

GPS Lab

The purpose of this lab is to introduce you to the world of Global Positioning Systems (GPS). GPS enabled devices are able to use satellite signals to find accurate locations on the surface of the earth. These devices will detect the signals from multiple satellites, and by reading the time it takes for the multiple signals to arrive at the receiver, it is able to accurately locate the unit's position in three-dimensional space.

The easiest way to do this lab is with your own phone enabled as a GPS device using an app.

I have tested **the Android app: GPS Essentials**.

I've been advised that for the **iPhone: Coordinates - GPS Formatter**, is said to be a good option.

For either app you will need to first select decimal degrees as your Position Format units.

In **GPS Essentials**,

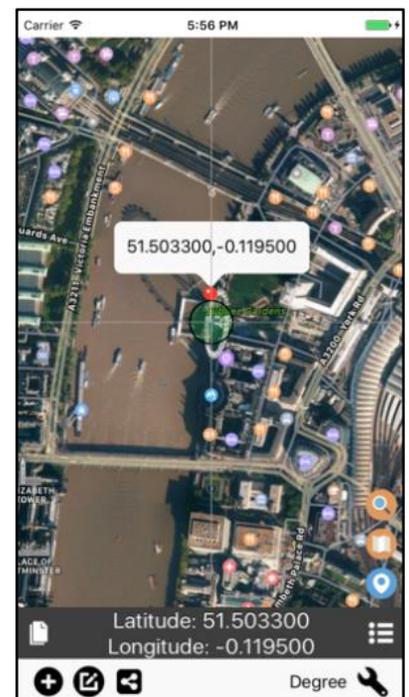
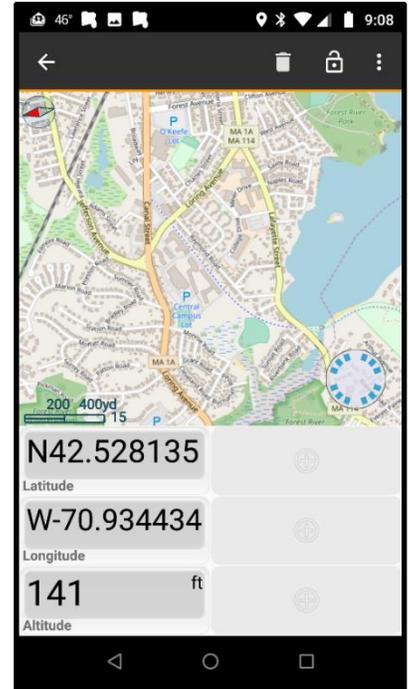
- Go to the 3 wavy lines (top left) and then go to Settings
- Now scroll down to Position Format and select decimal
- From the main screen select Portable Maps. You can zoom in/out of the map as well as scroll in any direction.
- Next you want to add dashboard items. Tap in the white area and it will allow you to select from many different items.
- You should first select Latitude, then Longitude and finally, Altitude. (Note: altitude can be omitted if difficult to configure)

For **Coordinates - GPS Formatter**:

I'm sorry but I have no information about the iPhone app.

This app should operate in a similar fashion to the Android app.

- So first set the positional units to decimal degrees
- Next find the display that shows you Latitude and Longitude. (Note: altitude may be omitted from this assignment)



PART ONE: Find the latitude, longitude and altitude (at arms height – about 4’-0” off the ground) for the following building corners on the Salem State College campus...

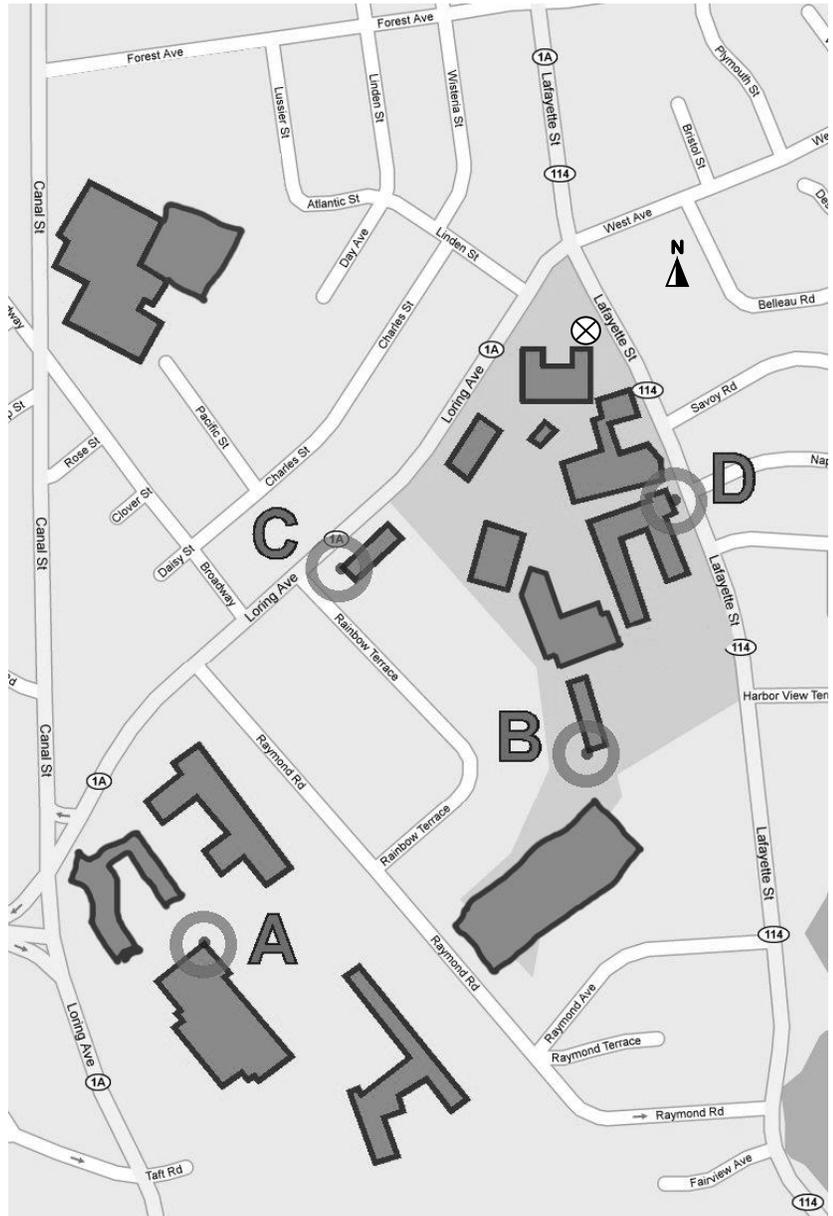
	Latitude	Longitude	Altitude
A – Bookstore			
B – Peabody Hall			
C – Bowditch Hall			
D – Meier Hall (doors)			

PART TWO: Use your GPS unit (and knowledge of how latitude and longitude work) to find the following coordinates on campus. Then describe the item or location of these coordinates.

	Latitude	Longitude
1	N 42.50633	W 070.89588
2	N 42.50537	W 070.89411
3	N 42.50487	W 070.89074

- 1) _____
- 2) _____
- 3) _____

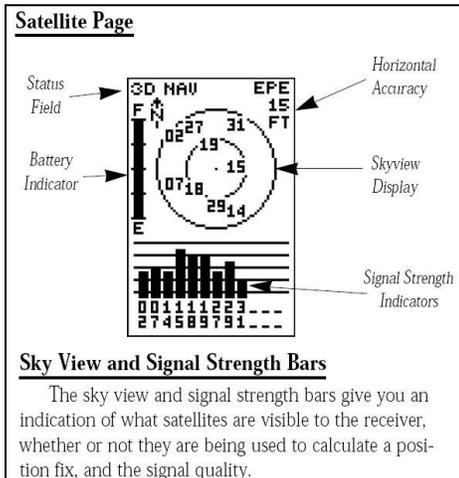
PART THREE: From location #3, walk about 90’ south (hints on map at right). There you will find a very interesting round table/patio. Here you will observe the current weather conditions and construct a simplified **Station Model** from your observations and fact finding (internet resources.) (Note: More info is found on following pages.)



Using the old GPS Units

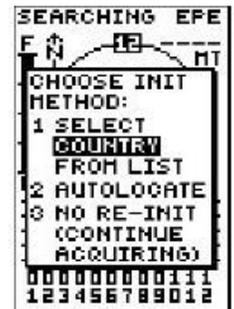
These units are Garmin GPS 12XLs. The main satellite page looks like the image to the left. In order for these units to be as accurate as possible, it is necessary to acquire the signal from the maximum number of satellites. For this reason, it is advisable to begin first by simply holding the unit up, away from too many obstructions such as buildings. Allow the receiver to first find (open boxes) and then acquire (solid boxes) the signal before taking any readings.

You need to set your unit to read out in degrees and decimal degrees. To do this, turn on the unit by pressing the red 'light' button for 1 second. Allow it to startup. It will automatically go to the satellite screen (left). Press <page> until the Main Menu screen appears. Use the arrow buttons to move to Setup Menu and click <enter>. Then select Navigation and hit <enter>. Then select the values under Position Frmt and hit <enter> (only the "h" will be selected). Use the arrow keys (up and down) to select hddd.ddddd° from the menu, hit <enter>. Click <page> <page> <page> and you will return to the satellite page.



To complete our lab today you will need to use two of the GPS screens. The first screen in the satellite page (explained above). Always start here and make sure you have good (at least 3) satellites in the black bars before continuing.

The other screen is the Position page. To get here you need to hit <page> until the screen appears. This will show you the current position in Latitude and Longitude of the unit, as well as the altitude. You will need to determine both the coordinates of certain locations as well as determine what feature is located at specific coordinates.



Other issues:

If the unit displays an error saying that the Memory Battery is Low... this is not a problem... simply hit <page> and continue normally.

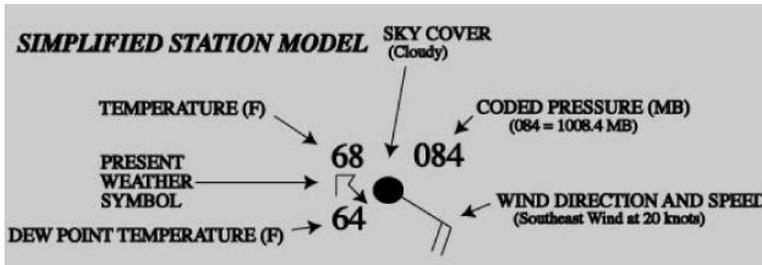
If the unit says it needs you to choose an INIT Method... select Country <enter> (see right), then use the up and down arrow keys to highlight United States MA <enter>.

GPS units can be used for a great many things, we are simply using it today as a method for determining basic location on the surface of the earth.

A **simplified station model** contains the location circle (indicating sky cover), a wind indicator (showing speed and direction), current temperature and barometric pressure, and the dew point temperature.

Some of these are easily found on the web, while others can be deduced while in the field (especially wind direction if you are standing in front of a big compass!)

Here are some helpful resources.



N Total sky cover		
0 No clouds.	3 3/8, or 4 tenths cloud cover.	6 6/8, or 7 to 8 tenths cloud cover.
1 1/8, or 1 tenth cloud cover.	4 4/8, or 5 tenths cloud cover.	7 7/8, or 9 tenths cloud cover.
2 2/8, or 2 to 3 tenths cloud cover.	5 5/8, or 6 tenths cloud cover.	8 Sky completely covered with clouds.

You can **skip** the present weather symbol because there are simply too many to deal with!

The Beaufort Scale

Wind	Symbol	Speed(mph)	Force #	Effect
calm		> 1	0	smoke rises vertically
light air		1-3	1	smoke drifts slightly
light breeze		4-7	2	leaves rustle; wind vane moves
gentle breeze		8-12	3	leaves-constant motion light flag extended
moderate breeze		13-18	4	raises dust and papers; small branches stir
fresh breeze		19-24	5	small trees sway
strong breeze		25-31	6	large branches move; use of umbrella difficult
moderate gale		32-38	7	whole trees in motion
fresh gale		39-46	8	twigs broken off trees; difficult to drive a car
strong gale		47-54	9	slight structure damage occurs
whole gale		55-63	10	trees uprooted; severe structural damage
storm		64-73	11	widespread damage
hurricane		above 75	12	devastation

The Beaufort Scale has unofficially been extended to Force 17 to describe tropical storms exceeding 126 miles per hour

WEATHER SYMBOLS									
00	01	02	03	04	05	06	07	08	09
10	11	12	13	14	15	16	17	18	19
20	21	22	23	24	25	26	27	28	29
30	31	32	33	34	35	36	37	38	39
40	41	42	43	44	45	46	47	48	49
50	51	52	53	54	55	56	57	58	59
60	61	62	63	64	65	66	67	68	69
70	71	72	73	74	75	76	77	78	79
80	81	82	83	84	85	86	87	88	89
90	91	92	93	94	95	96	97	98	99