



RTK GPS Differential Correction Services

10 January, 2005

Global Positioning System (GPS) applications that require consistent accuracy of less than six inches in mobile equipment need a commercial differential connection service, according to John Nowatzki, extension geospatial Specialist. Normal civilian GPS positions are accurate to about thirty feet, and free differential correction services are accurate to approximately three feet. In order to get consistent GPS positions within a few inches, users must subscribe to a commercial GPS differential correction service.

Real-time Kinematic (RTK) differential correction refers to Global Positioning System (GPS) locations that are accurate to within a few inches. Commercial companies that supply GPS differential correction services often use the terms of centimeter and decimeter (10 centimeters) accuracies. Nowatzki says these precise GPS differential correction services are used for agricultural equipment auto-steering systems and can also be used for most other GPS applications in agriculture. The highly accurate GPS differential correction services use base stations with known locations to measure GPS position errors and geosynchronous satellites to deliver the corrections to receivers in mobile agriculture equipment.

There are several nation-wide commercial companies that sell differential correction services in the United States including Omnistar and John Deere. Both Omnistar and John Deere provide two accuracy-levels of GPS differential correction services. Other agricultural equipment companies also provide GPS differential correction services but they cooperate with Omnistar to supply their services.

Omnistar offers OmniSTAR VBS and OmniSTAR HP. OmniSTAR VBS, available for an annual subscription cost of \$800, is a "sub-meter" level of service. OmniSTAR HP service is available for an annual subscription cost of \$1,500, will usually have a horizontal error of less than 15 centimeters. It operates without the need for local base stations.

John Deere offers two levels of accuracy available with their StarFire™ GPS system: Starfire 1 and Starfire 2. Starfire 1, available without additional subscription cost to John Deere customers, has an accuracy of 13 inches. Starfire 2, available for an annual subscription cost of \$1,500, is accurate to \pm 4 inches. StarFire RTK is designed to be used with John Deere GPS equipment. The StarFire RTK system consists of a local base station that transmits corrections to the vehicle StarFire receiver using radios. The StarFire receiver on the RTK-equipped vehicle must have a direct line of sight with the base station in order to receive the RTK signal. At distances beyond six miles, accuracy and reliability of the signal will be degraded. A repeater is available from John Deere that can be used to extend the base station signal around obstructions such as hills or tree lines.

The Rural Tower Network, a regional GPS differential correction service is available in the Red River Valley area of North Dakota and Minnesota. The Rural Tower Network differential connection service is available for an annual subscription cost of \$1,500 plus a one-time fee of \$2,500. This service uses a series of local base stations and is accurate to \pm 4 inches.

More information about geospatial technology is available from the NDSU Agriculture and Biosystems Engineering Department Web site at <http://www.ageng.ndsu.nodak.edu>. Follow the links to Extension Programs and Geospatial Technology Education.