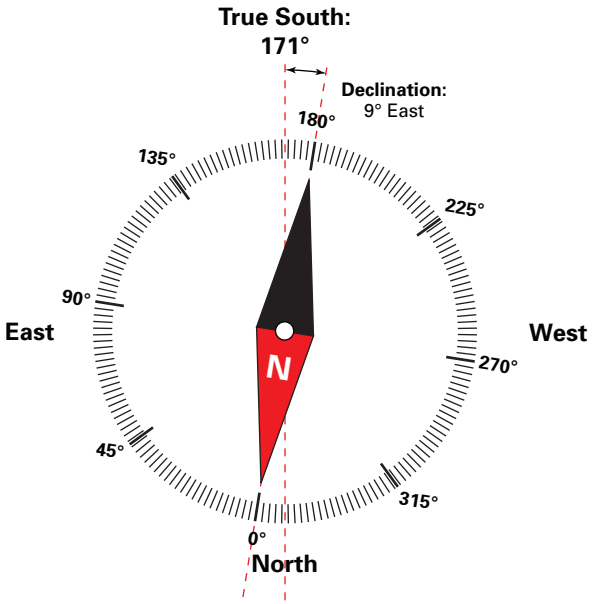
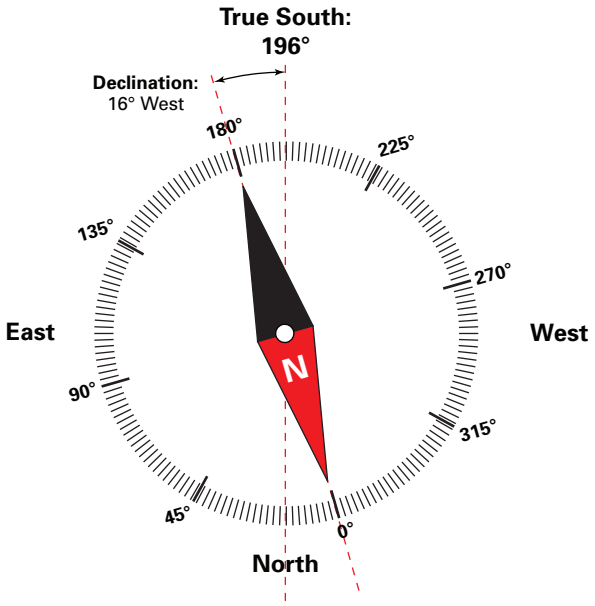
Finding True South

When you're siting your PV system or your passive solar house, accounting for magnetic declination can help optimize performance.





In the Northern Hemisphere, stationary PV arrays and the long side of passive-solar designed homes are oriented south to maximize solar gain. But using your compass to find south will only give you an indication of magnetic south—not true south. In the Northern Hemisphere, a compass needle aligns itself along the magnetic north-south line. In most cases, solar thermal and PV systems should be oriented to "true" or "solar" south ("geographic" south), so you'll need to account for magnetic declination—the angular difference between true and magnetic north.

The main cause for this discrepancy is the Earth's nonuniform, conductive, fluid outer core that consists mainly of iron and nickel. This layer pulls your compass needle away from true north/south. Depending upon your location on the planet, the "pull" varies in strength and direction.

The magnetic declination is an east or west correction that is either subtracted or added to your magnetic south compass reading. If you know your latitude and longitude, or your zip code, you can find the magnetic declination for your site at the National Geophysical Data Center's Web site: www.ngdc.noaa.gov/geomagmodels/Declination.jsp.

Let's say our PV system is in an area near Santa Fe, New Mexico. We find that the magnetic declination for this region is listed as 9°, 15′ east. (To make things easier, round this value to the nearest whole degree value, which in this case is 9° east. Because there are 60 minutes per degree, if the minute value is above 30, then we would round up. But since our minute value is less than 30, we round down.) This means that true south is 9° east of magnetic south. If our compass needle is aligned so that north points to 0°/360° on the compass and the south points to 180°, then true south will be at 171° (180° – 9°).

Portland, Maine, has a declination of 15°, 57′ west (which can be rounded up to 16° west). Here, true south is 16° west of magnetic south, or indicated by the 196° compass bearing (180° + 16°).

Depending on what resource you use to find magnetic declination values, they may or may not give the direction east or west, but provide either positive or negative values. Positive values have eastern declinations and negative values have western declinations. For example, if your area's declination is listed as -12°, then you know that your magnetic declination is 12° west. Conversely, if your locale's declination is 12°, then you know your magnetic declination is 12° east.

—Justine Sanchez