

# CONVERSION

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## Guest Columnist

## Stop dithering with GPS

by Robert K. Tendler

At a time when massive military expenditures are coming to an end for DOD contractors, there is one shining commercial spin-off to an otherwise totally military oriented activity. It is the Global Position Satellite (GPS) system, which now incorporates 26 satellites orbiting the earth to provide relatively accurate terrestrial position information to users around the globe.

The system was put up by the Air Force to assist in military maneuvers by providing of exact position location to an accuracy of at least plus or minus 20 meters.

But despite the millions spent on the GPS system, including its original engineering by the Rockwell Corp., the commercial spin-off applications of the system are in grave danger.

The reason is due to Selective Availability (S/A) in which the Department of Defense intentionally degrades the signal from the satellites such that an accuracy no greater than 100 meters or approximately 300 feet is obtainable. The dithering is accomplished by scrambling the pseudo range code transmitted by the satellites, which is essential to the position calculation.

DOD supposedly degrades the signal to prevent incoming Russian missiles from getting to within 100 yards of missile silos. With the demise of the Soviet Union and the concurrent threat reduction, it is apparent to all but DOD that selective availability should be shut off permanently.

It is interesting to note that if one were to instead rely on Russian GPS satellites, then all that would be necessary would be to tune the receiver to the frequency associated with the Russian satellites.

Secondly, the effect of S/A can be immediately removed by what is known as differential GPS, in which a local beacon broadcasts the correction factors to those within range.

Correction factors are determined by knowing the exact position of the beacon and adjusting the pseudo range code so that the difference in instantaneous position and exact position is transmitted as an error signal.

Since the "enemies" of the U.S. can easily generate this

error signal (Magnevox sells such a beacon) the efficacy of S/A is in question. While the absurdities of maintaining selective availability abound — especially in the post cold war era — DOD is considering turning off S/A in favor of a local jamming signal provided around strategic targets.

If this is the solution, then the commercial applications for the GPS system will flourish. First and foremost, emergency signalling will offer rescuers pinpoint location accuracy for the location of accidents, stolen cars and other emergency problems to within the originally designed 20 meters or 60 feet. But with differential GPS, there would be as much as plus or minus 2 meter accuracy.

While emergency services can cope with less precise GPS systems, vehicle tracking and on-board mapping can deal quite nicely with a 20-meter accuracy, assuming that S/A is turned off.

### GPS could get cheaper

Turning S/A off opens a whole host of inexpensive commercial GPS applications. If DOD turns off S/A, taxpayers will be able to use the system they paid for.

And by turning off S/A, cartographers will be able to map areas of the world that lack accurate maps. For instance, charts in the Bahamas are often off by more than two miles due to the inaccuracy of Admiralty Charts, some of which were generated in the last century.

Eliminating S/A will also immediately increase the safety associated with marine use of the GPS system, which is popular with recreational boaters and sailors — and at an extremely reasonable price. In fact the street price of a non-differential GPS has already come down to under \$350, with boaters buying up GPS receivers in droves.

By switching off selective availability, the government could do an extremely good service to boaters and the community at large. At the same time it would aid conversion from military to commercial use for an important former military technology.

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