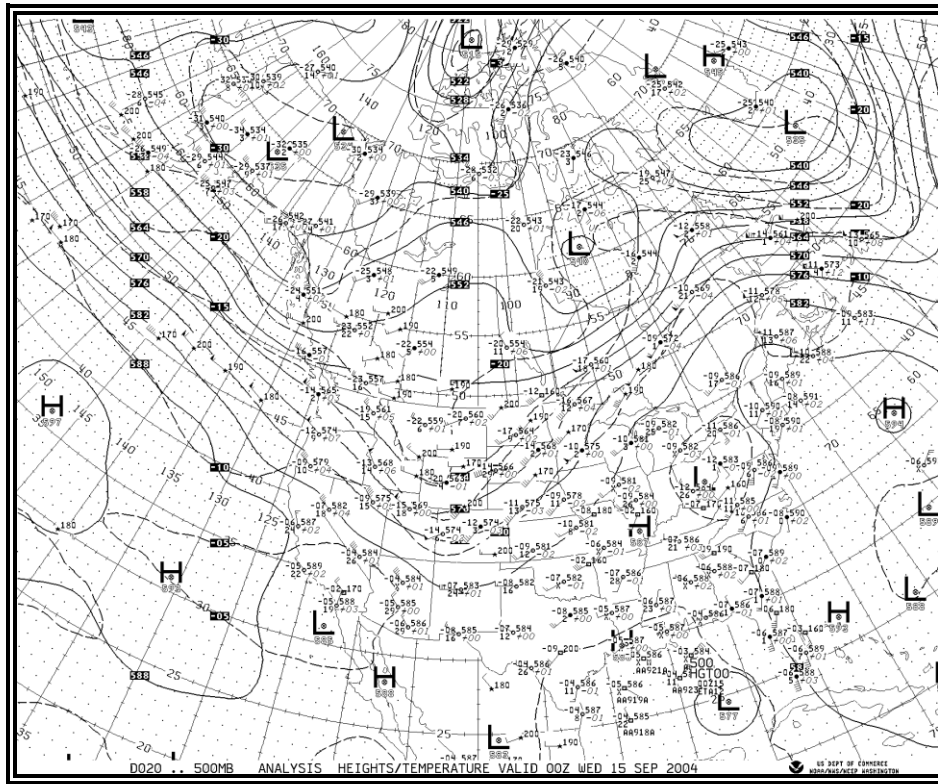


Figure 5-33. 500MB Analysis Chart Example

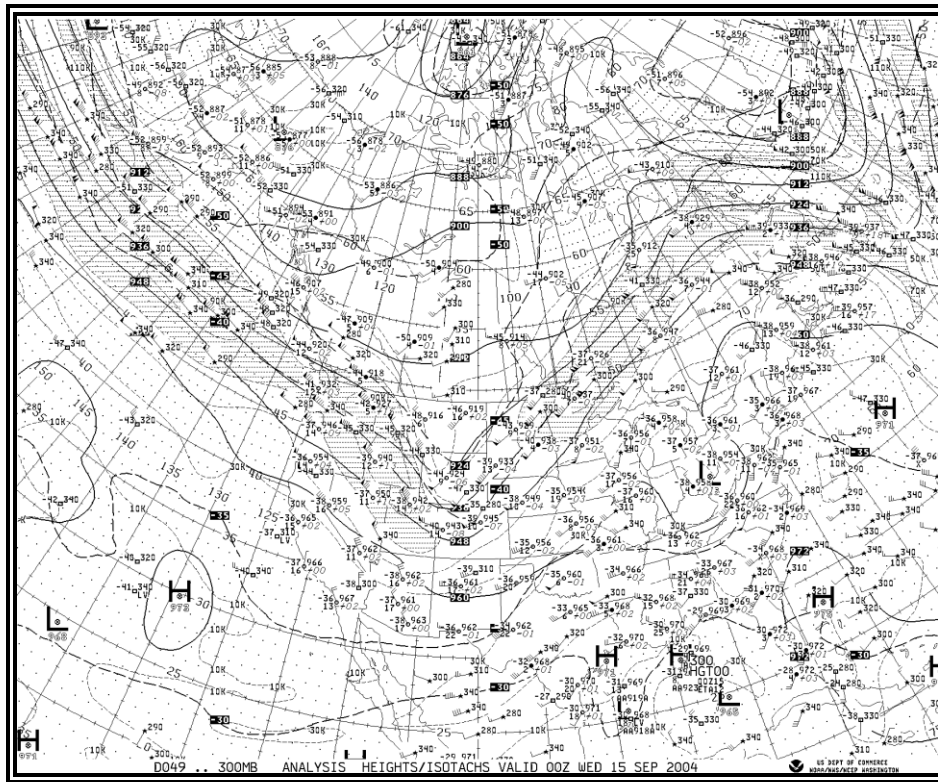


Figure 5-34. 300MB Analysis Chart Example

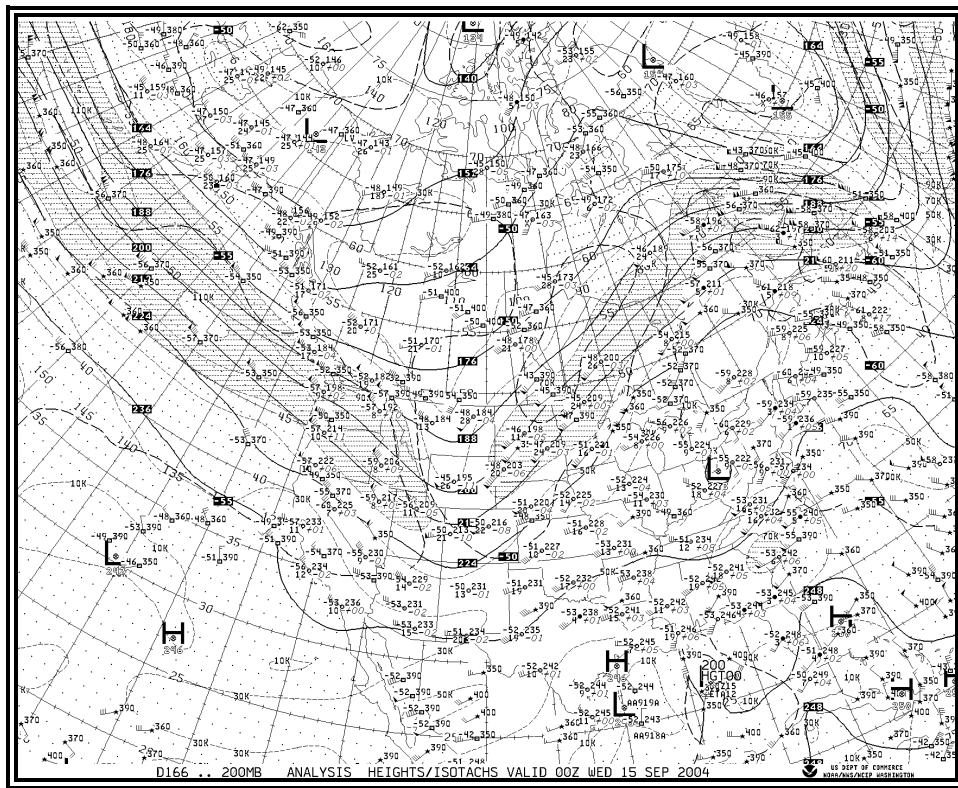


Figure 5-35. 200MB Analysis Chart Example