

Two waveform types are used. The first is a conventional direct sequence spread spectrum signal with pseudorandom BPSK modulation at a rate of 1.023 MHz, filtered so that the total bandwidth is 4.092 MHz. The second waveform type is a frequency hopping signal, with a total necessary bandwidth of 5.00 MHz. Within this bandwidth, the spectrum is divided into channels of adjustable width between 5 and 200 kHz, and modulated narrowband waveforms are transmitted hopping across a pseudorandom sequence of channels. The hop rate is adjustable between 30 and 3000 hops/second. The modulation of the narrowband waveforms is selected so that (a) the occupied bandwidth of each individual hop is less than the channel width, and (b) the data required for navigation can be carried in the desired number of hops. The use of adjustable channel widths, hop rates, and modulations is necessary to determine the effects of changes in these parameters on the achievable navigation accuracy.