

## **Section 5**

### **SURFACE ANALYSIS CHART**

The surface analysis chart is a computer-generated chart, with frontal analysis by HPC forecasters, transmitted every 3 hours covering the contiguous 48 states and adjacent areas. Figure 5-1 is a surface analysis chart, and Figure 5-2 illustrates the symbols depicting fronts and pressure centers.

#### **VALID TIME**

Valid time of the chart corresponds to the time of the plotted observations. A date-time group in Universal Coordinated Time (UTC) tells the user when conditions portrayed on the chart occurred.

#### **ISOBARS**

Isobars are solid lines depicting the sea-level pressure pattern and are usually spaced at intervals of 4 millibar (mb), or hectoPascals (hPa) in metric units (1 millibar = 1 hectoPascal). Each isobar is labeled. For example, 1032 signifies 1,032.0 mb (hPa); 1000 signifies 1,000.0 mb (hPa); and 992 signifies 992.0 mb (hPa).

#### **PRESSURE SYSTEMS**

The letter “L” denotes a low pressure center, and the letter “H” denotes a high pressure center. The pressure of each center is indicated by a three- or four-digit number that is the central pressure in mb (hPa).

#### **FRONTS**

The analysis shows positions and types of fronts by the symbols in Figure 5-2. The symbols on the front indicate the type of front and point in the direction toward which the front is moving. If the front has arrowhead-shaped symbols, it is a cold front. If the front has half-moon symbols, it is a warm front. A three-digit number near a front classifies it as to type (see Table 5-1), intensity (see Table 5-2), and character (see Table 5-3). A bracket ( [ or ] ) before or after the number “points” to the front to which the number refers. For example, in Figure 5-1, the front extends from eastern Montana into central North Dakota south through South Dakota and Nebraska into northwestern Kansas. The front is labeled “027” which means a quasi-stationary front (“0” from Table 5-1); weak, little, or no change (“2” from Table 5-2); and with waves (“7” from Table 5-3).

Two short lines across a front indicate a change in classification. In figure 5-1, note that two lines cross the front in central Montana (adjacent to the Low). To the left of the Low the front is numbered “450” which is a cold front; moderate, little, or no change; and no specification. The front to the right of the Low is numbered “027” which is a quasi-stationary front; weak, little, or no change; and with waves.

#### **TROUGHS AND RIDGES**

A trough of low pressure with significant weather will be depicted as a thick, dashed line running through the center of the trough and identified with the word “TROF.” The symbol for a ridge of high pressure is very rarely, if at all, depicted (Figure 5-2).

## **OTHER INFORMATION**

The observations from a number of stations are plotted on the chart to aid in analyzing and interpreting the surface weather features. These plotted observations are referred to as station models. There are two primary types of station models plotted on the chart. Those with a round station symbol are observations taken by observers. The locations with a square station symbol indicate the sky cover was determined by an automated system. Other plotting models that appear over water on the chart are data from ships, buoys, and offshore oil platforms. Figure 5-3 is an example of a station model that shows where the weather information is plotted. Figures 5-4 through Figure 5-7 help explain the decoding of the station model.

An outflow boundary will be depicted as a thick, dashed line with the word “OUTBNDY.”

A dry line will be depicted as a line with unshaded pips or a through symbol. It will also be identified with the words “DRY LINE.”

A legend is printed on each chart stating its name, valid date and valid time.

## **USING THE CHART**

The surface analysis chart provides a ready means of locating pressure systems and fronts. It also gives an overview of winds, temperatures, and dew point temperatures at chart time. When using the chart, keep in mind that weather moves and conditions change. Using the surface analysis chart in conjunction with other information gives a more complete weather picture.

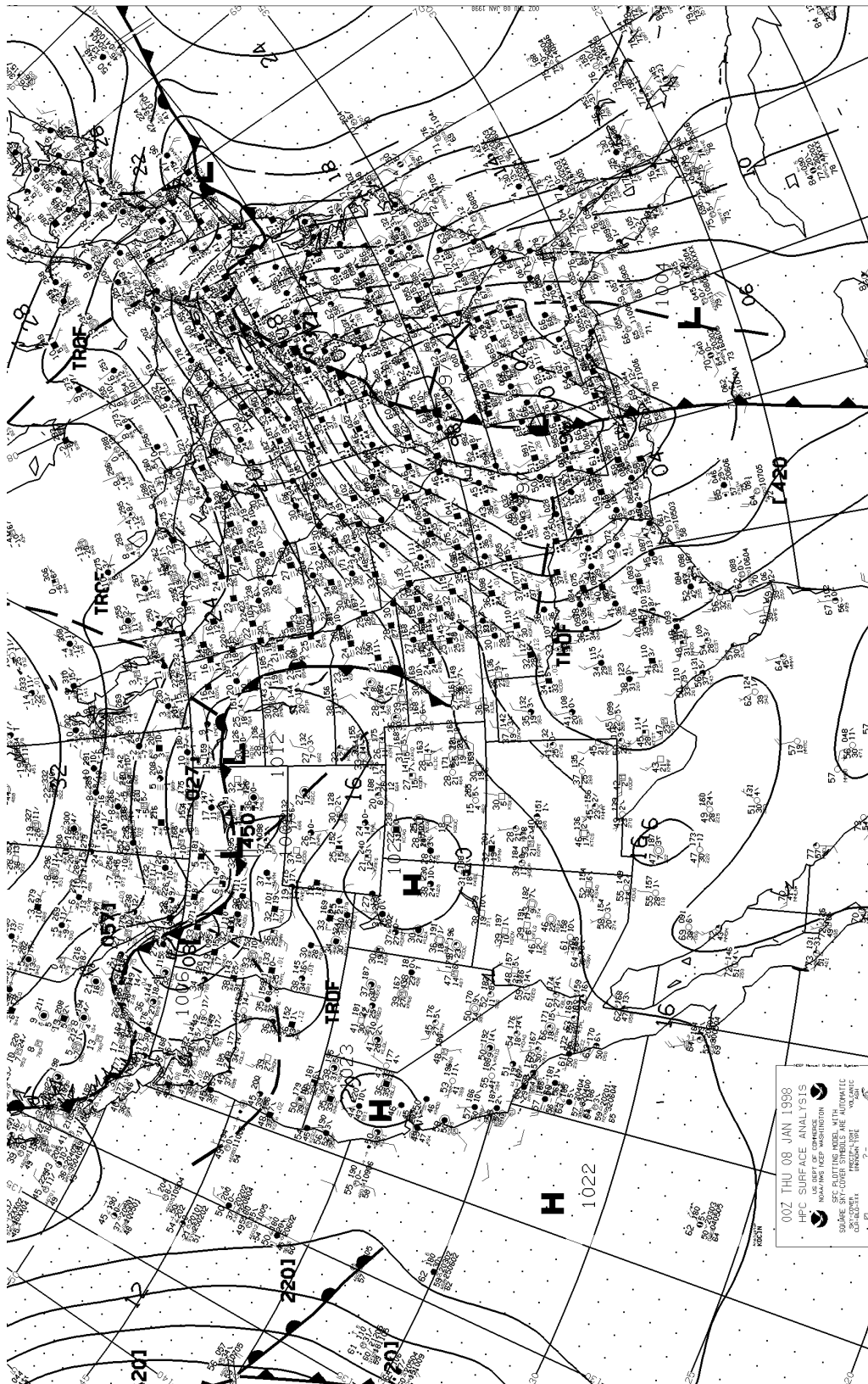


Figure 5-1. Surface Analysis Chart.








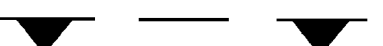




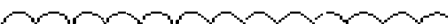


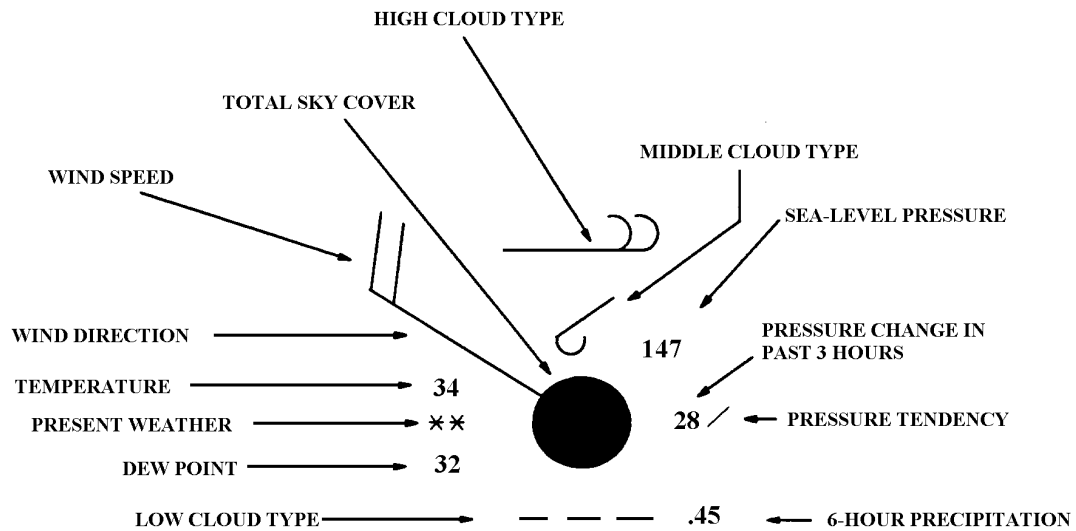
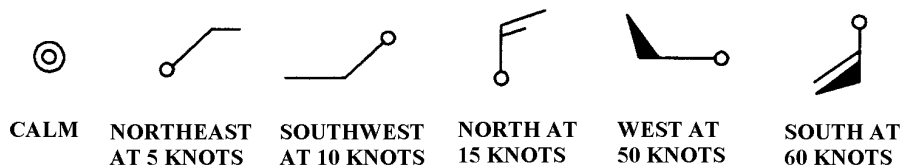
Color	Symbol	Description
Blue	H	High Pressure Center
Red	L	Low Pressure Center
Blue		Cold Front
Red		Warm Front
Red/Blue		Stationary Front
Purple		Occluded Front
Blue		Cold Frontogenesis
Red		Warm Frontogenesis
Red/Blue		Stationary Frontogenesis
Blue		Cold Frontolysis
Red		Warm Frontolysis
Red/Blue		Stationary Frontolysis
Purple		Occluded Frontolysis
Purple		Squall Line
Brown		Dryline
Brown		Trough
Yellow		Ridge

Figure 5-2. Symbols on Surface Analysis Chart.



1. Total sky cover: Overcast.
2. Temperature: 34 degrees F, Dew Point: 32 degrees F.
3. Wind: From the northwest at 20 knots (relative to true north).

### Examples of wind direction and speed



4. Present Weather: Continuous light snow.
5. Predominate low, middle, high cloud reported: Strato fractus or cumulus fractus of bad weather, altocumulus in patches, and dense cirrus.
6. Sea-level pressure: 1,014.7 millibars (mbs).  
NOTE: Pressure is always shown in three digits to nearest tenth of an mb. For 1,000 mbs or greater, prefix a "10" to the three digits. For less than 1,000 mbs, prefix a "9" to the three digits.
7. Pressure change in the past 3 hours: Increased steadily or unsteadily by 2.8 mbs. The actual change is in tenths of a mb.
8. 6 - hour precipitation in hundredths of an inch: 45 hundredths of an inch.

Figure 5-3. Station Model and Explanation.

**Table 5-1. Type of Front**

<b>Code Figures</b>	<b>Descriptions</b>
<b>0</b>	<b>Quasi-stationary at surface</b>
<b>2</b>	<b>Warm front at surface</b>
<b>4</b>	<b>Cold front at surface</b>
<b>6</b>	<b>Occlusion</b>
<b>7</b>	<b>Instability line</b>

**Table 5-2. Intensity of Front**

<b>Code Figures</b>	<b>Descriptions</b>
<b>0</b>	<b>No specification</b>
<b>1</b>	<b>Weak, decreasing</b>
<b>2</b>	<b>Weak, little, or no change</b>
<b>3</b>	<b>Weak, increasing</b>
<b>4</b>	<b>Moderate, decreasing</b>
<b>5</b>	<b>Moderate, little, or no change</b>
<b>6</b>	<b>Moderate, increasing</b>
<b>7</b>	<b>Strong, decreasing</b>
<b>8</b>	<b>Strong, little, or no change</b>
<b>9</b>	<b>Strong, increasing</b>

**Table 5-3. Character of Front**

<b>Code Figures</b>	<b>Descriptions</b>
<b>0</b>	<b>No specification</b>
<b>5</b>	<b>Forming or existence expected</b>
<b>6</b>	<b>Quasi-stationary</b>
<b>7</b>	<b>With waves</b>
<b>8</b>	<b>Diffuse</b>

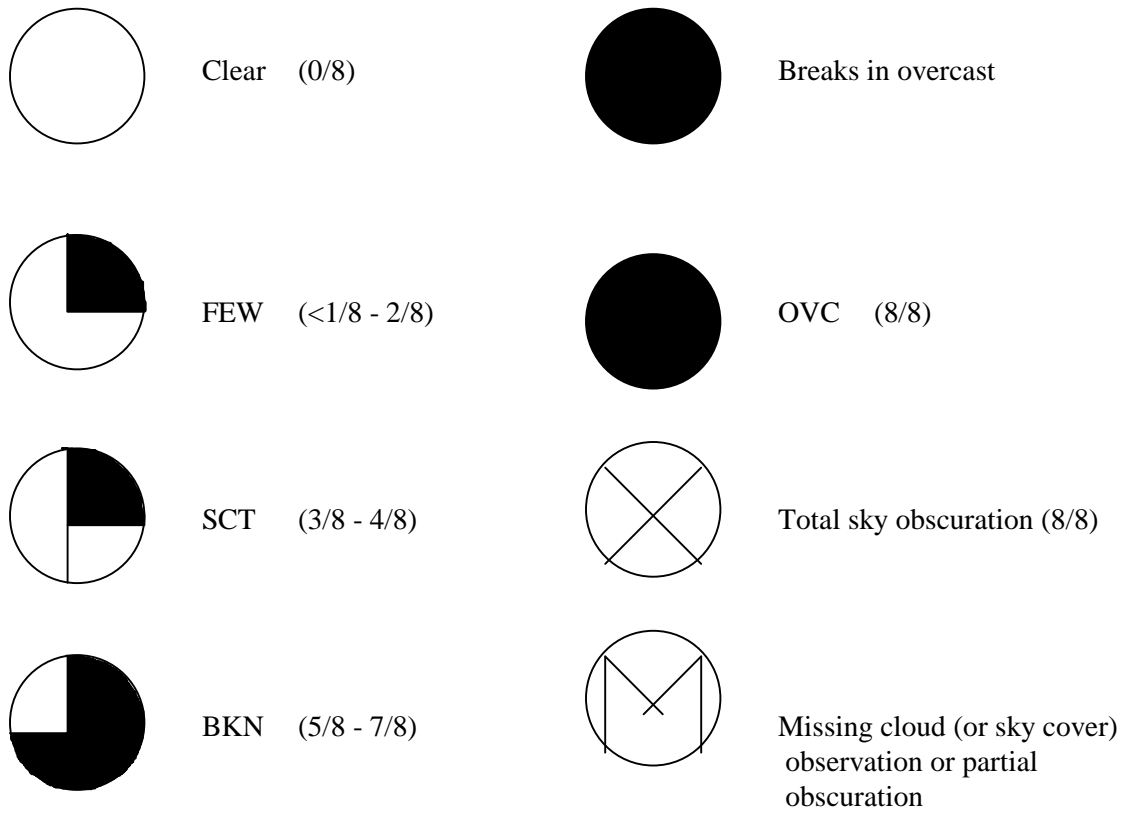


Figure 5-4. Sky Cover Symbols.












Description of Characteristic			
Primary Requirements	Additional Requirements	Graphic	Code Figure
<b>Higher</b>  Atmospheric pressure now higher than 3 hours ago.	Increasing, then decreasing		<b>0</b>
	Increasing, then steady; or		<b>1</b>
	Increasing, then increasing more slowly		
	Increasing; steadily or unsteadily		<b>2</b>
	Decreasing; or steady, then increasing; or  Increasing, then increasing more rapidly		<b>3</b>
<b>Same</b>  Atmospheric pressure now same as 3 hours ago.	Increasing, then decreasing		<b>0</b>
	Steady		<b>4</b>
	Decreasing, then increasing		<b>5</b>
<b>Lower</b>  Atmospheric pressure now lower than 3 hours ago.	Decreasing, then increasing		<b>5</b>
	Decreasing, then steady; or		<b>6</b>
	Decreasing, then decreasing more slowly		
	Decreasing; steadily or unsteadily		<b>7</b>
	Steady; or increasing, then decreasing; or  Decreasing, then decreasing more rapidly		<b>8</b>

Figure 5-5. Pressure Tendencies.



































CLOUD ABBREVIATION	C <sub>L</sub>	DESCRIPTION (Abridged from W.M.O. Code)	C <sub>M</sub>	DESCRIPTION (Abridged from W.M.O. Code)	C <sub>H</sub>	DESCRIPTION (Abridged from W.M.O. Code)
St or Fs - Stratus or Fractostratus		Cu, fair weather, little vertical development and flattened		Thin As (most of cloud layer is semitransparent)		Filaments of Ci, or "mares tails," scattered and not increasing
Ci - Cirrus		Cu, considerable development, towering with or without other Cu or Sc bases at same level		Thick As, greater part sufficiently dense to hide sun (or moon), or Ns		Dense Ci in patches or twisted sheaves, usually not increasing, sometimes like remains of Cb, or towers tufts
Cs - Cirrostratus		Cb with tops lacking clearcut outlines, but distinctly not cirroform or anvil shaped; with or without Cu, Sc, or St		Thin Ac, mostly semitransparent; cloud elements not changing much at a single level		Dense Ci, often anvil shaped derived from or associated Cb
Cc - Cirrocumulus		Sc formed by spreading out of Cu; Cu often present also		Thin Ac in patches; cloud elements continually changing and/or occurring at more than one level		Ci, often hook shaped gradually spreading over the sky and usually thickening as a whole
Ac - Altocumulus		Sc not formed by spreading out of Cu		Thin Ac in bands or in a layer gradually spreading over sky and usually thickening as a whole		Ci and Cs, often in converging bands or Cs alone; generally overspreading and growing denser; the continuous layer not reaching 45 altitude
As - Altostratus		St or Fs or both, but no Fs of bad weather		Ac formed by the spreading out of Cu		Ci and Cs, often in converging bands or Cs alone; generally overspreading and growing denser; the continuous layer exceeding 45 altitude
Sc - Stratocumulus		Fs and/or Fc of bad weather (scud)		Double-layered Ac, or a thick layer of Ac, not increasing; or Ac with As and/or Ns		Veil of Cs covering the entire sky
Ns - Nimbostratus		Cu and Sc (not formed by spreading out of Cu) with bases at different levels		Ac in the form of Cu-shaped tufts or Ac with turrets		Cs not increasing and not covering the entire sky
Cu or Fc - Cumulus or Fractocumulus		Cb having a clearly fibrous (cirroform) top, often anvil shaped, with or without Cu, Sc, St, or scud		Ac of chaotic sky, usually at different levels; patches of dense Ci are usually present		Cc alone or Cc with some Ci or Cs but the Cc being the main cirroform cloud
Cb - Cumulonimbus						

Figure 5-7. Cloud Symbols.