# Sub-meter Position Accuracy With Garmin Handheld GPS Units

## (Real Accuracy, Real Cheap)

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## Abstract

GPS has provided a means to easily determine the approximate geographic location. Consumer grade GPS units, costing less than $150, now have typical accuracy of 15 meters (49 feet). Dedicated survey GPS systems costing $5,000 to $10,000 can achieve accuracies of a few millimeters. In the past year it has become possible to increase the accuracy of certain Garmin GPS models by an order of magnitude and achieve sub-meter accuracy. This is accomplished by obtaining and then post processing the data stream received by the Garmin GPS. Data is collected on a laptop computer in the field, converted to a standard RINEX format and later post processed using data collected at a reference GPS station. The reference data is readily available from a network of continuously operating reference stations. This is similar to post-processing differential GPS but uses additional signal phase data to achieve a much higher accuracy. Several commercial programs are available to perform the position calculations. One, GeoGenius 2000, is available in a basic configuration suitable for performing the required calculations for free.