NDSU Extension
Geospatial Education Program

Choosing a GPS Receiver for Mobile Agricultural Applications

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How do you decide which Global Positioning System (GPS) receiver to buy for agricultural GPS applications? There are several companies selling GPS receivers and most companies have several model. One way to help sort through the many selections is to keep in mind the intended uses for GPS, according to John Nowatzki, NDSU extension geospatial specialist. The most common use farmers make of GPS today is equipment guidance, but there are other GPS applications on farms today such as yield monitoring, variable rate crop input applications, marking field boundaries and soil test locations. Each application requires certain features so if you intend to use a GPS receiver for more than one purpose it is important to consider the requirements for each application.

GPS is used as a guidance system on tractors and other farm equipment in two ways, one system requires the operator to monitor a position display and manually steer the vehicle, the second system, called auto-steer, is connected directly to the steerage mechanism and automatically steers the equipment. Both systems required frequent position updates because the vehicle is moving. How often the GPS position is re-calculated is referred to as frequency. A standard measure of frequency is Hertz, abbreviated Hz. It means "cycles per second." If the GPS receiver is listed as 5 Hertz that means it re-calculates its position 5 times per second. Guidance systems require GPS receivers with at least 1 Hertz. If the equipment is used for row crop planting or cultivation the GPS receiver needs to have higher frequency.

The other relevant frequency feature is single verses dual frequency. GPS satellites, called NAVSTAR satellites, continually broadcast on two frequencies. The standard positioning service (SPS) is the standard level of positioning and timing broadcast on one frequency (L1), and is available continuously to any user worldwide. Precise positioning service (PPS) is the most accurate level of positioning and timing broadcast on a second frequency (L2), and is also available continuously, but only to authorized US and foreign governments and eligible civil users. Dual frequency GPS receivers are more accurate than single frequency receivers and are more suitable to mobile GPS applications.

The frequency of position update is not so critical for the other common GPS applications in agriculture such as yield monitoring and variable rate application.

Another factor to consider is the differential correction signal the GPS receiver is capable of receiving. There are several correction signals available including WAAS, USCG Beacon, Omnistar, and Starfire. GPS receivers capable of receiving more types of correction signals are more versatile. Currently, John Deere only makes their Starfire signal available to John Deere receivers.

GPS receivers should be capable of connecting to portable computers for real-time GIS use. GPS receivers connect to handheld computers (PDA's) and tablet computers with either serial or USB connections. Real-time GIS is used for marking field boundaries ad other locations.

More information is available on at the NDSU Ag & Biosystems Engineering Department website at www.ageng.ndsu.nodak.edu/.