

TIMELY INFORMATION

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Using GPS as a Source for Ground Speed Radar Inputs

Introduction

Ground speed is a central input variable for agricultural equipment and technology to function properly. Ground speed is used as feedback control to maintain the desired field speed for equipment or as an input variable to controllers for maintaining the desired application rate of pesticides, fertilizers, seed, and other inputs. In the past, some systems used transmission speed to determine ground speed but often, due to tire slip, this method can produce inaccurate measurements. Ground speed has been measured using what is commonly called a **ground speed radar** (Fig. 1), which operates based on the Doppler Effect. The time interval from when the radar signal was transmitted to when it is reflected is used to compute the true ground speed. However, a common issue with these type speed sensors is vegetation and crop movement again causing inaccurate readings. The use of GPS receivers to provide ground speed measurements eliminates this miscalculation and has become a method of providing ground speed for agricultural equipment and technology. The intent of this publication is to outline companies which provide technology to convert GPS determined ground speed into simulated pulse output to replace ground speed radar.



Figure 1. Example ground speed radar mounted on a tractor (left) versus GPS receiver (right) providing simulated ground speed radar output.

GPS receivers output data using the NMEA (National Marine Electronics Association) standard data transmission protocol. Within the GPS data, ground speed is reported as a numerical value which causes an issue for equipment or technology expecting a pulse output for speed measurements. Recently, GPS receiver and guidance system manufacturers began converting the numeric speed into a pulse output essentially simulating the output of a ground speed radar. Typically a cable is required to communicate between the GPS receiver or guidance system and the necessary input connection on equipment or technology. Ground speed provided by GPS systems is usually accurate and can be used over a range of speeds typical of field operations. **When choosing one of these GPS based systems, please check with the manufacturer for the proper cable(s) needed for your existing equipment or technology.**

Disclaimer

The mention of trade names and commercial products is for informational purposes and does not necessarily imply endorsement by Auburn University or the Alabama Cooperative Extension System.

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Available Systems and Technology

The following table provides a *partial* list of companies providing GPS receivers or guidance systems capable of providing ground speed radar output (last updated July 2009).

Manufacturer	Product Name	Output Connection	Website
John Deere	StarFire™ iTC	RS232	1
	StarFire™ 300	RS232	
Ag Express	GVS	4 pin	2
Ag Leader	GPS 1000 Plus	RS232	3
	GPS 1500	RS232	
	GPS 5100	RS232	
Teejet / Mid-Tech	CenterLine 220	(adapter cable required)	4
	GPS Speed Sensor	(adapter cable required)	
Raven	Phoenix 300	RS232	5
	Invicta 210	(adapter cable required)	
	Invicta 310	(adapter cable required)	
Hemisphere GPS	A100 Smart Antenna	RS232	6
Rawson	ACCU-SPEED	4 pin	7
DICKEY-john	iSpeed	(adapter cable required)	8
	AgGPS 262	RS232	
Trimble	AgGPS 162	RS232	9
	Ag GPS Autopilot	RS232	
	EZ-Guide 250	(adapter cable required)	
	EZ-Guide 500	(adapter cable required)	

Related Websites

1	www.deere.com	4	www.teejet.com	7	www.rawsoncontrol.com
2	www.agexpress.com	5	www.ravenprecision.com	8	www.dickey-john.com
3	www.agleader.com	6	www.hemispheregps.com	9	www.trimble.com