For clarity, the following notation will be used:

\begin{center}

$\bold{b\_i}$ is a base GPS reading, $[latitude, longitude]$, with a set of reading denoted as

$\bold{B} = [\bold{b\_1} ... \bold{b\_n}]^\bold{T}$

$\bold{r\_i}$ is a base GPS reading, $[latitude, longitude]$, with a set of reading denoted as

$\bold{R} = [\bold{r\_1} ... \bold{r\_n}]^\bold{T}$

$\bold{\overline{b}}$ is the average base location, $[\overline{latitude}, \overline{longitude}]$

$\bold{e\_i}$ is the difference between the base reading $\bold{b\_i}$ and the average base location, $\bold{\overline{b}}$ : $\bold{e\_i} = \bold{b\_i} - \bold{\overline{b}}$

$\bold{r\_{i,c}}$ is a corrected roaming reading $\bold{r\_{i,c}} = \bold{r\_i} - \bold{\overline{e\_i}}$

$u\_i$ is the great circle distance between the average base location, $\bold{\overline{b}}$ and an uncorrected roaming reading $\bold{r\_i}$. This can also be denoted as $greatCircle(r\_i, \overline{b})$

$c\_i$ is the great circle distance between the average base location, $\bold{\overline{b}}$ and a corrected roaming reading $\bold{r\_{i,c}}$

\end{center}

\subsubsection{Internal altitude calculation}

In order for altitude to be calculated, the Barometric input register must be programmed with the test conditions ambient pressure, either at sea level for the absolute altitude, or the pressure on the runway to measure relative altitude. If the project is adapted to include a real time display, this register would have be be programmed to get true altitude, which adds complexity as some input method would have to be made. However, by knowing the difference between air pressure at ground level and 15m or by waiting for the altitude, no matter what the value, to change by 15m, this complexity can be avoided.

In order to get a receivers location using GPS, 4 satellites must be in line of sight of it. These satellites have atomic clocks on board and this time, as well as the location of the satellite in space, is transmitted using radio-waves. When picked up by the receiver, it compares the received time to its internal time and the difference is the time it took to for the signal to reach the receiver. Knowing that the signal travels at the speed of light, the distance from the satellites can be calculated and the knowing the distance to 3 satellites can give location in 2D using trilateration. 4 satellites allow altitude to also be calculated.