ES302 Quantitative Methods – Introduction to Tape and Compass Mapping
(updated 2/9/09 – post HSS construction)

Introduction

The most basic tool for a geologist involves mapping and the use of a compass. Brunton compasses are designed as pocket transits for geologists and are equipped with a clinometer, directional compass, and peep sites. The compass is used for measuring bearings while the clinometer is useful for measuring vertical slopes and angles. Your instructor has provided a basic introduction to the compass and potential applications. This exercise involves the use of a map, measuring tape, and Brunton compass to locate positions on the surface of the Earth.

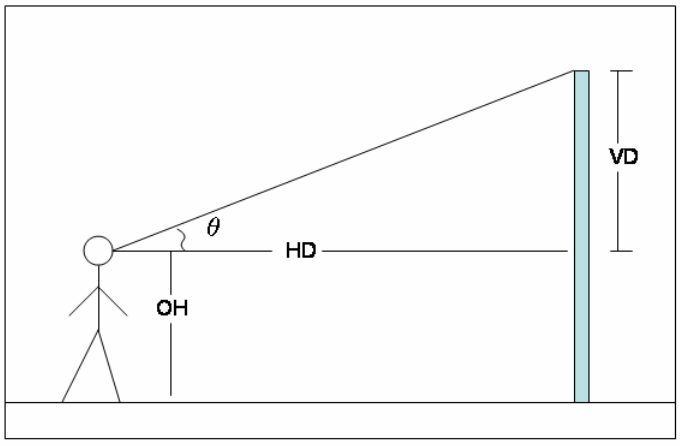
Task 1 – Familiarization with the Compass

Organize the class into working groups of two to three students. You will each be assigned a compass and given a campus map. Each group will also be assigned a tape measure. Re-familiarize yourself with the parts of the Brunton compass including, spotting mirror, peep sights, clinometer, and compass housing. Make sure that your magnetic declination is set properly, as demonstrated by your instructor.

Task 2 – Measuring Heights of Objects

Move your working group and equipment outside the Natural Science Bldg. Your first task is to measure the height of the telephone pole located at the base of the steps, on the southeast entrance to NSB, adjacent to Jackson Street. You will need to know your ocular height (distance from the ground to your eyes), a known horizontal distance from the telephone pole, and the angle of inclination from your eyes to the top of the telephone pole. Collect the data, fill in the table below, and solve for height of the telephone pole using trigonometry.

The trigonometric relations are shown below.



OH = ocular height, VD = vertical distance from eyes to top of object, HD = horizontal distance from eyes to object, θ = angle of inclination between eyes and top of pole:

$$\text{Tan } \theta = VD / HD \qquad \text{Total Height of Object} = OH + VD$$

Ocular Height _____
HD _____
θ _____
VD _____
Total Height _____

Now use the same technique and find the height of the Natural Science Building. Fill in your data in the space provided below.

Task 3 – Tape and Compass Navigating

A series of landmarks around campus have been selected to test your navigating skills. These are mostly objects like lamp posts, signs, notable trees, etc. The distance and azimuth bearings are listed in the table below. The base station (starting point) is the lamp post adjacent to the sidewalk, approximately 10 meters east of the steps at the southeast exit of NSB (facing the old library or new academic services bldg). Using your compass and tape measure, find the landmarks and write a description of the objects in the space provided. In addition, mark the locations of the objects, labeling the stations, on the campus base map provided. Mark the map positions as accurately as possible, you will want to use the map scale, landmarks, and a ruler / protractor to accurately determine your map position. (**HINT**: each station is at some sort of notable point, pole, marker, sign, corner of bldg, etc. If you end up in the middle of a building or lawn, something is wrong!),

Station	**Distance (ft)**	**Azimuth Bearing (deg)**	**Landmark Description**
Starting Pt (base station)	N/A	N/A	Small cedar tree south adjacent to NSB103
1	71	78	_____
2	87	53	_____
3	185.0	356	_____
4	179.0	321	_____
5	152.0	358	_____
6	136.0	290	_____
7	64.0	210	_____
8	161.0	295	_____
9	126.0	145	_____
10	105.0	128	_____
11	114.0	86	_____
12	226.0	170	_____
13	73.0	233	_____
14	114.0	164	_____