

# **Accuracy of Electronic Navigation**

by

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The most accurate electronic fix is from the Global Positioning System (GPS) augmented with the Wide Area Augmentation System (WAAS) correction signal. Accuracy of WAAS is 2 to 3 meters horizontal, 95% of the time in accordance with the Federal Radio Navigation Plan, FRS paragraph 3.2.2.3.B. Coverage area is throughout the 48 contiguous states, Hawaii, Puerto Rico and most of Alaska (except for the Alaskan peninsula west of longitude 160 degrees west or outside the GEO satellite broadcast area). WAAS was developed for the Federal Aviation Administration.

A slightly less accurate electronic fix is from the Global Positioning System with Differential GPS (DGPS) correction signal. Accuracy of DGPS is 10 meters or better, 2 drms (95% of the time) in accordance with the Federal Radio Navigation Plan, FRS paragraph 3.2.2.1.B. Coverage area is a minimum of 20 nm from shore of the continental U.S., selected portions of Hawaii, Alaska, and Puerto Rico, and inland coverage of the majority of inland rivers. DGPS was developed, before WAAS, for the United States Coast Guard.

The accuracy of Global Positioning Systems, Standard Positioning System (SPS) fix, with Selective Availability (SA) disabled, is 13 meters horizontal, 22 meters vertical and time within 40 nanoseconds, 95% of the time according to the Federal Radio Navigation Plan, FRS paragraph 3.2.1.B. Coverage area is worldwide. Selective Availability was turned-off on 1 May 2000.

The accuracy of a modern recreational marine Radar is bearing to within plus or minus one degree and range to within 22 meters. Bearing accuracy, thanks to digital signal processing, is better than it's antenna beam width.

When SA was enabled, the accuracy of Global Positioning Systems fix was 100 meters, 95% of the time. Selective Availability deliberately degraded the accuracy of the transmitted SPS signal.

The absolute accuracy of Loran-C fix is 0.25 nm (approximately 400 meters) or better, 2 drms (95% of the time). The repeatable accuracy (returning to the same Loran-C location) is usually between 18 and 90 meters. Coverage of the U.S. Loran-C system is: U.S. Coastal waters and the conterminous 48 states, the Great Lakes, the Gulf of Alaska, the Aleutians, and the Bearing Sea. Other nations provide additional Loran-C coverage.

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