Lab 4 – GPS Receiver Processing

Due: 12/2/2015

This lab utilizes the Nordnav IF data

Part I: Acquisition

Write software to acquire GPS satellites from the sampled IF data

a) Provide a 3D plot of the autocorrelation vs. code phase and Doppler for SV #4 using 1 ms of data

b) Repeat part a) with 10 ms of data. How does the performance improve or degrade. Repeat with the next 10 ms of data.

c) Add random noise with a 1σ=6 and 1σ=12. Can you acquire the SV with 1 ms of data? What about with more data?

d) (Optional) Using information from Part II, remove the databit(s) and repeat part a) over 40 ms set of data and compare the results.

Part II: Tracking

Write software to track the GPS signal and decode the data message

a) Decode the data bits for SV#4. What is the zcount following the first preamble?

b) Calculate the delta psuedorange between SV #4 and SV #17.

c) Plot the Doppler and carrier measurement vs. time for SV #4

d) How much noise can you add to the IF and still track the GPS signal? How does this compare to the noise value to which you could acquire the satellite?

e) (Optional) Calculate the delta psuedorange from SV #4 and at least 3 additional SVs to compute the position and receiver clock offset. Using that time calculate the psuedorange for the 4 SVs. How does your position solution and psuedoranges compare to the Novatel.