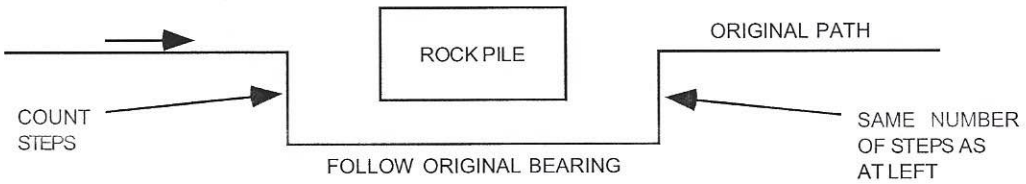
HOW TO FOLLOW A COMPASS BEARING IN THE FIELD

1. Rotate the compass dial until the desired bearing is over the direction of travel arrow.

2. Hold the compass just as you would in taking a bearing, and rotate your whole body around until the red magnetic needle is aligned over the tape arrow.

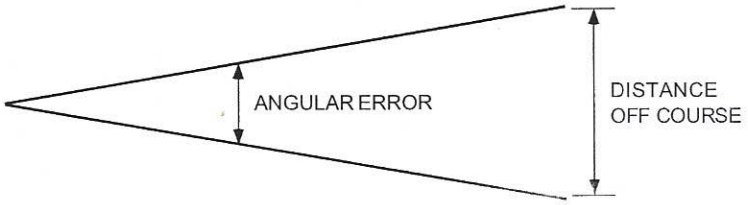
3. Special techniques:

- Distant object method (used in good visibility). Note the most distant, easily recognizable object or landform in the line of sight of the bearing. Put the compass in your pocket and walk toward the landform. Repeat as necessary.
- Reduced visibility method (used in poor visibility, night, white-out). Have one person go ahead to the limit of visibility. Use hand or voice signals to direct that person until aligned exactly on the desired bearing line from you, to be followed. Move the group to this new position. Repeat as necessary.
- Dead reckoning implies the following of a compass bearing (from a known location) at a set speed for a set period of time to deduce your new position. Since errors in both direction and speed are inevitable, you should re-establish (fix) your location at every opportunity. Crossing a stream identified on the map will establish distance traveled. Passing just to right (or left) of a landmark (ridge, knob, rockpile) as expected will verify that you are following the correct bearing.
- Hiking past an obstruction: If you find an obstruction in your way while following a compass bearing, turn 90° to left (or right) and count the number of steps it takes to get past edge of obstruction. Then turn back onto your original bearing. Once past the obstruction, turn back 90° the same number of steps to return to your original path. Then continue on your way. Do not change your compass setting while making this detour. Leave the compass bearing as it is; use the top or bottom edge as a guide for walking 90° away from your original bearing.



4. Angular error: For every degree off course, you will end up nearly 100 feet away from your intended target for each mile you walk. Check the table below for more exact figures.

Angular Error	Offset Distance After 4 Miles
10°	7/10 mi (3700')
5°	1/3 mi (1850')
2°	740' (1½ city blocks)



If you are hiking in a meandering gully or dry stream bed, you can easily keep track of your position. Starting a point A (Figure 18A), you are going due east (90°). Soon you find you are heading at a bearing of 120°. When your compass next shows you are heading at 90°, you know you are at point B.

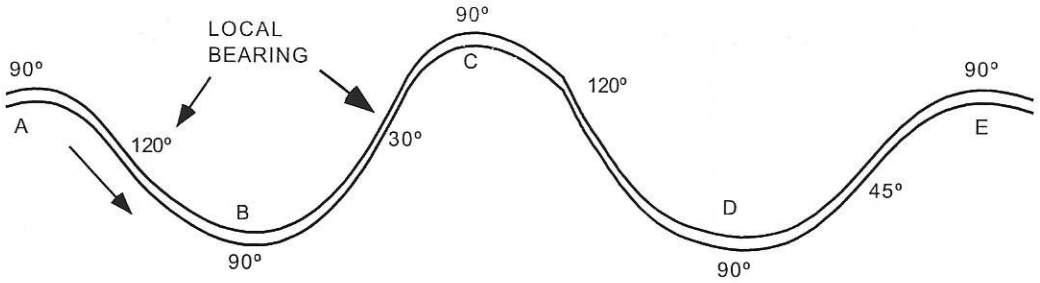


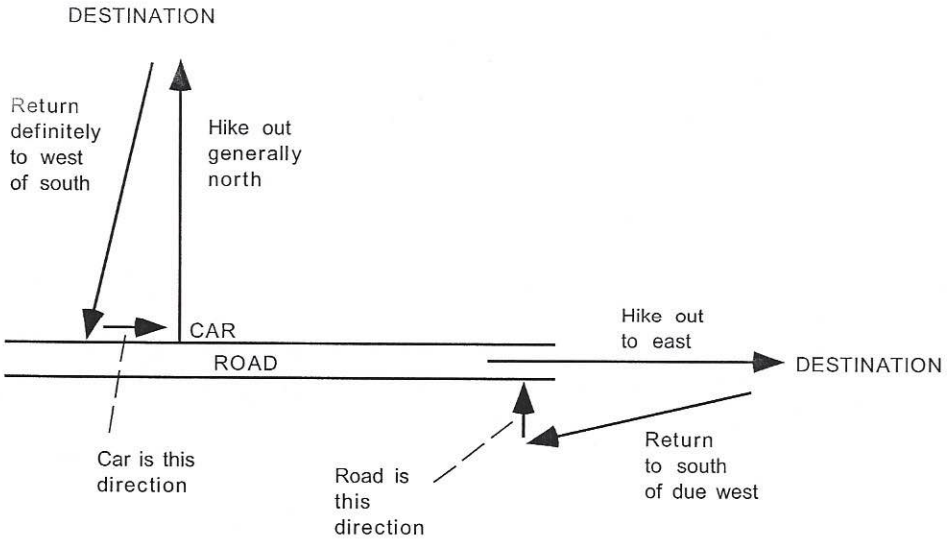
FIGURE 18A.

THE ESSENTIALS OF GETTING BACK

Hikers frequently park along a road, then hike away from the road to a destination. To return to the car, if they try to head directly back, they may reach the road at a location where the car is out of sight. They would then not know whether to go left or right to find the car.

Rather then head directly back to the car, a better choice is to purposely head to one side. Then, when the road is reached, they will know which way to turn to quickly find the car. (See Figure 18B).

A variation of this method is used in locating the end of a road (or trail) where hikers have continued hiking past the end of the road (or trail). Again, hikers should aim to one definite side. Once they are sure they are past the end of the road, they will know which direction to turn to quickly reach the road.



"LINE OF SIGHT" PROFILES

On the trail, it is often impossible to determine whether or not an observed feature is the exact one intended for navigational purposes. The Sierra Nevada Mountains typically provide several excellent features by which one can navigate. It is easy to fall into a trap, however. That is, to use a feature that appears to be visible (by eye) from the point of observation, but which actually is not. The elimination of this trap involves planning. Line of sight profiles should be made of the major features that are to be used for trail navigation. These will be determined from the topo map. A lightly drawn pencil line is made from the feature to be used (peak, pass, saddle) to the trail, at points that might be hourly distances apart. Each profile will then indicate the usefulness of that particular feature at the indicated point on the trail. If the indication is as in Figure 7C, the feature will be usable, but if it appears as in Figures 7D or 7E, it will not be useful. It will be out of the line of sight, hidden by intervening landforms. This is important if the navigational feature is one of a FEW available, or possibly the ONLY ONE available.

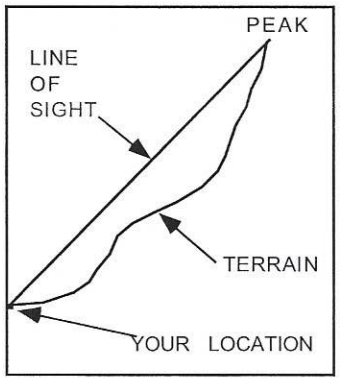


FIGURE 7C.

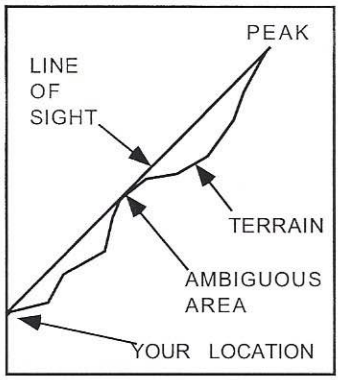


FIGURE 7D.

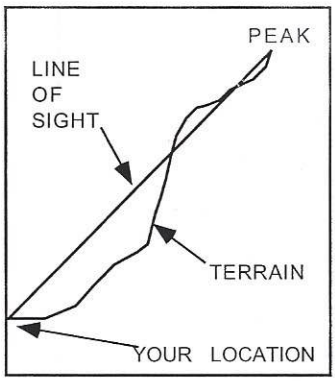


FIGURE 7E.

SLOPE

Slope is a measure of the vertical rise divided by the horizontal distance. A slope of 67% (34°) is called the **angle of repose**. This is the largest angle at which sand or other loose material is stable. A steeper sand hill will slide until it reaches this angle. Trails are generally 20% or less.

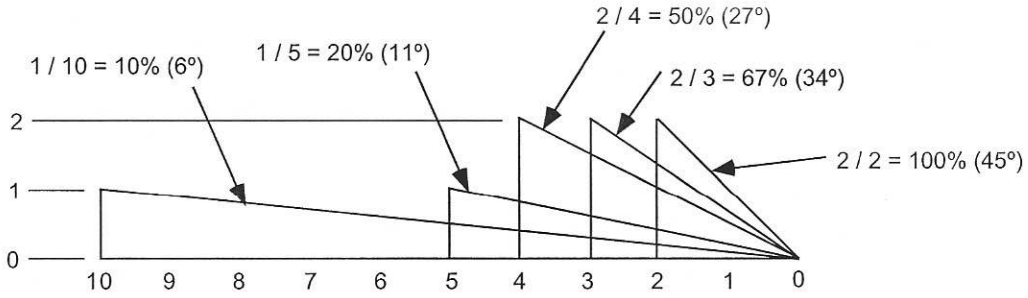


FIGURE 7F.

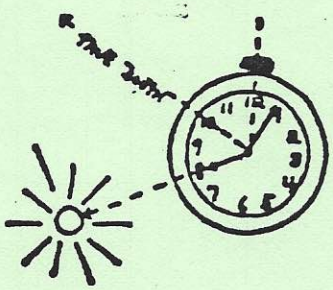
On a 7½-minute map (2000 ft/in or 200 ft per 1/10 inch) with 40' contour interval (200' index contour interval), a 20% slope will be represented by contour lines 1/10" apart and index contour lines 5/10" or 1/2" apart.

Slope	10%	20%	50%	67%	100%
Vertical Distance Between Contour Lines	40'	40'	40'	40'	40'
Horizontal Distance on Ground	400'	200'	80'	60'	40'
Distance on Map Between Contour Lines	1/5"	1/10"	1/25"	0.03"	1/50"
Vertical Distance Between Index Contour Lines	200'	200'	200'	200'	200'
Horizontal Distance on Ground	2000'	1000'	400'	300'	200'
Distance on Map Between Index Contour Lines	1"	1/2"	2/10"	0.15"	1/10"
	Gentle			Very	Steep

SGV 2/22

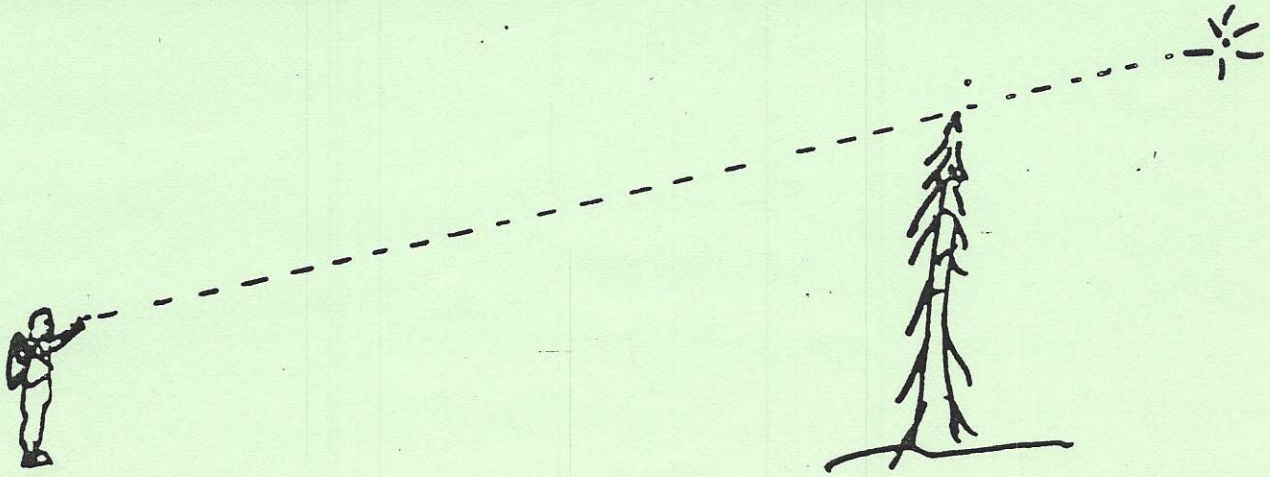
Watch and Compass Tricks

A watch can be used as a makeshift compass or to check a compass which is in doubt. The accuracy of this effort will be within 7½ degrees, depending on where you are in the time zone with respect to its center. The watch must be accurately set to the local, STANDARD time, and the sun must be shining brightly enough to cast a clear shadow. Lay the watch flat, face up, with the hour hand pointed directly at the sun. This can be verified by placing a small twig or pine needle at the edge of the watch, vertically, so that the shadow cast by the sun falls exactly along the hour hand. At this time, true South is the direction of a line drawn between the hour hand and the "12", on the side of the shorter arc. See the diagram below. The reverse process can be used to set a watch if the need should arise. Determine accurately as possible the direction of South with the compass. Using the shadow method as described above to keep the hour hand pointed at the sun, adjust the watch until South is on the line between the hour hand and "12". The watch will then be set to within a few minutes of local STANDARD time.



Checking Compass By the Stars

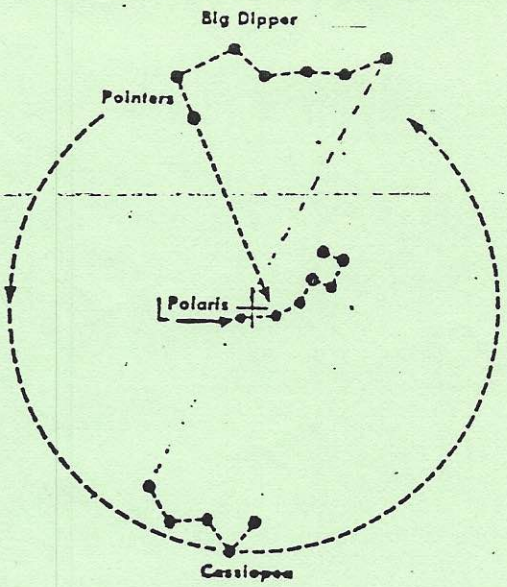
If you feel the need to check your compass at night, you can use the stars. Stand in a position such that the star you intend to use (Polaris, belt of Orion, etc.) is lined up with some natural feature such as a tree top. Then take a compass bearing on this natural feature. It should be much easier than trying to take a bearing on the star directly. See the diagram below.



SGV 2/22

Direction from Polaris

In the Northern Hemisphere one star, Polaris (the Pole Star), is never more than approximately 1° from the Celestial North Pole. In other words, the line from any observer in the Northern Hemisphere to the Pole Star is never more than one degree away from true north. We find the Pole Star by locating the Big Dipper or Cassiopea, two groups of stars which are very close to the Celestial North Pole. The two stars on the outer edge of the Big Dipper are called pointers, as they point almost directly to Polaris. If the pointers are obscured by clouds, Polaris can be identified by its relationship to the constellation Cassiopea. The illustration indicates the relation between the Big Dipper, Polaris, and Cassiopea. See Fig. 1



RELATIONSHIP OF POLARIS TO THE BIG DIPPER AND CASSIOPEA

Fig. 1

Direction from Orion

The constellation of Orion consists of seven stars. The three close together are called the Belt of Orion. The star through which the north-south line on the diagram passes is exactly on the Celestial Equator. No matter where on earth you are, this star rises due east of you and sets due west. See Fig. 2

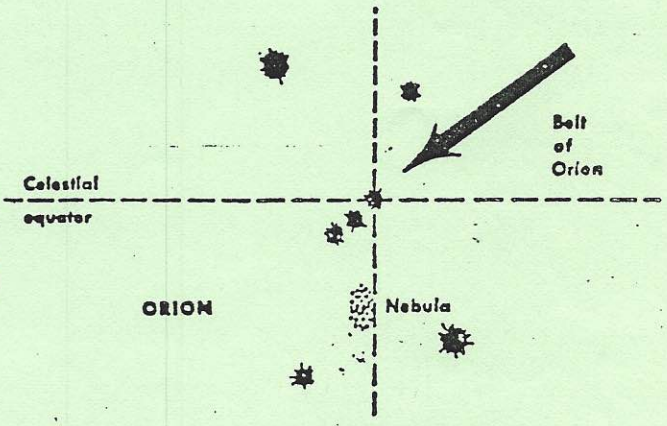
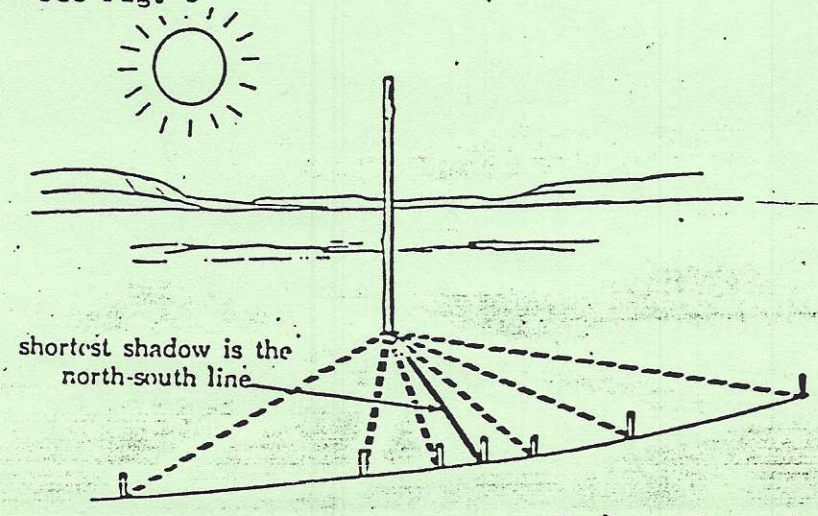


Fig 2

Direction from the Sun

Put up a stick in a level place. Begin marking the end of the stick's shadow. You will probably have to estimate the position of the shortest shadow. The line of the shortest shadow is also the line of the local meridian or north-south line. Whether the sun is north or south of you at midday will depend on your latitude. North of 23.4° N, the sun will always be due south at local noon; and the shadow will point north. See Fig. 3



Stick and Shadow Method of Determining Direction