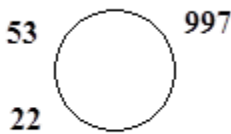


Weather Maps

Purpose: The purpose of this lab exercise is to become familiar with the Daily weather map published by **NOAA** (National Oceanic and Atmospheric Administration) and the **WMO** (World Meteorological Organization) station model.

Introduction: The surface weather map contains station data and analysis for 7:00 a.m. EST. The station data for temperature, pressure, cloud cover, precipitation, etc. can be interpreted using the WMO station model, see next page. Isobars (lines of constant pressure) are drawn as solid lines at 4.0 mb intervals. Isotherms (lines of constant temperature) are also included (particularly on the upper air chart) and are drawn as dashed lines. The surface weather map usually includes the isotherm that corresponds to the freezing line. Tracks of low pressure areas are indicated by a chain of arrows; locations of these centers at 6, 12, and 18 hours preceding map time are indicated by small white crosses in black squares. Areas of precipitation are indicated by shading of the surface map. Cold fronts are indicated by triangles pointing in the direction of advancing cold air and warm fronts are indicated by half-circles pointing in the direction of advancing warm air.

1. Using the WMO station model and the appendix of your text, decode the information from each of the following station models. See pages 10 through 13 of this activity or <http://profhorn.meteor.wisc.edu/wxwise/wxpilot/lesson3/smbkgrnd.html> and <http://profhorn.meteor.wisc.edu/wxwise/wxpilot/lesson3/smpractice.html> for practice.



Barometric Pressure _____

Temperature _____

Dew Point _____



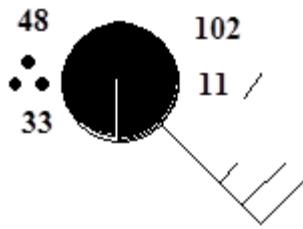
Barometric Pressure _____

Temperature _____

Dew Point _____

Sky Coverage _____

Current Weather _____



Barometric Pressure _____

Sky Coverage _____

Temperature _____

Current Weather _____

Dew Point _____

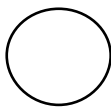
Wind Velocity ____

Pressure change in last 3 hr _____

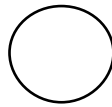
Pressure Tendency _____

2. Plot the information given below for the three cities (A, B, C)

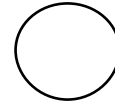
	City A	City B	City C
Air Temperature	70 °F	62 °F	43 °F
Dew point	65 °F	33 °F	43 °F
Air Pressure	1005.7 mb	1040.3 mb	993.4 mb
Wind direction	SW	calm	NE
Wind Magnitude	15 knots		60 knots
Cloud coverage	75 %	no clouds	100 %
Present weather	light rain		Thundershowers



City A

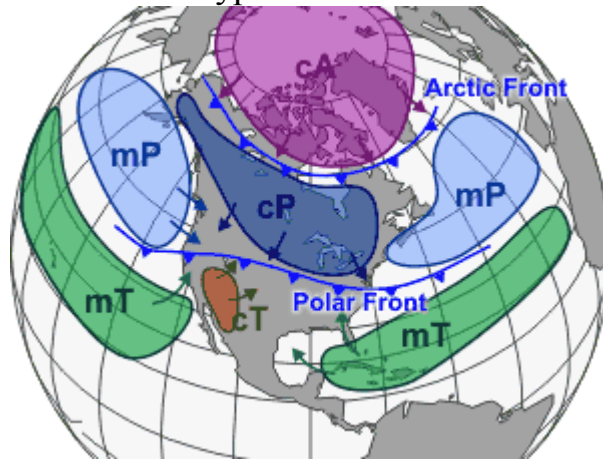


City B



City C

3. Air masses are large masses of air that are named for **their source region** which gives the air mass its original temperature and moisture characteristics. Their temperature characteristics are classified as equatorial, tropical, polar, or Arctic; and their moisture content is identified as maritime or continental. Below is a list of the air masses and their typical characteristics



-(mE) Maritime equatorial	Very warm and moist
- maritime tropical (mT)	Warm and moist
-maritime polar (mP)	Cool and moist (RH high)
-continental tropical (cT)	Warm and dry
-continental polar (cP)	Cool and dry
-continental Arctic (cA)	Cold and dry

For the contiguous US we only see the mP, mT, cP, and cT air masses.

Which type of air mass is described in each sentence below. (Use your text if necessary)

Air coming into San Diego from the Southwest.

Air coming into Santa Fe New Mexico from the South.

Air coming into Vancouver Wa from the Northwest.

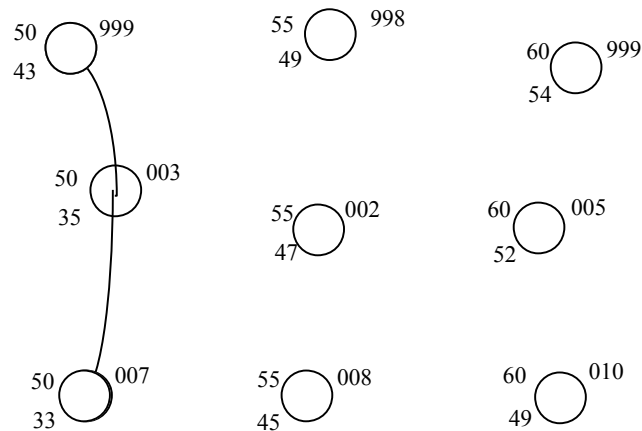
Air coming into Vancouver Wa from the North or Northeast.

Air coming into Vancouver Wa from the southwest.

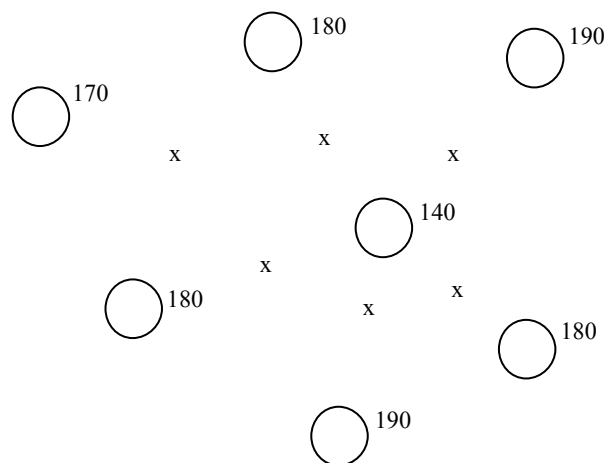
Air coming into New Orleans from the South.

Contours: See <http://profhorn.meteor.wisc.edu/wxwise/wxpilot/lesson3/lesson3bkgrnd.html> and <http://profhorn.meteor.wisc.edu/wxwise/wxpilot/lesson3/contourpractice.html> for practice.

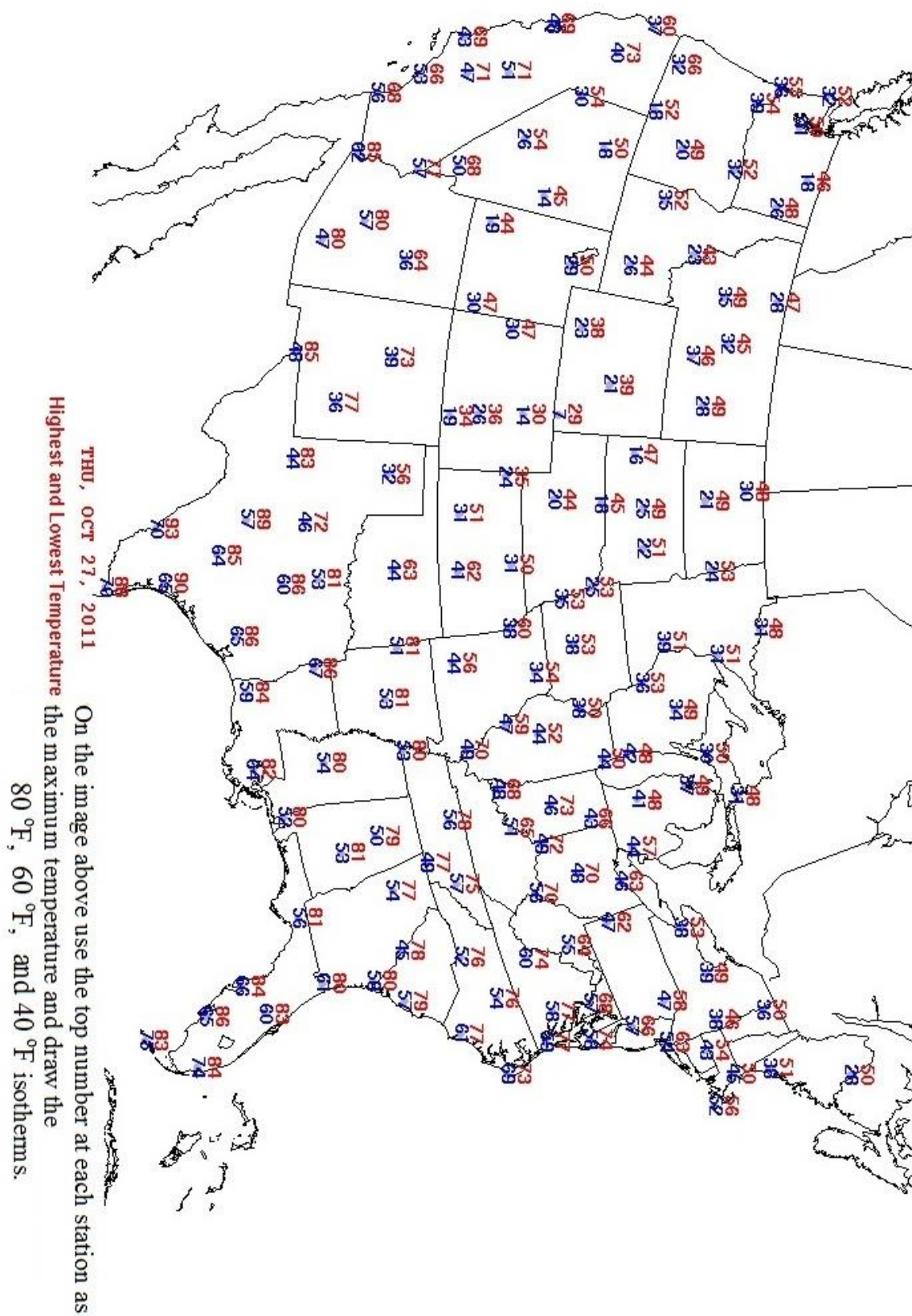
3. Isotherms are lines of constant temperature. Complete the analysis below by drawing the 60°F and 55 °F isotherms.



4. In the above example drawing the isotherms was pretty easy since you knew where the data points were located for the isotherms. However, most real maps require an interpolation of the data before the isolines can be drawn. For example, on the map below we have enough information to place the 1016.0 mb isobar, even though none of the stations are reading exactly 1016.0 mb. Notice that 1016.0 mb is estimated to be half-way between 1018.0 and 1014.0 mb two thirds of the way between 1017.0 and 1014.0 mb, and two-fifths of the way between 1019.0 and 1014.0 mb.



Draw a smooth curve connecting the x's on the previous figure which represents your estimate of the 1016 mb isobar contour line.



Check answer above <http://www.atmosedu.com/meteor/Labs/Oct27HighLow.jpg>

Fronts

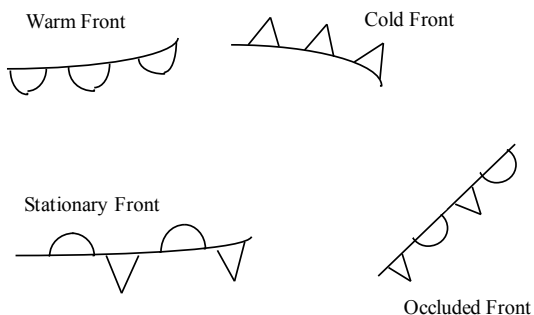
6. The boundary between two air masses is called a **front**. A cold front identifies cold air moving under warm, while a warm front identifies warm air moving over cold.

The frontal boundary can be identified by:

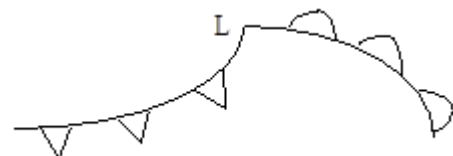
- * A sharp temperature change
- * A sharp change in Relative Humidity which can be identified by a change in the difference between the air temperature and dew point.
- * A sharp change in wind direction.

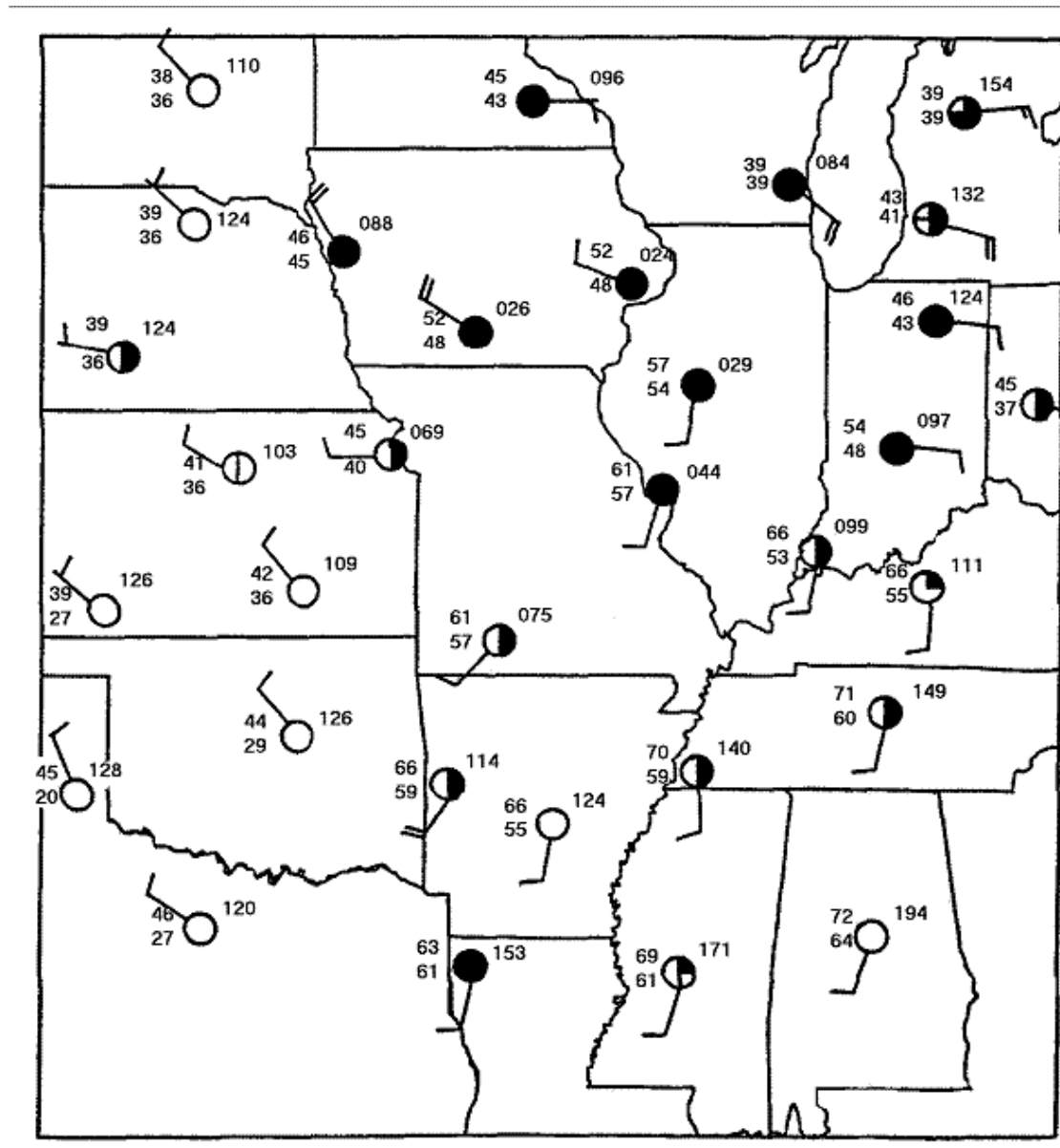
Weather map symbols:

<ol style="list-style-type: none"> 1. cold front; 2. warm front; 3. stationary front; 4. occluded front; 5. surface trough; 6. squall/shear line; 7. dry line; 8. tropical wave <p>Our primary interest below will be 1 and 2 (cold and warm fronts)</p>	
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7. Occasionally, wave cyclones form around a low pressure where both cold and warm air masses circulate around the low (see figure below and Fig. 12.11 of our text). Wave cyclones are the underlying cause of many storm systems in the US or other midlatitude regions of the world. When the Cold front catches up with the warm front an occluded front is formed which is usually the most intense phase of the storm.



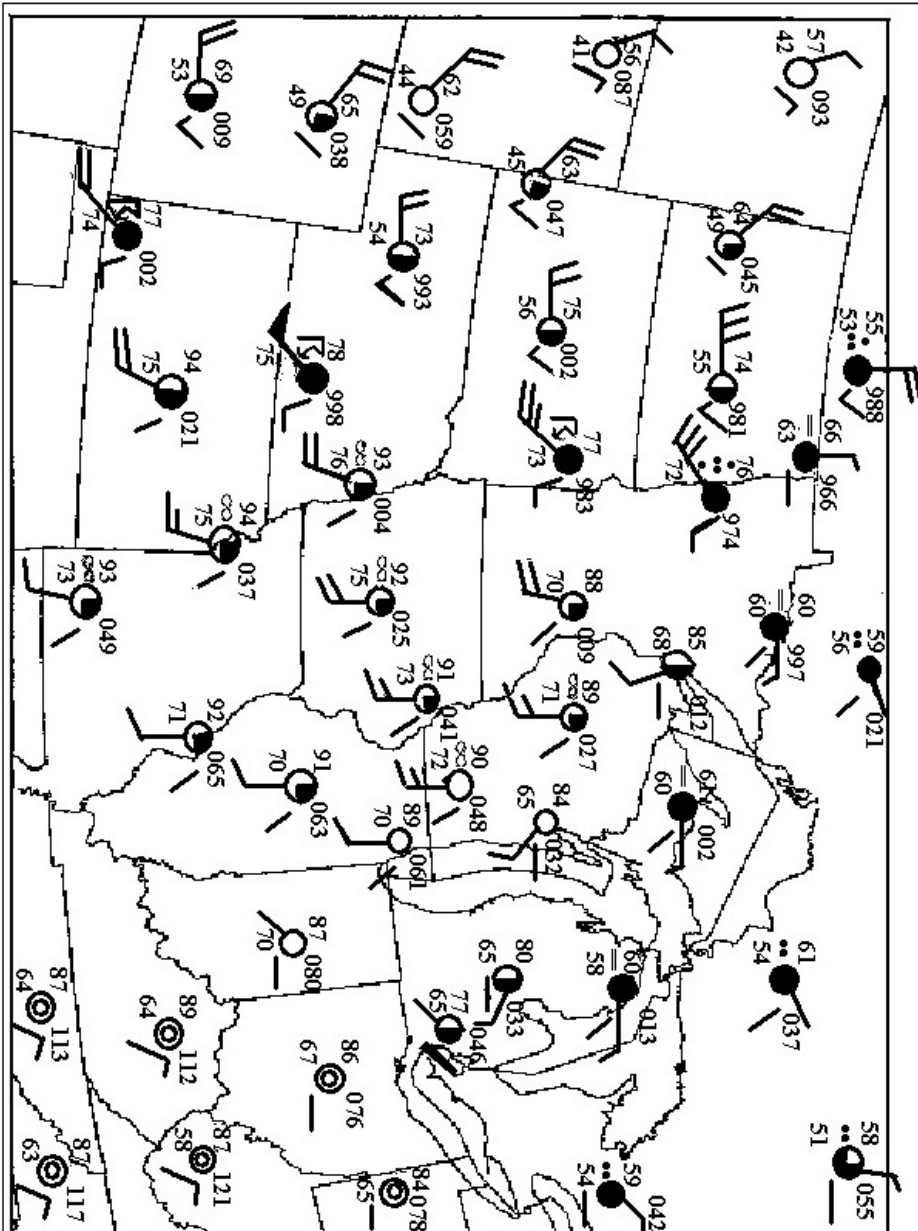


On the figure above..

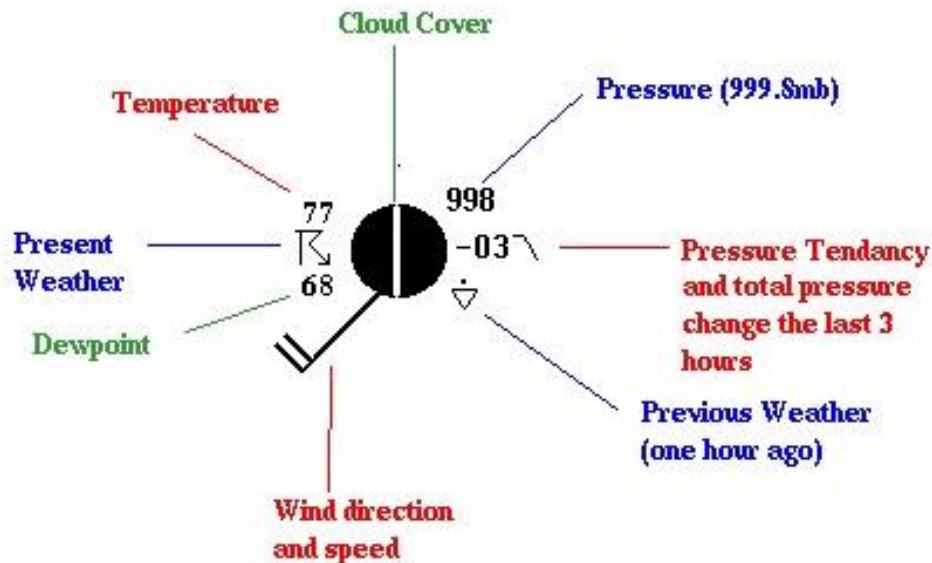
- Identify the lowest pressure with a large L. This will be where the cold front and warm front meet.
- Make a large loop surrounding all stations that show relatively warm air moving from the south or southwest.
- Make a large loop surrounding all stations that show relatively cold air moving from the Northwest or west or southwest.
- Make a large loop surrounding all stations that show relatively cool air moving from the east or Southeast..
- Draw the cold front and warm front suggested by this data.

- On the figure above..
- Identify the lowest pressure with a large L. This will be where the cold front and warm front meet.
 - Make a large loop surrounding all stations that show relatively warm air moving from the south or southwest.

- Make a large loop surrounding all stations that show relatively cold air moving from the Northwest or west or southwest.
- Make a large loop surrounding all stations that show relatively cool air moving from the east or Southeast.
- Draw the cold front and warm front suggested by this data.



Station Model



Temperature in °F (77 °F)

Dew Point in °F (68 °F)

PRESSURE

998: Pressure, to the nearest tenth of a millibar. Add either a 10 or 9 in front based on which would bring the value closer to 1000. The pressure here is 999.8 millibars (mb).

PRESSURE (other examples)

Sea-level pressure is plotted in tenths of millibars (mb), with the leading 10 or 9 omitted. For reference, 1013 mb is equivalent to 29.92 inches of mercury. Below are some sample conversions between plotted and complete sea-level pressure values:

410: 1041.0 mb
 103: 1010.3 mb
 987: 998.7 mb
 872: 987.2 mb

-03: Pressure tendency the last 3 hours, to the nearest tenth of a millibar. The pressure here has fallen .3 mb the last 3 hours

Wind Flag info

50 + 10 + 10 + 5



Wind blowing from the west at 75 knots



Wind blowing from the northeast at 25 knots



Wind blowing from the south at 5 knots



Calm winds

SKY COVER

The amount that the circle at the center of the station plot is filled in reflects the approximate amount that the sky is covered with clouds. Below are the common cloud cover depictions:



Clear



Scattered clouds
(approximately 25% cloud cover)



Partly cloudy
(approximately 50% cloud cover)



Mostly cloudy
(approximately 75% cloud cover)



Overcast





















Sky Obscured

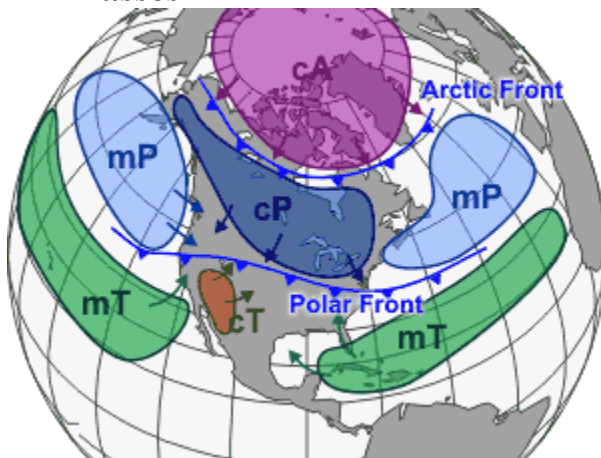


Sky Cover Missing

Present Weather Symbols

			Rain (light,moderate,heavy)
			Snow (light,moderate,heavy)
			Thunder (with rain,snow,no precipitation)
			Shower (rain,snow)
			Drizzle
			Freezing rain, Freezing drizzle
			Ice pellets/Sleet
			Fog (shallow,deep)
			Haze

Air masses



Different air masses which affect North America, as well as other continents, tend to be separated by frontal boundaries. In this illustration, the Arctic front separates Arctic from Polar air masses, while the Polar front separates Polar air from warm air masses. (cA is continental arctic; cP is continental polar; mP is maritime polar; cT is continental tropic; and mT is maritime tropic.)